Scientists as Activists: The Psychology of Identity, Morality, and Collective Action in the Climate Crisis

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Abstract

Amidst the climate and ecological crisis, this thesis investigates the psychological drivers of environmental activism. Spanning five papers, it examines the interplay of identity and moral processes driving pro-environmental activism, utilising surveys, interviews, and fieldwork. Paper 1 details how expansive moral and self-concepts are associated with increased identification as environmental activists and activism. Reflecting scientists' rising prominence in environmental movements, subsequent papers scrutinise the scientist identity's impact on activism. Paper 2 used mixed methods with a multinational sample of 329 scientists from 41 countries to show that scientist identity content—particularly perceiving science and activism as harmonious—predicts engagement more strongly than mere strength of identification as a scientist. Viewing environmental stewardship as a scientific duty and believing objectivity remains uncompromised by activism correlated with greater activist involvement, underscoring the importance of "scientist-activist compatibilism." Paper 3 employs critical discursive analysis to explore the ideological dilemma scientist-activists face, revealing two core strategies to reconcile traditional scientific values with the urgency of the climate crisis: redefining the scientist identity and reframing scientific work. Scientists adopt subject positions that legitimise activism, portraying it as objective, rational, and ultimately an extension of a moral duty to advocate for evidence-based solutions. Paper 4 addresses the uncertainty stemming from the climate and ecological crisis by examining how scientists construct the future along a continuum from collapse to transformation. Drawing on a critical discursive analysis, it shows how talk of an inevitable future narrows perceived solutions, while more open, transformable framings highlight human agency and invite broader strategies—from collective action to technological innovation. Paper 5 presents an ethnographic study of scientist-activists, documenting how symbols of scientific authority (notably the lab-coat) are repurposed as instruments of protest and revealing the emotional, practical, and identity-related

challenges encountered at the nexus of research and civil disobedience. Collectively, these studies address the pivotal question of what motivates individuals to confront the climate and ecological crisis. The findings underscore the significance of identity and moral processes in shaping environmental activism, offering insights into the psychological dimensions of climate action and potential pathways to effect meaningful change.

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Dedication

I dedicate this to my son Hugo, who has brought immeasurable joy and purpose into my life.

Declaration

I declare that this thesis is my own work completed solely by myself under the supervision of Prof. Mark Levine and Dr. Jared Piazza. It has not been submitted in substantially the same form for the award of a higher degree elsewhere.

Signed: Samuel Finnerty

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Statement of Authorship

Paper 1 – Finnerty, S., Piazza, J., & Levine, M. Self and Morality: Expansive Perspectives and Environmental Activism. ***Manuscript Reviewed.*** ***https://osf.io/am5nk_v1***

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Reflexivity Statement

Personal Reflexivity

I am conscious of the values and convictions that guide my research. I recognise the seriousness of climate change and biodiversity loss as a global crisis. I endorse activism as a vital and legitimate response to this emergency. My intellectual curiosity about human intention and behaviour, coupled with my commitment to environmental issues, directed my focus toward social psychology to explore the psychological mechanisms behind pro-environmental behaviours.

Central to my research is an ethnographic approach, drawing on my anthropological background, to gain a fuller understanding of environmental activism. This requires me to be both observer (see Figure 1.1) and participant (see Figure 1.2). My lived experience as an activist complemented my survey and interview research, providing firsthand insights into the motivations, challenges, and dynamics of environmental activism. It allowed me to empathise with research participants and to understand the activist community from an insider's perspective. However, I am mindful of the need to critically examine these experiences rather than allowing them to unilaterally guide my conclusions, overshadowing the rigour of my work.

Various strategies were employed to enhance the rigour and credibility of this research. Firstly, to ensure a comprehensive understanding of environmental activism, my research employed a triangulation of methods. Ethnography, surveys, and interviews were integrated to capture a full spectrum of perspectives—from macro-level trends identified through quantitative data to the rich, personal narratives revealed in qualitative interviews. To ensure the reliability and relevance of emergent findings, I cross-referenced them with established literature, which served to validate my results and highlight areas where my research can contribute new insights.

Secondly, recognising the potential for subjectivity in data collection, analysis, and interpretation, I engaged in ongoing reflexivity, acknowledging my own influence as both a researcher and an activist on the research process. For instance, my personal stance on environmental issues could subconsciously bias my interpretation of interview responses, leading me to emphasise narratives that align with my views. To account for this subjectivity, I included my experiences and perspectives in this reflexivity statement and actively sought out disconfirming evidence that challenges my preconceptions.

Thirdly, I sought the perspectives of my peers not involved in the activist community review of my data and analysis, valuing their capacity to provide a more detached viewpoint. Finally, I conducted member checks by sharing preliminary findings with interviewees and ethnographic research participants. Their feedback was instrumental in ensuring that my interpretations accurately reflect the experiences and perspectives of activists and scientists included in my research. By actively incorporating these strategies I aimed to uphold the integrity of my research, contribute valuable insights to empirical research on climate activism, while acknowledging and respecting its complex, multifaceted nature.

Figure 1.1. April 2022, Scientists for Extinction Rebellion protesting at Department for Business, Energy, and Industrial Strategy. Author on bottom right between two bollards with camera. Photo Credit: Andrea Domeniconi.

Figure 1.2. April 2023, The Big One, March for Nature, Westminster. Photo Credit: Crispin Hughes.

Epistemological Stance of the Research

Adopting a critical realist perspective, this research acknowledges the existence of an objective reality while recognising that our understanding of it is shaped by our perceptions, theories, and constructions. This stance enables speculation about underlying structures and mechanisms, such as motivations or cognitive biases, that influence pro-environmental behaviours. Simultaneously, it acknowledges the role of individual and social interpretations in shaping these behaviours. Consider the construct of 'social identity strength,' which may be measured using a series of Likert scale items. The framing of these items is designed to capture the strength of participants' identification with environmental groups—a psychologically 'real' state that persists beyond the confines of the survey instrument. However, the way these items are presented can influence how participants articulate their attitudes and beliefs, reflecting the interplay between objective measurement and subjective interpretation.

I also acknowledge a form of weak social constructionism in my research. This perspective does not deny the existence of an objective reality independent of our perceptions but emphasises the role of social practices in shaping understanding of reality. In the context of interviews, for example, the social context—comprising my background as the interviewer, the interviewee's background, the language used, the questions posed, and the narratives exchanged—contributes to the co-construction of meaning between me and the interviewee. These interactions are framed by social norms and expectations. However, my goal is not merely to describe these specific contexts, but to identify and understand the underlying psychological factors that influence pro-environmental behaviours.

By adopting this nuanced epistemological stance, the research aimed to provide a comprehensive understanding of pro-environmental activism. It recognises the interplay between objective psychological factors and the socially constructed nature of our understanding, thereby capturing the complexity of the phenomena under study. This epistemological stance aligns with the pragmatic approach of the research, which is concerned with producing knowledge that has practical utility for researchers and practitioners alike.

Chapter 1: Introduction

In an era increasingly defined by the climate and ecological crisis, a critical question emerges: what are the underlying motivations that drive individuals to stand against this tide? This thesis explores the diverse motivations driving environmental activism, delving into the factors that fuel not only the high-stakes commitment exemplified by movements like Extinction Rebellion and Just Stop Oil, where individuals face substantial personal costs including being arrested for their actions, but also encompassing the broader spectrum of environmental engagement that includes more routine, low-cost behaviours from petition signing to lifestyle changes.

Across 5 papers, encompassing 5 studies, this multi-part thesis examines the interplay of identity and moral processes underpinning pro-environmental activism. Employing a diverse array of methodologies – including surveys, in-depth interviews, and ethnographic fieldwork – each study contributes a unique perspective to our understanding of environmental activism. This methodological richness allowed for a comprehensive and nuanced examination of the subject matter from various perspectives which I hope provides an enriched representation of this phenomenon. From examining the expansive nature of moral consideration and the self-concept in shaping environmental attitudes (Paper 1; studies 1 & 2) to exploring how scientist identity influences engagement in activism, particularly within the context of real-world activist groups to enhance ecological validity (Papers 2, 3, 4, & 5; Studies 3, 4, & 5).

The research in this thesis continually evolved, responding to new insights gained from the literature and empirical work. My background in social and cultural anthropology significantly influenced this research, fostering an attentiveness to real-world phenomena and shaping the direction of the studies. This perspective was pivotal when, in the early stages of my research, the rise of scientist-activism, exemplified by groups such as Scientists for Extinction Rebellion and Scientist Rebellion, emerged as a significant and relevant development. The anthropological focus on holistic understanding through in-depth fieldwork provided an apt framework for examining this unique form of environmental activism, where the traditionally distinct worlds of science and activism intersect.

Opting for a multi-part thesis format provided the flexibility necessary to thoroughly investigate specific, interrelated facets of environmental activism, each demanding its unique methodological approach, while ensuring a cohesive narrative throughout the thesis. Crucially, this format also streamlined dissemination of findings by allowing each section to be crafted as an independent paper for submission to peer-reviewed journals. While each paper stands alone, they collectively weave together showcasing diverse aspects of environmental activism with a particular focus on the role of identity.

The structure of this chapter is as follows. First, there is an overview of key literature that shaped the initial PhD proposal and how it motivated a shift to an examination of moral and self expansiveness. While each individual paper within this thesis includes a focused literature review pertinent to its specific research question, this section provides a cohesive synthesis across these varied domains, thus ensuring a comprehensive understanding of the broader field. Here, I have strived to avoid rote repetition, though some overlap with the papers' reviews is inevitable. Then, there is a section on how fieldwork shaped the trajectory of the research by raising the salience of scientist-activism and providing a real-world context in which to examine processes affecting environmental activism. Finally, there is a broad overview of the 5 papers that comprise this thesis.

1.1 Literature Review of Theoretical Frameworks

In the face of accelerating climate change and biodiversity loss, understanding the catalysts of environmental activism is a pressing social issue. This targeted literature synthesis charts the evolution of the central thesis question from an initial focus on identity fusion with humanity to a broader examination of the psychological constructs of moral and self-expansiveness and their influence on environmental activism. It lays the foundation for understanding the complex motivations that drive environmental activism, preparing the ground for the subsequent focus on scientist-activism shaped by immersive fieldwork.

1.1.1 Clarifying Terms: Climate Activism and Environmental Activism

As this thesis delves into the motivations driving environmental activism, it is crucial to clarify the relationship and distinctions between climate activism and broader environmental activism. While these terms are often used interchangeably and intersect in many aspects, they encompass slightly different scopes and focus areas. Climate activism focuses on issues related to climate change, such as global heating, greenhouse gas emissions, and climate policy. Environmental activism, on the other hand, adopts a broader lens. It not only includes the critical issue of climate change but encompasses a wider array of environmental concerns, including biodiversity loss, sustainability, and conservation. This broader perspective is reflected in the agendas and actions of various environmental social movements. For instance, Just Stop Oil (JSO, 2023) adopts targeted aims centred on specific issues such as ending oil and gas licensing to mitigate the effects of climate change. In contrast, movements like Extinction Rebellion (XR, 2023a) integrate both climate and ecological justice into their activism, emphasising a more holistic environmental approach.

Two actions by Scientists for Extinction Rebellion (S4XR) illustrate this intersection. In April 2022, scientists highlighted the ongoing climate crisis by pasting scientific papers to the UK government's Department of Business, Energy and Industrial Strategy (BEIS) with some gluing their hands to the building (Gayle, 2022). Nine scientists were arrested. This action, resulting in the arrest of nine scientists, was a direct response to governmental proposals to expand oil and gas production, contradicting the UK's declared climate emergency (Gardner et al., 2022).

The following year, scientists joined the March for Nature on Earth Day as part of The Big One environmental demonstration outside Westminster (Russell & Graham, 2023). Twenty-four scientists held placards aloft throughout the march, showcasing crucial facts about the state of nature in the UK and worldwide in their role as scientific ambassadors (Scientists for Extinction Rebellion, 2023a).This intersection of climate-focused actions with broader environmental concerns underscores the interconnectivity of these issues.

This broader environmental perspective is further underscored by legislative efforts such as the Climate and Ecology Bill in the UK, aiming to comprehensively address both climate change and biodiversity loss (Climate and Ecology Bill, 2022). In addition, weekly public polling in the UK conducted by YouGov (YouGov, 2023) has for years included 'the environment' as an option, rather than insolating ‘climate change’, to understand what the public feels are the most pressing current issues facing the UK. These examples and trends highlight the rationale for adopting the term 'environmental activism' in this thesis, acknowledging that activists' motivations and actions often span beyond single-issue campaigns to address the complex facets of the climate and ecological crisis. In conclusion, our focus on environmental activism, rather than solely on climate activism, offers a more inclusive, realistic, and policy-relevant perspective. It allows us to capture the complexity of activist agendas, align with public perception, and provide richer theoretical and practical insights into the sphere of environmental engagement.

1.1.2 The Role of Environmental Social Movements

As we confront the most significant global challenges of our time—climate change and biodiversity loss—the role of environmental social movements becomes paramount. Social movements can drive system change (IPCC, 2022) and may be a catalyst for social tipping points, potentially altering destructive trajectories towards more sustainable futures (Otto et al., 2020; Winkelmann et al., 2022). Social movements engaged in protest and dissent can play critical roles in addressing climate change (della Porta, 2020) including stopping environmentally destructive practices (Villamayor-Tomas & García-López, 2018), countering fossil fuel extraction, and challenging prevailing objectives and trajectories (Andreucci, 2019). Understanding the catalysts that mobilise collective action is crucial to harnessing the power of social movements to counter the adverse effects threatening humanity and biodiversity (IPBES, 2019; IPCC, 2022).

1.1.3 Psychological Drivers of Environmental Activism

There is now a large body of work on the psychology of climate change and environmental concern, spanning climate psychology (Ferguson & Schmitt, 2021) and environmental psychology (Steg & De Groot, 2019). While perceptions of climate change's psychological proximity and personal experiences of ecological disasters are linked to pro-environmental behaviours (Sparks, 2021a), they are not sufficient for motivating environmental action. Even as public awareness grows, there remains a gap between recognising climate change as an immediate threat and translating that recognition into action (van Valkengoed et al., 2023). Of interest here, are what motivates action, especially collective action within environmental social movements. Research has consistently demonstrated that deeply held identities, informed by personal values and political ideologies, shape the way individuals and groups respond to the environmental crisis (Agostini & van Zomeren, 2021a; Mackay, Cristoffanini, et al., 2021a; Vesely et al., 2021). The role of social norms and the alignment with ingroup expectations are shown to reinforce these pro-environmental tendencies (Ferguson & Schmitt, 2021; Mackay, Schmitt, et al., 2021). In addition, a shared belief in the efficacy of group action is a critical driver, empowering individuals with the confidence to initiate and sustain environmental activism (Fritsche & Masson, 2021; Mackay, Schmitt, et al., 2021).

1.1.4 High-Cost Environmental Activism

Non-violent direct action within environmental activism stands out for its intensity and high personal cost to participants. The emergence of movements like Extinction Rebellion (XR) reflected a dramatic shift in public engagement with climate issues. In 2019, climate change went from an issue of concern for many, to one which caused alarm and motivated demands for change (Berglund & Schmidt, 2020). This is evidenced by the fact that environment has been a top 3 issue for at least 20% of the UK public since the 18th of April 2019 (YouGov, 2023), signalling a major shift in public sentiment compared to the years before. It is only eclipsed in relative importance by the economy (51%) health (46%), and immigration and asylum (38%), with 22% citing it as a top 3 issue as of the 21st of February 2024. The mass protests in London in April 2019 epitomised this shift, as over a thousand individuals willingly accepted arrest to champion XR's cause. This not only disrupted the capital but also succeeded in catapulting the climate and biodiversity emergency into the spotlight, generating worldwide attention, and closely preceded the UK parliament's declaration of a climate emergency (Reuters, 2019), a central demand of the Extinction Rebellion protests. Such high-cost activism raises critical questions about the psychological mechanisms that underlie the readiness to engage in self-sacrificial protest. At the core of XR’s initial vision and demands were a sense of shared humanity and communion with all living species predicated on an ethic of cooperation between people (Extinction Rebellion, 2023a). This collective stance, which sees individual activists willingly face arrest, suggests a deep psychological connection to humanity as a whole, which transcends individual self-interest. The initial research proposal was thus inspired by a desire to understand the psychological mechanisms underpinning such high-cost environmental activism.

1.1.5 Identity Fusion, Humanity and Environmental Activism

The concept of identity fusion, where a social identity becomes intrinsic to an individual's self-concept leading to a fusion of personal and social identities (Swann et al., 2012), seemed a promising avenue for exploring an identity-based driver of high-cost actions. Identity fusion emphasises the strength derived from personal relationships within a group, often leading to costly pro-group behaviours. The Extinction Rebellion movement, with its inclusive vision and appeal to a shared sense of humanity, seemed to exemplify the potential for such fusion at a superordinate level. The phenomenon where members of XR exhibited a readiness to undertake personal risks for the collective benefit hinted at a potent fusion with humanity, posited to underpin pro-social behaviours on this grand scale. However, while research had linked the concept of identity fusion with increased pro-sociality, particularly in contexts requiring personal sacrifice for the group (Buhrmester et al., 2015; Swann et al., 2010; Swann & Buhrmester, 2015), its direct application to the domain of environmental activism was yet to be established.

Prior research on identification with humanity explored it as a form of social identity, finding it correlated with pro-social behaviours across both in-group and out-group boundaries (McFarland et al., 2012, 2019). However, this was not based on identity fusion theory, and no existing research had applied the identity fusion framework to the concept of identification with humanity. The initial PhD research was therefore poised to explore this novel application: Could a fusion with the broad category of humanity, inspired by the shared and urgent threat of climate change, motivate individuals to act beyond their local identities and engage in pro-social, high-cost environmental activism, overcoming a human tendency to deny the plight of another person from a different social category?

Although this exploration did not evolve into empirical research on identity fusion with humanity, it was a pivotal theoretical inquiry that informed the early developmental stages of the PhD. This approach opened a broader inquiry into the fabric of human identification which prompted consideration of the broad array of entities that can be identified with and that may be pertinent to action.

1.1.6 The Human Category, its Complexities, and Myriad Factors Affecting Action

Conceptions of what it means to be human, embedded in numerous histories and philosophies (Stevenson & Haberman, 1998), have been used to affect behaviour and coordinate social cohesion throughout history, including social movements, religious revolutions, and development aid. The complexity of the human category, however, is underscored by its variability across cultures and societies. For example, research has highlighted how different populations can attribute varying degrees of 'humanness' to each other, often based on cultural or perceived civilisational characteristics (Bain, 2013). This underscores the subjective nature of human identity, which can fluctuate and be selectively applied, sometimes resulting in the dehumanisation of others—a process whereby individuals or groups are denied the qualities that make one 'human' (Haslam, 2006). This recognition of nuanced understandings of humanity problematised the initial reading of identity fusion's potential. It highlighted the limitations of a single focus on humanity, which fails to account for the rich array of identification targets that extend beyond the human category. Such identifications can extend to animals (Amiot et al., 2019; Dhont et al., 2019), place (Devine-Wright, 2013; Devine-Wright & Clayton, 2010), nature (Mackay, Cristoffanini, et al., 2021a; Schmitt et al., 2019), and objects and possessions (Belk, 1988, 2016), reflecting a concern that goes beyond the anthropocentric to a more biocentric or ecocentric worldview. Examining XR's vision further we see not only a concern for all humanity but also the natural world and its biodiversity suggesting forms of identification and moral consideration that are inclusive of all forms of life (Extinction Rebellion, 2023a). This diversity of identification and concern motivated a search for psychological concepts that attend to this diversity.

1.1.7 Expansiveness: A Novel Approach to Environmental Activism

The preliminary exploration into the complexities of the human category and the limitations of a singular focus on identity fusion with humanity led to the consideration of a more inclusive concept: expansiveness. This term, as applied in this research, refers to the breadth and depth of an individual's concern and identification that transcend human-centric views, embracing a wider ecological and biocentric perspective. We suspected that it might be a more fitting lens through which to view the motivational landscape of environmental activism. Environmental movements such as XR employ a collective vision that extends beyond the welfare of humanity to include the broader biosphere, suggesting an ethos of moral consideration that is inclusive of all life forms (Extinction Rebellion, 2023a).

1.1.7.1 Moral Expansiveness: Broadening the Circle of Concern. The concept of moral expansiveness aligns with the inclusive vision of modern environmental movements. It represents the tendency to extend moral value and concern beyond just human entities, embracing non-human life and the environment (Crimston et al., 2016). A person's moral circle describes the breadth of their moral concern for others. Those included in it are considered worthy targets of moral concern compared with those outside, who are not (Singer, 1981). There appears to be a general trend towards more expansive moral boundaries with more and more entities being deemed worthy of moral consideration (Bloom, 2010; McFarland et al., 2012; Pinker, 2011; Singer, 1981). Responding to this trend, the moral expansiveness scale (MES) was developed as a quantitative measure of how far individuals extend their circle of moral concern, including to humans, animals, and plants, and has been shown to predict altruistic behaviour and sacrifice for the environment (Crimston et al., 2016, 2018). Such expansiveness in moral consideration suggests a possible psychological profile that underlies environmental activism—one that encompasses a broader range of moral concerns and identifies with a wider collective beyond the self. Individuals with more expansive moral circles tend to connect more deeply to nature and endorse universalistic values (Crimston et al., 2016) view humans and animals as highly similar (Starzyk et al., 2021), and support the conservation of wildlife (Ghasemi & Kyle, 2021). Moral expansiveness with regards to nature targets is also associated with increased ecospirituality, a view of nature as sacred (Billet et al., 2023). Moreover, individuals with more expansive moral circles were more likely to identify with all humanity and endorse universalism, indicating that there may be a common psychological profile, or at least features of people, which encourage identification with, and moral consideration of, broader categories of entities.

1.1.7.2 Self-Expansiveness: Expanding the Concept of Self. Identity, as "a construct with broad meaning" (Clayton & Opotow, 2003), offers a diverse and multifaceted lens through which we can understand human behaviour and motivation. The concept of moral expansiveness provides a possible template for thinking about the self-concept. Inspired by this, my research (explored in Paper 1) asks a parallel question: can a person's self-concept be conceptualised in a similarly expansive manner? I propose self-expansiveness as an extension of identity-based approaches, integrating multiple aspects of a person's environment, community, and the wider world into their self-concept[1]. Early approaches to an extended or expanded sense of self, conceived in relation to one's own body, possessions, and other people, provide support for such an approach (Prelinger, 1959).

Critically, the self-concept is intricately linked to prosocial behaviour. Group based identity theories, such as Social Identity Theory (Tajfel & Turner, 1979) and Identity Fusion (Swann et al., 2012), highlight the link between perceived category membership and increased prosociality towards others perceived to be members of that category (Buhrmester et al., 2015;

[1] Self-expansion has been examined before (Aron et al., 1991). However, this was operationalised to factor in inclusion of a singular other in the self e.g., a person with whom you are in a close relationship. This differs from our approach which follows Crimston and colleagues (2016) in attending simultaneously to a broad range of entities.

Levine et al., 2005a). Some have examined how such processes can be extended, from identity fusion processes being extended to distant category members e.g., national identity (Buhrmester et al., 2015), to social identification with all humanity (McFarland et al., 2012; Sparkman & Hamer, 2020). As noted earlier, others have extended identity theories noting that the self-concept can encompass a more biocentric worldview to include animals, places, and nature within it (Amiot et al., 2019; Devine-Wright & Clayton, 2010; Dhont et al., 2019; Mackay, Cristoffanini, et al., 2021a; Mackay, Schmitt, et al., 2021; Schmitt et al., 2019). These approaches focus on singular aspects of identity with each category – whether it be a connection to a place, a feeling of oneness with nature, or a kinship with animals – typically considered in isolation. The scope of identity in each model is thus confined to its domain and becomes relevant in specific contexts. However, we propose that the concept of self-expansiveness transcends these boundaries by exploring how individuals may simultaneously identify with multiple and diverse categories. While context undoubtedly plays a role in shaping the salience of different aspects of identity, self-expansiveness suggests that some individuals may extend their sense of self more broadly, encompassing various aspects of their environment, community, and the wider world regardless of context. This broader conception of self-identity may be particularly relevant in understanding the motivations driving participation in environmental movements, where individuals might feel a simultaneous connection to various entities such as specific local communities, broader humanity, animal species, natural landscapes, and global ecological systems. Moreover, an individual's broadened self-concept, which includes various entities within it, can potentially strengthen affiliations with pro-environmental social groups, thereby facilitating pro-environmental collective action (Fritsche et al., 2018).

Given the centrality of identity and moral psychological processes to environmental concern and action, it is crucial to investigate how these factors interrelate within the context of environmental activism. While individuals vary in their degree of moral expansiveness, previous research has not thoroughly examined how this relates to identity processes[2]. Perception of these entities as integral to one's identity may relate to their inclusion within one's moral circle, though this may not be true for all entities. For example, people may incorporate objects and possessions into their self-concept (Belk, 1988, 2016) but it is possible this does not lead to corresponding moral concern.

Moreover, understanding the contribution of moral and self-expansiveness to engagement with environmental social movements is critical. Pro-environmental social identities are a key factor influencing involvement in environmental movements (Mackay, Cristoffanini, et al., 2021b; Van Stekelenburg, 2013). The question then is whether individuals with broader self-concepts and moral circles exhibit higher levels of identification with environmental activism and engagement in activism.

1.1.7 Centrality of Activist Identity

Despite the introduction of self- and moral expansiveness in this research, the concept of environmental activist identity maintains a central role across the thesis. Identity processes are central to the understanding of "political-protest participation either as as antecedents, mediators, moderators, or consequences" (Klandermans, 2014, p. 19). These identities are simultaneously individual and collective, highlighting the dynamic interplay between personal identification and group membership. The activist identity is a multi-faceted construct, encompassing elements of personal, social, and collective identities simultaneously. An activist can be defined as someone that "advocates or engages in action, spec. that undertakes vigorous political or social campaigning" (OED, 2024) with environmental activists undertaking such

[2] Moral expansiveness has been moderately linked to identification with all humanity (Crimston et al., 2016), an expansive sense of self aligned with a super-ordinate identity, transcending local and national identities. However, the current paper represents a rare instance where moral and identity processes have been directly compared, and in the applied context of environmental activism.

action for the environment. The environmental activist identity is critical for shaping the motivations, behaviours, and self-perceptions of individuals engaged, to varying degrees, in environmental social movements (Bamberg et al., 2015; Mackay, Schmitt, et al., 2021). Klandermans (2014) notes that identity can be delineated into personal, social, and collective identity. There are subtle, but important distinctions to made between each. Personal identity refers to how individuals see themselves in relation to their environmental beliefs and actions. For instance, environmental self-identity could be defined as the extent to which individuals perceive themselves as engaged in environmental behaviour (van der Werff et al., 2013). Similarly, environmental activist self-identity involves the degree to which one identifies as an environmental activist, influencing their environmental preferences, intentions, and behaviours (Fielding et al., 2018).

These personal identities can be shared with others and in a social context these are transformed into social and/or collective identities (Klandermans, 2014). Social identity can be defined as the part of an individual's self-concept arising from their perceived membership in social groups and includes the values, norms, and behaviours associated with the group (Tajfel & Turner, 1979; Turner et al., 1987). Acting in unison with others and coordinating mass action, involves not only self-identification, but realising that you share this identity with other people. Collective identity is a group level concept which is formed when members of a group each share the same group identity representation (Klandermans, 2014). What is key is that group identification e.g., with the environmental social movement, marries social identity and collective identity processes e.g. joining a group and committing to it. The collective identity thus emerges from, and is maintained and evolved through, each individual group member's process of social identification with the group. In specific contexts, the collective identity can become politicised when the identity becomes a vehicle for attempts to establish, change, or defend a power structure (Klandermans, 2014). Individuals acting in unison with others in environmental movements transition from a personal to a shared social and collective identity/ The emergence of Extinction Rebellion for example enabling members to take mass action to compel the UK government to act on climate change.

1.1.7.1 Identity Processes in Extinction Rebellion (XR). An illustrative example of these identity processes in action are evident in the emergence of Extinction Rebellion (XR). XR enabled its members to take mass action to compel the UK government to act on climate change. This mobilisation demonstrates the intertwining of personal, social, and collective identities within the environmental activist context. Individuals who joined XR may have initially held personal environmental self-identities, driven by their concern for the planet. However, as they engaged with XR and its like-minded activists, they transitioned to a social identity, aligning themselves with the XR community, adopting shared values and norms, and collaborating with fellow activists. Furthermore, XR's collective identity emerged as the movement grew and solidified its goals. XR members collectively identified as advocates for urgent climate action, making their environmental activism a collective cause. In this specific context, XR's collective identity became politicised, as it aimed to challenge and change government policies on climate change. Members of XR shared a common goal, forming a collective identity representation that empowered them to take coordinated mass actions, such as protests and demonstrations.

1.1.8 Social Identity Approach.

Addressing climate change requires political action and a critical part of this is collective mobilisation (Mackay et al., 2021a; Schmitt et al., 2019). Given the psychological orientation of this thesis, I adopt the Social Identity Approach (Reicher et al., 2010) to explore how, and the degree to which, individuals perceive themselves as part of the environmental movement. This means that rather than focusing on self-identity, the primary focus is on social identity as it accounts for the group-based aspect of environmental activism exemplified by groups such as XR. Social identity theory has been instrumental in examining how individuals perceive environmental issues and the actions they undertake in response (Fielding & Hornsey, 2016). Activist identity can be viewed as a politicised form of collective identity, emerging from the shared experiences, values, and objectives of individuals within the environmental movement. Mackay and colleagues (2021a) emphasise that SIA offers a comprehensive lens to examine how politicized environmental identities guide behaviour. Within this framework, the extent to which individuals identify as activists, and the specific content of this identity are of paramount importance.

Adopting the Social Identity Approach in this thesis, I specifically investigate the extent and nature of individuals' identification with the environmental movement and how it is affected by and interacts with other factors. The research delves into three key aspects of social identity: the strength of identification with the environmental social movement, the specific content that defines this activist identity, and how this identity interacts with other personal and professional identities. Critically, identity is fluid and individuals may hold multiple identities (Klandermans, 2014; Reicher et al., 2010). The interplay of multiple identities within Extinction Rebellion, from XR Doctors to Scientists for Extinction Rebellion, motivated the research undertaken in Papers 2, 3, and 4. It was ethnographic fieldwork rather than reviews of the literature that brought this to attention.

1.2 Ethnographic Fieldwork and Evolution of Research

My original research proposal underscored the significance of studying activism within its lived context by drawing on anthropological methods. By immersing myself in activism, attending actions in person, and engaging directly with activists, a deeper understanding of the intricacies, motivations, and dynamics of environmental activism may emerge. This approach serves as a vital means of sense-checking and adding authenticity to the research, ensuring alignment with the realities and nuances of activist experiences. My direct participation in activism facilitated the identification of salient issues, emergent themes, and provided context-rich data that enriched the research process and augmented the research trajectory. This process was significantly influenced by my background in social and cultural anthropology. This interdisciplinary training instilled in me an attentiveness to emergent real-world phenomena.

1.2.1 Participation in activism

I engaged with the Extinction Rebellion movement from 2019 onwards, initially joining my local group before working with the XR Videography group during Covid. This was primarily motivated by a personal conviction that action on the climate and ecological crises was insufficient and that XR, along with the wider environmental movement, were right to raise the alarm and hopefully shift public consciousness. Witnessing XR's efforts to raise awareness and catalyse societal change further fuelled my interest in understanding the psychological and social drivers behind such activism.

In early 2021 I joined Scientists for Extinction Rebellion (S4XR). Engaging with S4XR not only expanded my network within the activist community but also laid the foundation for ethnographic fieldwork, wherein I began systematically documenting observations, interactions, and insights through detailed field notes. When joining S4XR I communicated my research interests and intentions to explore factors influencing scientist engagement. I emphasised how this research could contribute to S4XR's mission of increasing scientific participation and public engagement, aligning with their goals and aspirations. This not only enhanced transparency of the research but also facilitated buy-in from S4XR.

1.2.2 Fieldwork and Participant Observation

The ethnographic method of participant-observation was used to document my participation in, and observation of, S4XR’s actions, and XR’s actions more broadly, from 2021 to 2023. Participant-observation is an empirically grounded method emphasising direct observation and participation to better understand social and cultural dynamics within a group or setting (Tedlock, 2007). Participant-observation can also enhance rapport and trust between researcher and participants, facilitating a deeper understanding of a group's experiences and perspectives. It was hoped that fieldwork would act as a sense check on the survey data on environmental activism and provide some much-needed ecological validity to the PhD research. It was by participating as a member of XR that I became aware of the group S4XR and scientist activism more broadly.

1.2.3 Emergence of Scientist Activism and Pivot in Research Focus

The recent phenomenon of collective scientist-activism first emerged in 2017 in the March for Science, where demonstrators marched in defence of scientific research and evidence-based policymaking (Reardon et al., 2017). Since this, with the emergence of groups such as S4XR and Scientist Rebellion, there has been a more pronounced environmental aspect to this activism, one often featuring civil disobedience. Both natural and social scientists are represented in groups like S4XR (S4XR, 2023) and Scientist Rebellion (S4XR, 2023) underscoring the interdisciplinary nature of environmental activism and highlighting the collective commitment across scientific disciplines. Actions are varied, from leaking the IPCC report (Scientist Rebellion, 2021), to symbolically pasting scientific papers to government buildings (Gayle, 2022), and blocking fossil fuel infrastructure (Oza, 2023). Often these actions explicitly invoke the scientist identity e.g., by wearing white lab-coats. Alongside and following on from these actions, there has been a considerable increase in perspectives on the legitimacy and moral imperatives underpinning scientist-activism (Capstick et al., 2022; Gardner et al., 2021, 2022; Rodgers, 2023) and empirical research on scientist-activism and advocacy (Dablander, Sachisthal, Cologna, et al., 2024a; Dablander, Sachisthal, & Haslbeck, 2024; Finnerty, 2022; Finnerty et al., 2024a, 2024b, 2025; Latter et al., 2024).

Rather than my attention being brought to this phenomenon via the literature it was witnessing these actions ‘in the wild’ that stimulated questions for research. The rise of scientist activism presented a unique opportunity to explore environmental activism from a fresh perspective, one that examined the intersection between science and activism. The yawning gap between the scientific consensus (IPCC, 2023; Lynas et al., 2021; Myers et al., 2021) and policy action to change the trajectory (IPCC, 2023; SEI et al., 2023; United Nations Environment Programme, 2023) has prompted many scientists to become activists. However, this presents a dilemma (Billig et al., 1988) as the scientific community traditionally emphasizes objectivity and neutrality, discouraging overt political engagement (Betz, 2013; Castree, 2019; Lackey, 2007; Nelson & Vucetich, 2009; Nielsen, 2001; Sedlak, 2016). This raises the question of why scientists choose to engage and how they do so. In particular, given the social psychological focus of this thesis, what are the associations between identity processes and climate action among environmentally concerned scientists. This intersection and tension between scientist and activist identities prompted a pivot in research focus away from the general public to scientists specifically.

Fieldwork was integral to this shift and highlighted the need to delve deeper into the motivations and identity processes of scientist-activists, leading to a more comprehensive understanding of the multifaceted nature of environmental activism. This real-world grounding ensured that the research remained closely aligned with the evolving landscape of environmental and scientific activism, making a significant contribution to the field.

1.3 The Research Theme and Thesis Overview

This thesis constitutes a series of interconnected papers, each linked by a central question that examines the role of identity in environmental activism and its intersection with other factors. Paper 1 explores whether expansive perspectives, both of moral circles and the self-concept, drive pro-environmental action. Individuals demonstrating broader and deeper moral circles, alongside a more inclusive self-concept, exhibited heightened tendencies to identify as environmental activists and engage in pro-environmental activism. However, neither construct predicted signing the Climate and Ecology Bill, indicating the need for further investigation into factors influencing pro-environmental behaviour. This theme of identity exploration extends into subsequent papers, with Papers 2-5 examining factors influencing scientist engagement, including scientist identity content (Paper 2), the discursive strategies scientists use to manage the tension between science and activism (Paper 3), how scientists perceive the future (Paper 4), and how the scientist identity is employed in action (Paper 5). Paper 2 details how the perceived inter-identity fit (Turner-Zwinkels, Postmes, et al., 2015) between science and activism is a critical factor for scientist engagement. Specifically, scientists who view core values of objectivity and impartiality as being uncompromised by activism, and who perceive a moral duty to be an activist, tend to be more engaged. Subsequent thematic analysis further illustrated this, revealing diverse constructions of scientist identity which could be employed to either legitimise or delegitimise action, depending on the invoked values. Engagement presents a dilemma for scientists, given conflicting perspective that argue for (Capstick et al., 2022; Gardner et al., 2021; Rodgers, 2023), and against (Betz, 2013; Castree, 2019; Lackey, 2007; Nelson & Vucetich, 2009; Nielsen, 2001; Sedlak, 2016), scientist advocacy. Paper 3 explores how scientists navigate the tension between their roles as objective researchers and their desire to act on climate and environmental issues. We found that scientists are challenging traditional notions of objectivity, viewing activism as a valid extension of their research efforts. While others are creatively using their research and teaching as tools for activism, aligning their work with environmental goals. Finally, some feel a deep moral obligation to act on climate issues, reflecting a shift towards more engaged and impactful roles. Paper 4 focuses on how scientists construct the future in the context of climate change. It identifies a temporal spectrum that frames scientists' talk about the future and how it might be changed, from a fixed and inevitable future to a contingent and transformable future. The degree of fixity or openness in scientists' talk about the future shaped the range of arguments available, demonstrating varying levels of argumentative flexibility when framing solutions to climate change. These framings shaped how scientists argued for solutions—including prepping, civil disobedience, collective action and prefiguration, and technological innovation. Finally, the culmination is an ethnographic study (Paper 5) of scientist-activists. Grounded in the lived experiences of this unique group, this paper advances understanding of identity performance and negotiation—including inter-identity fit—symbolic action, moral conviction, and intragroup processes, such as solidarity and trust, that sustain high-risk collective action such as civil disobedience.

1.4 Personal Contributions

For this thesis, I was responsible for most of the work undertaken, including theoretical conceptualisation, study design, ethics, data collection and analysis, primary manuscript writing and drafting, manuscript submissions, and responding to peer-review. This was under the guidance of my supervisors without whom it would not have been possible to construct this thesis: Prof. Mark Levine and Dr. Jared Piazza. Contributions outside of this are noted in the acknowledgements.

1.5 Open Science Statement

This thesis employs open science practices throughout to enhance transparency, reproducibility, and accountability in scientific research. My intention in embracing these practices is to ensure that every aspect of the research process, from conceptualisation to publication, is openly documented and accessible to promote collaboration and trust within the scientific community.

All studies presented in this thesis have been pre-registered to outline their intended design, methodology, and analysis plan, thereby enhancing transparency and enabling readers to identify any deviations from the original plan. Data transparency is prioritised, with most data sources, methodologies, and analytical techniques openly disclosed and accessible to all. Additionally, research protocols, materials, and procedures are accessible. Despite widespread recognition of the importance of data sharing practices (A. Towse et al., 2021b, 2021b; Wilkinson et al., 2016), psychology has been inconsistent in doing so (J. Towse et al., 2021a). I have strived to make the data Findable, Accessible, Complete, and Well-described (A. Towse et al., 2021b), recognising its importance for a more open and collaborative scientific culture (Ellemers, 2021).

Ethical considerations pertaining to confidentiality and privacy necessitated that certain aspects of the research, such as interview transcripts and fieldwork notes, were not made openly accessible. This underscores the need for open science recommendations to better reflect the diversity of research methods and their specific ethical and practical commitments (Prosser, Hamshaw, et al., 2023). As Prosser and colleagues stress, the current expectations of journals regarding open data may inadvertently disadvantage qualitative researchers in the peer review and publication process.

Producing this thesis as an open science document, wherever feasible, demanded considerable thought and effort. The process involved making data files accessible, creating comprehensive analysis documentation with data code and output (see here for an example), and providing detailed Readme documentation for each project. Despite the challenges, I feel that adopting open science has substantially enhanced both the quality of my work and my development as a researcher.

Chapter 2: Paper 1 Self and morality: Expansive perspectives and environmental activism

Note: The paper included in this chapter represents its latest version. It incorporates revisions based on feedback from peer reviews, first at the European Journal of Social Psychology, and second at the Journal of Environmental Psychology. Detailed discussions of the peer review process and its impact on the evolution of this research are presented in the bridging page preceding Chapter 3. This context is provided to offer a comprehensive understanding of the paper's current form and the rationale behind its development.

Abstract

Amidst escalating global environmental crises, understanding the psychological factors driving pro-environmental action is crucial. We argue that stewarding the Earth System away from instability requires an embrace of expansive perspectives that drive effective action. Past perspectives underscore the importance of ‘expansiveness’ for prosocial behaviour, including both a more inclusive moral universe and an extended self-concept. Across two studies (N = 546), expansiveness was assessed via the well-established Moral Expansiveness Scale (MES), and identification processes. Specifically, we employed a tailored version of the MES to scrutinize self-identity and its relative expansiveness. Study 1 revealed a significant relationship between moral concern and self-expansion, yet each exhibited distinct patterns, displaying discriminant validity. The degree of identification with an entity, especially nature-related ones, related to moral concern judgments associated with it, offering fresh insights into moral expansiveness. In Study 2, individuals demonstrating broader and deeper moral circles, alongside a more inclusive self-concept, exhibited heightened tendencies to identify as environmental activists and engage in pro-environmental activism. However, neither construct predicted signing the Climate and Ecology Bill, indicating the need for further investigation into factors influencing pro-environmental behaviour. This paper extends research into environmental activism by examining the unique contribution of expansiveness in moral circles and the self-concept, shedding light on individuals' prosocial engagement with the natural world.

Keywords: moral expansiveness, self-expansiveness, moral circle, social identity, climate change, environmental activism

2.1 Introduction

Climate change, ecosystem degradation and biodiversity loss threaten humanity's way of life (IPCC, 2022). These formidable challenges are set against a stark backdrop of accelerating species extinction (IPBES, 2019). These interdependent crises disproportionately inflict damage, with poorer regions experiencing more adverse effects including worse health outcomes, food insecurity, declining access to potable water, increase in disease, and loss of economic productivity (IPBES, 2019; IPCC, 2023). An expansion in perspective may be required for humanity to become stewards of the entire Earth System to avoid the most dire trajectories (Steffen et al., 2018). At the forefront of this transformation are environmental social movements. These movements represent not just a reaction to the crises but also a manifestation of a shifting global perspective towards environmental stewardship. Driving system change (IPCC, 2022), they may be a catalyst for social tipping points, potentially altering destructive trajectories towards more sustainable futures (Otto et al., 2020; Winkelmann et al., 2022). Social movements engaged in protest and dissent can play critical roles in addressing climate change (della Porta, 2020), including stopping environmentally destructive practices (Villamayor-Tomas & García-López, 2018), countering fossil fuel extraction and challenging prevailing objectives and trajectories (Andreucci, 2019). Understanding the catalysts that mobilise collective action is crucial to harnessing the power of social movements to counter the adverse effects threatening humanity and biodiversity. Moral psychological and identity processes are pivotal in shaping individuals' relationships with environmental issues and the natural world (Amiot et al., 2019; Brügger et al., 2011; Clayton, 2003; M. Feinberg & Willer, 2013; Schultz & Tabanico, 2007). In this context, we draw on the moral expansiveness literature (Crimston et al., 2016; Kirkland et al., 2022) to examine the potency of moral- and self-expansion processes in understanding pro-environmental activism.

2.1.1 Psychological Drivers of Environmental Activism

Understanding the psychological underpinnings of environmental activism is crucial in addressing the gap between awareness of environmental issues and action. A substantial body of research in climate psychology (Ferguson & Schmitt, 2021) and environmental psychology (Steg & De Groot, 2019) has explored various factors influencing pro-environmental behaviours. While perceptions of climate change's psychological proximity and personal experiences of ecological disasters are linked to pro-environmental behaviours (Sparks, 2021a), they alone are not sufficient for motivating environmental action (van Valkengoed et al., 2023).

Of particular interest are the motivators of collective action within environmental social movements. Studies consistently demonstrate that deeply held identities, shaped by personal values and political ideologies, significantly influence individual and group responses to environmental crises (Mackay, Cristoffanini, et al., 2021b; Mackay, Schmitt, et al., 2021; Vesely et al., 2021). Additionally, adherence to social norms and alignment with ingroup expectations reinforce pro-environmental tendencies (Ferguson & Schmitt, 2021; Mackay, Schmitt, et al., 2021). Furthermore, a shared belief in the efficacy of collective action plays a critical role in empowering individuals to initiate and sustain environmental activism (Fritsche & Masson, 2021; Mackay, Schmitt, et al., 2021). Going beyond these factors, if an expansion in perspective is necessary, another potentially influential factor in motivating participation in environmental social movements is moral expansiveness.

2.1.2 Expansive Perspectives and Environmental Activism

Environmental movements such as Extinction Rebellion employ a collective vision that extends beyond the welfare of humanity to include the broader biosphere, suggesting an ethos of moral consideration that is inclusive of all life forms (Extinction Rebellion, 2023a). In exploring the dynamics of environmental activism, we introduce a more inclusive concept:

expansiveness. This term, as applied in this research, refers to the breadth and depth of an individual's concern and identification that transcend human-centric views, embracing a wider ecological and biocentric perspective. Drawing from the moral expansiveness literature (Crimston et al., 2016), we suspected that it might be a more fitting lens through which to view the motivational landscape of environmental activism.

2.1.2.1 Moral Expansiveness. The concept of moral expansiveness aligns with the inclusive vision of modern environmental movements. It represents the tendency to extend moral value and concern beyond just human entities, embracing non-human life and the environment (Crimston et al., 2016). A person's moral circle describes the breadth of their moral concern for others. Those included in it are considered worthy targets of moral concern compared with those outside, who are not (Singer, 1981). There appears to be a general trend towards more expansive moral boundaries with more and more entities being deemed worthy of moral consideration (Bloom, 2010; McFarland et al., 2012; Pinker, 2011; Singer, 1981). Responding to this trend, the moral expansiveness scale (MES) was developed as a quantitative measure of how far individuals extend their circle of moral concern, including to humans, animals, and plants, and has been shown to predict altruistic behaviour and sacrifice for the environment (Crimston et al., 2016, 2018).

Expansiveness in moral consideration suggests a possible psychological profile that underlies environmental activism—one that encompasses a broader range of moral concerns and identifies with a wider collective beyond the self. Individuals with more expansive moral circles tend to connect more deeply to nature and endorse universalistic values (Crimston et al., 2016) view humans and animals as highly similar (Starzyk et al., 2021), and support the conservation of wildlife (Ghasemi & Kyle, 2021). Moral expansiveness with regards to nature targets is also associated with increased ecospirituality, a view of nature as sacred (Billet et al., 2023). Moreover, individuals with more expansive moral circles were more likely to identify with all humanity and endorse universalism, indicating that there may be a common psychological profile, or at least features of people, which encourage identification with, and moral consideration of, broader categories of entities.

2.1.2.2 Self-Expansiveness: Expanding the Concept of Self. Identity, as "a construct with broad meaning" (Clayton & Opotow, 2003), offers a diverse and multifaceted lens for understanding human behavior and motivation. The concept of moral expansiveness provides a possible template for thinking about the self-concept. Can a person's self-concept be conceptualised in a similarly expansive manner? We propose self-expansiveness as an extension of identity-based approaches, integrating multiple aspects of a person's environment, community, and the wider world into their self-concept[3]. Similar to a person's moral circle, identity can contract and expand, dynamically attending to a rich and diverse world. Early approaches to an extended or expanded sense of self, conceived in relation to one's own body, possessions, and other people, provide support for such an approach (Prelinger, 1959).

The self-concept is intricately linked to prosocial behavior. Group-based identity theories highlight the link between perceived category membership and increased prosociality (Buhrmester et al., 2015; Levine et al., 2005b; Swann et al., 2012; Tajfel & Turner, 1979). Some have examined how such processes can be extended, from identity fusion processes being extended to distant category members e.g., national identity (Buhrmester et al., 2015), to social identification with all humanity (McFarland et al., 2012; Sparkman & Hamer, 2020). Others note that the self-concept can encompass a biocentric worldview, including animals, places, and nature (Amiot et al., 2019; Devine-Wright & Clayton, 2010; Dhont et al., 2019; Mackay et al., 2021b, 2021a; Schmitt et al., 2019).

[3] Self-expansion has been examined before (Aron et al., 1991). However, this was operationalised to factor in inclusion of a singular other in the self e.g., a person with whom you are in a close relationship. This differs from our approach which follows Crimston and colleagues (2016) in attending simultaneously to a broad range of entities.

These approaches focus on singular aspects of identity with each category – whether it be a connection to a place, a feeling of oneness with nature, or a kinship with animals – typically considered in isolation. The scope of identity in each model is thus confined to its domain and becomes relevant in specific contexts. However, we propose that the concept of self-expansiveness transcends these boundaries by exploring how individuals may simultaneously identify with multiple and diverse categories. While context undoubtedly plays a role in shaping the salience of different aspects of identity, self-expansiveness suggests that some individuals may extend their sense of self more broadly, encompassing various aspects of their environment, community, and the wider world regardless of context. This broader conception of self-identity may be particularly relevant in understanding the motivations driving participation in environmental movements, where individuals might feel a simultaneous connection to various entities such as specific local communities, broader humanity, animal species, natural landscapes, and global ecological systems. Moreover, an individual's broadened self-concept, which includes various entities within it, can potentially strengthen affiliations with pro-environmental social groups, thereby facilitating pro-environmental collective action (Fritsche et al., 2018).

2.1.3 Rationale for Studying Moral and Self-Expansiveness

Given the centrality of identity and moral psychological processes to environmental concern and action, it is crucial to investigate how these factors interrelate within the context of environmental activism. While individuals vary in their degree of moral expansiveness, previous research has not thoroughly examined how this relates to identity processes[4]. Perception of these entities as integral to one's identity may relate to their inclusion within

[4] Moral expansiveness has been moderately linked to identification with all humanity (Crimston et al., 2016), an expansive sense of self aligned with a super-ordinate identity, transcending local and national identities. However, the current paper represents a rare instance where moral and identity processes have been directly compared, and in the applied context of environmental activism.

one's moral circle, though this may not be true for all entities. For example, people may incorporate objects and possessions into their self-concept (Belk, 1988, 2016), but it is possible this does not lead to corresponding moral concern.

Moreover, understanding the contribution of moral and self-expansiveness to engagement with environmental social movements is critical. Pro-environmental social identities are a key factor influencing involvement in environmental movements (Mackay, Cristoffanini, et al., 2021b; Van Stekelenburg, 2013). The question then is whether individuals with broader self-concepts and moral circles exhibit higher levels of identification with environmental activism and engagement in activism.

2.2 The current research

The present set of studies aims to examine the interconnection between moral and self-expansiveness and explore their individual and combined contributions to pro-environmental activism. The research addressed four interrelated questions:

1. To what extent are moral expansiveness and self-expansiveness:
    a. Related constructs?
    b. Stable psychological constructs over time?
2. What are the relative contributions of moral expansiveness and self-expansiveness for:
    a. Identifying as an environmental activist?
    b. Engaging in activism?

To explore these questions, we developed the Self-expansiveness Scale (SES)[5], modelled after the Moral Expansiveness Scale (MES; Crimson et al., 2016), to explore potential variation in

[5] The Self-expansiveness Scale (SES) developed for this study is intended as an exploratory instrument for examining the self-concept, its relationship with moral processes, and engagement in environmental social movements. The SES serves as a preliminary tool to facilitate investigation into the dimensions of self-expansiveness and its associations with other constructs. Efforts have been made to assess its reliability and validity through measures such as test-retest reliability and comparison with other tools. We acknowledge the need for further validation efforts in future research.

self-expansiveness and to motivate future work exploring the expansiveness of the self-concept.

Study 1 introduces the SES and examines its relationship with the MES and the temporal stability of the constructs measured by the MES and SES. This was accomplished by administering the same measures to participants four weeks apart. In Study 2 we explored the relationship between moral- and self-expansiveness and their relationship with a person's social identification as an environmental activist, self-reported environmental activism, and a state-behavioural measure of environmental activism (signing a petition).

2.3 Study 1

The primary aim in developing the SES was to better understand the relationship between moral- and self-expansiveness. As such, we modelled the SES using the MES as a template. Moral expansiveness is a trait variable – that is, it has been shown to be temporally stable (Crimson et al., 2016). In Study 1, we tested the temporal stability of self-expansiveness and considered its relationship with moral expansiveness. We explored the relationship between these two expansiveness constructs using a wide range of natural and artificial entities. This enabled us to explore the two-dimensional space in which entities are (a) identified with, and (b) concerned for. We expected identification and moral concern to be related, but distinct processes. For example, we expected some entities (e.g., objects) to be more relevant for self-identification than for moral concern, but, overall, we expected identification with entities to relate to having moral concern for them, especially with regards to "close" entities (those in the inner moral circle) and natural entities.

2.3.1 Method

Study 1 was preregistered on the open science framework (follow link at end for an anonymised version of pre-registration) and reports of all measures, manipulations, and exclusions, as well as data, analysis code, and materials are available for download for study one here.

2.3.1.1 Sample. Two hundred and eighty-five UK participants (63.16% female; M_{age} = 34.56, SD = 11.42) were sourced through Prolific. A pre-screen survey was used to identify participants who wished to take part in the entire study and identify UK citizens resident in the UK, since some of the survey items were UK specific, e.g., British citizen. A pool of more than 31,000 participants met these criteria. One participant was excluded for indicating they were not of British nationality. Two hundred and eighty-four participants were invited to take part in the main study. Of these initial 284 participants, two hundred and forty-four completed it at time one (64.61 % female, M_{age} 34.95, $SD = 11.65$) and two hundred and sixteen completed both surveys (64.35 % female, M_{age} 35.42, $SD = 11.70$). Two hundred and fourteen participants opted to report their ethnicity: 85.65% White; 6.02% Asian or Asian British; 2.78% Black, African, Black British or Caribbean; 4.63% Mixed or multiple ethnic groups; and 0.46% other. The mean political ideology score on economic issues was 3.44 ($SD = 1.46$), and on social issues was 2.87 ($SD = 1.43$) scales ranging from 1 (Very liberal) to 4 (Moderate) to 7 (Very conservative).

Power analysis was conducted before commencing the study. We specified the minimum correlation of interest at greater than or equal to 0.2 (small correlation). Using Gpower for correlation sample size calculation it was determined that a sample size of 255 was required to find correlations at 0.2 and above with an approximate statistical power of 90%, given recent recommendations (Brysbaert, 2019), and significance level of 0.05. Due to attrition over the course of the three surveys our final sample, 216, was smaller than planned though was modestly powered (80%) to find significant small correlations of .19 (two sided) and above.

2.3.1.2 Measures. The MES formed the basis for the SES and is described first. See Appendix Items Study 1 for complete measures.

Moral expansiveness. We assessed moral expansiveness by adapting Crimston et al.'s (2016) thirty-item MES. In the original scale, these items were placed in ten respective categories, three items in each: family and friends, in-group, out-group, revered people, stigmatised, villains, high-sentience animals, low-sentience animals, plants, and environment (see Supplements for use of original categories). Participants indicated their moral concern for human (e.g., *family member*, *British citizen*) and nonhuman entities (e.g., *fish*, *old-growth forest*) within four defined boundaries: 0 – outside the moral boundary ("These entities deserve no moral concern or standing. Feeling concern or personal responsibility for their moral treatment is extreme or nonsensical"), 1 – fringes of moral concern ("These entities deserve minimal moral concern and standing, but you are not morally obliged or personally responsible for their treatment"), 2 – outer circle of moral concern ("These entities deserve moderate moral concern and standing. You are concerned about their moral treatment; however, your sense of obligation and personal responsibility is greatly reduced"), and 3 – inner circle of moral concern ("These entities deserve the highest level of moral concern and standing. You have a moral obligation to ensure their welfare and feel a sense of personal responsibility for their treatment"). We adapted four items to be more relevant to our UK participants. We changed: 1) "*American citizen*" to "*British citizen*", 2) "*U.S. President*" to "*British Prime Minister (position, not specific individual)*", 3) "*U.S. soldier*" to "*British soldier*", and 4) "*Grand Canyon National Park*" to "*Lake District*". We randomised the order of items for each participant using Qualtrics randomisation features. These items were then summed and standardised, resulting in a score ranging from 0 to 3, with higher scores indicating higher moral expansiveness. The overall MES score thus summarises the "breadth" and "depth" of a person's moral circle (Crimston et al., 2016).

Self-expansiveness. Modifying the underlying structure of the MES to focus on self, participants indicated the relative self-relevance of the same range of entities by placing them within four defined boundaries: 0 – outside of self ("These entities have no impact on who you are"), 1 – fringes of self ("These entities play a minimal role in your sense of self. They form part of who you are but to a lesser degree than entities in the inner and outer circles"), 2 - outer circle ("These entities are important to your sense of self. They form significant parts of who you are") and 3 - inner circle ("These entities are central to your sense of self. They form essential parts of your identity. You could not imagine or describe who you are without them"). Using the original Crimston et al., (2016) items, these items were then summed and standardised, resulting in a score ranging from 0 to 3, with higher scores indicating higher self-expansiveness. The overall SES score thus summarises the "breadth" and "depth" of a person's sense of self.

We included 11 additional items to compare nuances in self-relevant judgments with moral judgments. Considering the identity-related importance of objects (Belk, 1988, 2016), we included six technological objects (e.g., *phone*, *laptop/computer, hardback/softback book*) for exploratory purposes. These items were selected based on their potential relevance to the study's context and to encompass a broader representation of potential self and moral domains. Including these additional entities allowed investigation of potential shifts in self and moral expansiveness across a wider spectrum of entities. In keeping with Crimston et al.'s (2016) three entities per category structure, the technological items were divided into digital and analogue technology categories, three per category. We also included three symbolic entities, "*British flag*", "*Religious text (could include the Bible, Quran, the Vedas, or other religious text)*", and "*Planet Earth*", that we conjectured may have identity relevance. Finally, as they included two outgroup targets, "*Supporter of opposing political party*" and "*Somebody with* *different religious beliefs*" we included ingroup versions of these to see how these performed relative to the original ingroup items.

Demographic questions. Following Crimston et al. (2016), in addition to other demographic questions, we included two single-item measures of political conservatism: economic conservatism ("Please indicate your political beliefs from left/liberal to right/conservative on issues of the economy, e.g., social welfare, government spending, tax cuts"), and social conservatism ("Please indicate your political beliefs from left/liberal to right/conservative on social issues, e.g., immigration, homosexual marriage, abortion"), with scale points 1 = left/liberal to 7 = right/conservative.

2.3.1.3 Procedure. Participants were required to complete the study on a laptop or desktop computer as the SES and MES were difficult to complete using the drag and drop procedure on mobile and tablet devices. This stipulation was added to the Prolific advert and Qualtrics' device detection was used to automatically reject participants who tried to access the survey via other devices. Participants first completed a pre-screening survey with demographic and political orientation questions. A week later, participants were invited to complete the first survey. No participants were removed before analysis. A preliminary debriefing sheet was provided at time one. After participants completed the final survey four weeks later (time two), a more substantive debriefing sheet was provided explaining the study's aims.

2.3.1.4 Analysis Plan. In our exploration, we primarily focused on the original 30 entities that were introduced in the MES by Crimston et al., (2016). These entities have undergone extensive testing and validation in previous research, and their categorisations are well established, making them a reliable basis for our study. However, to expand the scope of our analysis and explore potential nuances between the self-concept and moral concern, we used all 41 items when examining the relationship between the self and moral dimensions for individual entities.

In line with recent recommendations (Maier & Lakens, 2022), to increase confidence in the observed results, by minimising Type 1 error rates, a sample standardised alpha was calculated ($astan = \frac{\alpha}{\sqrt{\frac{N}{100}}} = \frac{0.05}{\sqrt{\frac{216}{100}}} = .03$). We conducted analyses using R 4.1.1 (R Core Team, 2021a) in RStudio 1.4.1717 (RStudio Team, 2021). Main analyses were conducted using base R, and 'psych' 2.1.9 (Revelle, n.d.) and 'matrixTests' 0.1.9.1 (Koncevičius, 2021) packages.

2.3.2 Results

2.3.2.1 Stability and the relationship between moral and self-expansion. The 30-item MES and SES demonstrated excellent internal consistency at both time points (αMES = .91-.92; αSES = .93-.94). Test-retest reliability for both scales was satisfactory, with MES showing moderate stability, $r(214) = .63$, $p < .001$, and SES displaying very good stability, $r(214) = .75$, $p < .001$.

The 30 item SES and MES shared meaningful variance at time one, $r(214)= .49$, $p < .001$, and time two, $r(214) = .50$, $p < .001$), moderate (Dancey & Reidy, 2007), borderline large correlations (Cohen, 1998). Including all 41 items, the SES and MES shared increased variance at both time points: $r_{T1}(214) = .56$, $p < .001$; $r_{T2}(214) = .60$, $p < .001$. Thus, the scales correlate moderately.

Unique patterns with demographic variables and political conservatism were observed for the MES and SES. The SES displayed small positive correlations with age $r_{T1}(214) = .20$, $p < .001$; $r_{T2}(214) = .18$, $p < .001$, and no relationship with political orientation. Conversely, the MES was unrelated to age, but displayed negative associations with political conservatism both time points: conservatism (economic), $r_{T1}(214) = -.22$, $p < .001$; conservatism (social), $r_{T1}(214) = -.22$, $p = <.001$; conservatism (economic), $r_{T2}(214) = -.20$, $p = .003$; conservatism (social), $r_{T2}(214) = -.18$, $p = .009$. There were no gender differences for either variable (for full output, see Supplementary Materials).

2.3.2.2 Distribution and Relationships of Entities in the Self-Expansion and Moral Concern Dimensions. There was consistency in how some entities were rated within the SES and MES, particularly with regards to the highest and lowest positions. *Family member*, *partner*, and *close friend*, followed by *Planet Earth*, scored highest, for both scales, while *murderer*, *child molester,* and *terrorist* scored lowest. However, placement of the remaining entities varied between the scales. With the exception of five technological items, entities scored higher for moral concern than for self-relevance. The correlation between the SES and MES ranged from small to moderate, $r(214) = .28$ for *family member* (a target which exhibited very low variance for both scales), to large, $r(214) = .78$ for *religious text*[6].

Figure 2.1 displays how entities scored on both self and moral dimensions at time one. Similar results were observed at time two. The axes are bifurcated halfway, i.e., score of 1.5, from 0 (no self-relevance / no moral concern) – 3 (maximum self-relevance / inner circle of moral concern). Some entities, specifically the four aforementioned entities, as well as *British citizen* at time one, scored highly on both self and moral dimensions (top right quadrant). Many other entities exhibited low to moderate self-relevance scores, i.e., less than 1.5, but higher scores for moral concern. No entities populated the bottom right quadrant (high self, low moral concern). However, some technological items (e.g., *cash*, *phone*, *computer*) teetered at the edge of this quadrant – indicating their relevance to individual's sense of self but of lesser moral concern.

[6] Opposite party did not correlate significantly at time one ($p = .08$). All other correlations were significant ($p < .001$).

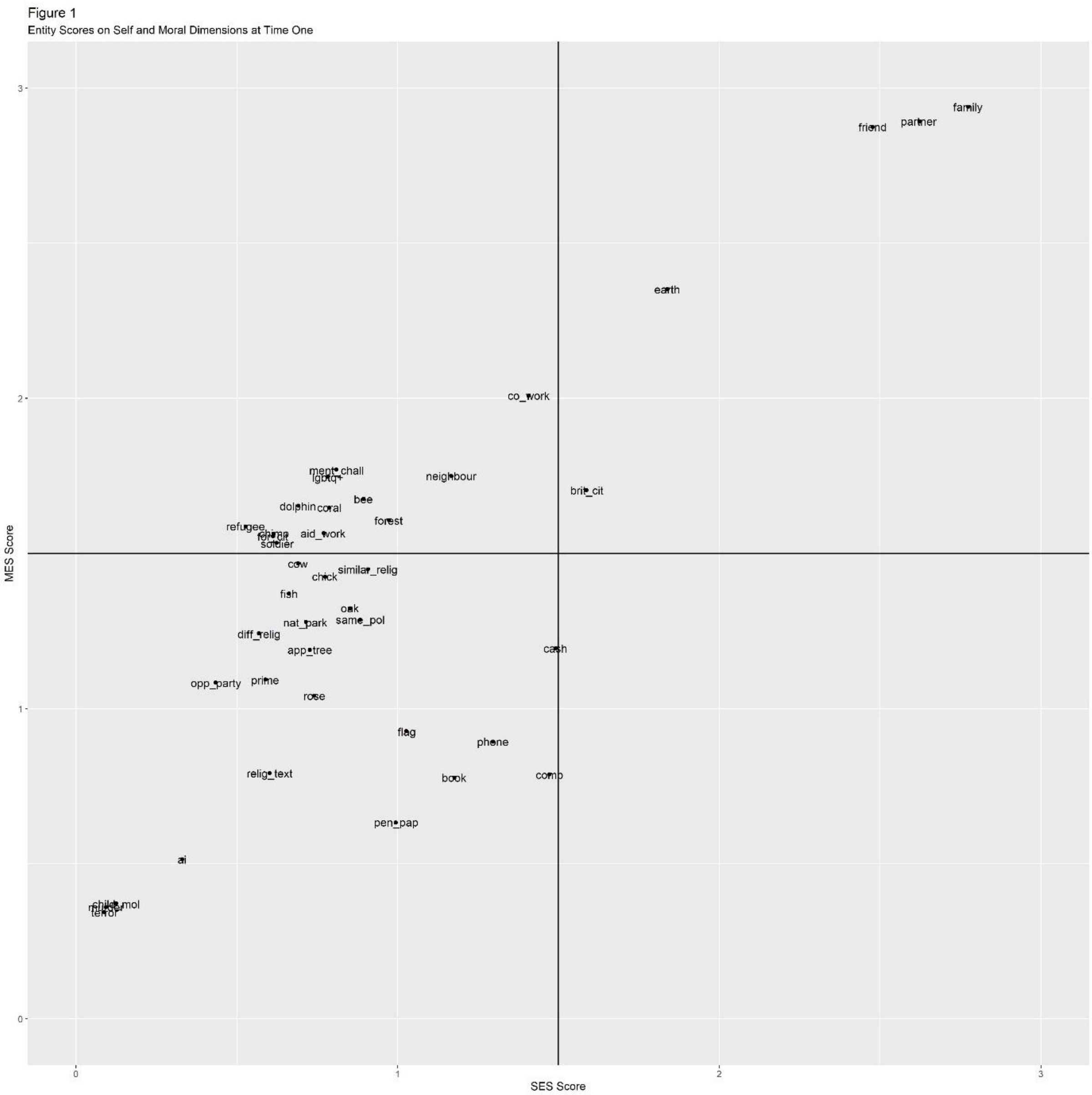

Figure 2.1. Entities graphed along the dimensions of Moral Expansiveness (MES) x Self-Expansiveness (SES) at Time 1.

2.3.2.3 Entity group categories. To further uncover insights into the relationship between moral and self-expansiveness, we employed a principal components analysis (PCA) on the individual entities from the MES to identify unique clusters along the moral dimension. The MES comprises a diverse set of entities, permitting an exploration of patterns of moral concern. As such an analysis had not been reported in the literature for the original entities[7],

[7] Rottman and colleagues (Rottman et al., 2021) later conducted a factor analysis for the MES, although the items used were quite different from the original formulation.

we sought to identify moral concern entity clusters to further unpack how the moral and self-concept dimensions relate and differ (See supplementary materials for details on the PCA).

Four distinct components were identified within the MES entities: nature-related entities (animals, plants, environmental targets, and *planet Earth*); diverse human entities (ingroups, outgroups, revered individuals, and stigmatised individuals); objects (five of the object/technological items (excluding *artificially intelligent robot* and *British flag*); and villain entities. *Family member*, *close friend*, *partner*, *artificially intelligent robot,* and *religious text* did not load with the four components. As the original research grouped the first three entities together ("friends and family"), and due to their *prima facie* similarity, we grouped them together (α = .36[8]). Artificially intelligent robot and religious text were excluded from subsequent analysis. We computed five composite variables based on the self-relevance and moral worth averaged across the items that loaded to each component (see Table 2.1). T-tests revealed distinct differences in ratings of self-expansion vs. moral concern. Correlations between the dimensions (Table 2.1) revealed that nature targets demonstrated the strongest relationship between self- and moral expansiveness, while humans showed the weakest.

[8] This result is similar to the original research which is due to low variance in how these entities were scored. These items were given maximum scores by most of the sample which is consistent with their centrality in people's moral worlds.

Table 2.1

Means, standard deviations, correlations, and t tests, between new entity categories on SES and MES, at time one in study one. In order of highest to lowest correlation between each entity group on self and moral dimensions

Variable	*M (SES)*	*SD (SES)*	*M (MES)*	*SD (MES)*	CORR.	T STAT	Entities
Nature	0.84	0.70	1.51	0.69	0.63***	-16.44***	apple tree, bee, chicken, chimpanzee, coral reef, cow, dolphin, fish, old growth forest, oak, National Park (Lake District), rose, planet Earth
Villains†	0.10	0.36	0.36	0.66	0.59***	-7.01***	murderer, terrorist, child molester
Objects	1.24	0.66	0.87	0.70	0.57***	8.74***	book, cash, computer (laptop or desktop), British flag, pen & paper, phone
Humans (excluding family & friends)	0.83	0.52	1.53	0.56	0.44***	-17.78***	individual from a different religious background, individual from same political party, foreign citizen, individual from a similar religious background, individual from opposite political party, lgbtq+ individual, refugee, aid worker, neighbour, mentally challenged individual, British citizen, British prime minister (position, not specific individual), British soldier
Family & friends†	2.62	0.51	2.90	0.28	0.38***	-8.54***	family member, close friend, partner

Note. SES = Self-expansiveness Scale. MES = Moral Expansiveness Scale. M and SD are used to represent mean and standard deviation, respectively. Individual Entity Scores range between 0 (Irrelevant to self / outside of moral concern) and 3 (Maximum self-relevance / moral concern). Scores adjusted to be on a 0 - 3 scale. * indicates $p < .03$. ** indicates $p < .01$. *** indicates $p < .001$. †Family & friends and Villains exhibited very low variance, with ceiling and floor effects respectively, which limits the suitability of drawing conclusions from the correlations and t-tests.

Overall, entities were considered more central to moral concern than self-relevan (seen in Figure 2.2 below). Technological entities, however, scored higher for self-relevance than moral concern. Family and friends occupied equivalent positions for both self-relevance and moral concern. Villains were considered outside both the self-concept and moral concern.

Figure 2.2. Radial graph representing the average SES and MES scores for various entity types within the sample. Higher scores are depicted by proximity to the centre, indicating stronger identification or moral concern, while lower scores are represented by distance from the centre.

2.3.3 Discussion

Study 1 established a foundation for exploring the dynamic interplay between self-expansion and moral expansiveness. Findings revealed a moderate to large relationship between moral concern and self-expansion, across 30 to 41 unique entities. Yet, as well, each construct exhibited distinctive patterns and relationships. Relative to moral expansiveness, self-expansiveness tended to be lower on average towards the entities, with higher levels of variation between participants. Self-expansion was more temporally stable and did not significantly relate to political orientation.

The moderate to large relationship confirms that the degree of identification with an entity is a source of moral concern for that entity. The entity- and category-level analysis revealed that nature entities exhibited this relationship most strongly, with variation along the identification dimension highly correlated with moral concern values. As predicted, objects were a unique category, scoring significantly higher on self-relevance than moral concern, which underscores their relative greater importance for the self-concept than for moral concern. Unexpectedly, friends and family, though they were highly identified with and engendered moral concern, did not exhibit self x morality correlations, likely due to the low level of variability (i.e., ceiling effects were observed along both dimensions).

2.4 Study 2

2.4.1 Method

Study 2 was preregistered on the open science framework (follow link at end for an anonymised version of pre-registration) and reports of all measures, manipulations, and exclusions, as well as data, analysis code, and materials are available for download here.

2.4.1.1 Sample. Three hundred and thirty UK participants (67.27% female; Mage = 31.57, SD = 10.70) were sourced through Prolific. Four Prolific pre-screening criteria were used to invite suitable participants. Participants had to be UK citizens, residing in the UK, Study 1 participants were ineligible for Study 2, and were required to believe that climate change is real. Belief in climate change was required since it is a necessary pre-requisite for action on climate change. We suspected that many people believe climate change is real but do not engage in environmental activism and/or identify as an environmental activist. Indeed, a high proportion of the UK public believe climate change is real[9] as of July 21st, 2021 (YouGov, 2021), and Prolific's participant pool has a similarly high proportion that believe climate change is real[10]. Three-hundred and twenty-nine participants opted to report their ethnicity: 90.30% White; 3.64% Asian or Asian British; 3.33% Mixed or multiple ethnic groups; 1.82% Black, African, Black British or Caribbean; 0.61% other ethnic group; and 0.3% preferring not to say. The mean political ideology score on economic issues was 3.09 (SD = 1.50), and on social issues was 2.67 (SD = 1.54) scales ranging from 1 (Very liberal) to 4 (Moderate) to 7 (Very conservative). We calculated our required sample size based on research which found generally small effects e.g., donating a kidney, signing a petition etc.,(Crimston et al., 2016). Based on the range of values observed in Crimston et al.'s study an f^2 estimate of 0.05 (a very small effect) was the minimum effect size that our study aimed to identify. According to GPower, for a multiple regression, a sample size of 288 is required to find small effects of $f^2 = 0.05$, at a significance level of .05, and 90% power. Our final sample size of 330 participants ensured that planned analyses were adequately powered.

2.4.1.2 Measures. See Appendix Items Study 2 for complete measures.

Expansiveness Scales. The MES and SES were measured and scored using methods described in Study 1. The 30-item SES had excellent internal consistency (α = .94), with a

[9] This survey found that 71% believe that the world's climate is changing as a result of human activity, 13% believe the world's climate is changing but not because of human activity, a further 13% not being sure, and finally 2% believing the world's climate is not changing.

[10] Prior to commencing the study (18:42 on Monday 13th of September 2021) a pool of 28,804 participants, who had been active in the past 90 days, were asked this question on Prolific and satisfy the other aforementioned pre-screening criteria. Of these 26,888 (93.3%) participants selected 'Yes', 1247 (4.3%) selected 'Don't know', 497 (1.7%) said 'No', and 172 (0.6%) selected 'Not applicable / rather not say'.

mean of 0.92 ($SD = 0.45$), suggesting a relatively low level of self-expansiveness on average. The MES had excellent internal consistency (α = .92), with a mean of 1.60 ($SD = 0.43$), indicating a moderate level of moral expansiveness on average.

Identification as an environmental activist. Identification as an environmental activist, as a form of politicised environmental identity, was measured using 8 items adapted from Cameron (2004), half of which were reverse scored, e.g., "The idea that I am an environmental activist rarely enters my mind" (see also Mackay et al., 2021b). Higher scores indicate stronger identification. Options were scored from 1 – 7. Higher scores indicate stronger identification. The scale had excellent internal consistency (α = .84), with a mean of 3.40 ($SD = 1.03$), indicating a neutral or ambivalent stance towards identification as an environmental activist on average.

Frequency of activism. The activism orientation scale (AOS; Corning & Myers, 2002) was adapted to measure self-reported frequency of environmental activist behaviours. The original scale assessed a person's *likelihood* of engaging in political activism. We were interested in assessing a person's *frequency* of behaviours related to environmental activism, and therefore asked, "How often do you engage in the following activities related to environmental activism?", followed by 34 items completing this stem, e.g., "display a poster or bumper sticker with an environmental message". Respondents indicated how often they engage in each behaviour using a scale with points of 0 (never do this), 1 (rarely do this), 2 (sometimes do this), or 3 (often do this). Higher scores indicated greater engagement in activist behaviours. Excellent internal consistency was attained (α = .94), with a mean of 0.49 ($SD = 0.38$), suggesting that, on average, participants engage in environmental activist behaviours at a relatively low frequency.

Signing up to the Climate and Ecology Bill. We selected the UK-based supporters' campaign for the Climate and Ecology Bill (Climate and Ecology Bill, 2022), formerly the

Climate and Ecological Emergency Bill. This was chosen to extend the research beyond self-report measures and provide a real-world measure of pro-environmental behaviour (van der Linden, 2019). The bill had its first reading in the House of Commons on the 21st of June 2021. Study 2 was conducted in September 2021. Participants were presented with information about the campaign and were then asked:

> "Would you like to join the Climate and Ecological Emergency Bill campaign? We remind you that your responses and personal data are anonymised in this study. The information collected by the CEE campaign is not connected with this study. It is your choice whether you would like to sign this bill or not. Your response does not affect your participation in this study."

Participants could answer either "Yes" or "No". Participants who said "No" proceeded to the next part of the study (identification with environmental activists) and were assigned a score of '0'. Those that selected "Yes" were then presented with a hyperlinked statement 'Join the CEE campaign' and were instructed to click it if they wished to join. If they no longer did, they could click through to the next part of the study. We amended the HTML and Java script to record whether participants clicked on the link or not. If they clicked on the link, it was automatically coded as a '1'. If they opted to skip to the next part of the survey, then their response was coded as a '0' (i.e., unwilling to support the bill). 167 indicated they were not willing to join, 91 indicated they were willing to join but did not, and 72 followed through (22% of the sample).

Demographic variables. Demographic variables from Study 1 were used.

2.4.1.3 Procedure. Participants completed either the SES or MES first (order was randomised), then the AOS, followed by the CEE bill, identification as an environmental activist scale, and lastly the demographic questions. The identity questions were placed after the behaviour measures to avoid making an environmental identity salient prior to these questions.

2.4.1.4 Analysis Plan. Our pre-registered analysis plan was to use appropriate logic models based on the distribution of the data. To make for a fair comparison with the MES, we used the original 30 item versions of the SES and MES for all analyses. We calculated a sample-justified alpha ($\alpha stan = \frac{\alpha}{\sqrt{\frac{N}{100}}} = \frac{0.05}{\sqrt{\frac{330}{100}}} = .028$). We conducted analyses using R 4.1.1 (R Core Team, 2021) in RStudio 1.4.1717 (RStudio Team, 2021). Main analyses were conducted using base R, 'car' (Fox et al., 2019), 'HMisc' 4.6.0 (Harrell Jr., 2021), 'matrixTests' 0.1.9.1 (Koncevičius, 2021), 'psych' 2.1.9 (Revelle, 2021), and 'QuantPsyc' 1.5 (Fletcher, 2012) packages. To assess the unique contribution of self-expansiveness we performed hierarchical regressions with three tests for each dependent variable: (a) identification as an environmental activist; (b) frequency of activism behaviours; (c) support for the CEE bill. Demographic variables to include in the model were chosen based on their relationship with self and moral expansiveness: age was positively associated with SES scores and political conservatism had a negative relationship with MES scores. At step one we entered the control variables; at step two we included the MES; at step three we included the SES. To correct for multiple tests a Bonferroni correction was performed that resulted in revising alpha from .028 to .009. Bootstrapped regressions were used to assess the robustness of the results as they do not rely on assumptions of normality or homoscedasticity (Field et al., 2012). A hierarchical logistic regression was employed for the dichotomous CEE bill measure.

2.4.2 Results

Correlations between the measures are reported in Table 2.2. There were no gender differences for any of the key variables (SES, MES, activist identification, activism) – see Supplemental Materials for details.

Table 2.2

Means, standard deviations, and correlations between self-expansiveness, moral expansiveness, age, political conservatism, activism frequency, identification with environmental activists, and the Climate and Ecological Emergency bill

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. SES	0.92	0.45	___	___	___	___	___	___	___
2. MES	1.60	0.43	.46***	___	___	___	___	___	___
3. Age	31.57	10.7	.21***	.20***	___	___	___	___	___
4. Conservatism (social issues)	2.67	1.54	.03	-.21***	.11	___	___	___	___
5. Conservatism (economy)	3.09	1.50	.00	-.21***	.06	.73***	___	___	___
6. Activism Frequency Score	0.49	0.38	.30***	.38***	-0.03	-.29***	-.34***	___	___
7. Identification with environmental activists	3.40	1.03	.24***	.29***	-.13*	-.27***	-.33***	.6***	___
8. CEE Bill			-.01	.13*	.00	-.19***	-.20***	.27***	.27***

Note. SES = Self-expansiveness Scale. MES = Moral Expansiveness Scale. CEE Bill is Climate and Ecological Emergency Bill. M and SD are used to represent mean and standard deviation, respectively. * indicates $p < .028$. ** indicates $p < .01$. *** indicates $p < 001$. CEE bill correlations are point biserial correlations

2.4.2.1 Identification as an environmental activist. In support of our pre-registered hypotheses both self and moral expansiveness related to identification as an environmental activist (see Table 2.2)[11]. Adding in MES score at Step 2 (Table 2.3) contributed a significant amount of variance over and above the control variables. Adding in SES score at Step 3 contributed a significant amount of variance over and above the control variables and the MES. Thus, as predicted, having a moral- and self-expansive identity predicted activist identification.

[11] This hypothesis was part of a mediation hypothesis (identification with environmental activists mediating effect of self and moral expansiveness on behaviour) which we do not include in this study due to issues of interpretation (Rohrer et al., 2022) and the design of our study i.e., correlational (see here for mediation analysis). A necessary first part of this hypothesis is that the independent variables relate to the mediating variable i.e., identification with environmental activists. This first part is supported by the observed data.

Results of the multiple regression indicated that the model explained 21% ($r^2 = .213$) of the variance and significantly predicted identification as environmental activists, $F(2, 321) = 17.37$, $p < .001$. A medium effect size ($f^2 = .251$) (Cohen, 1988) was observed for the model. There were no issues of multicollinearity (all VIFs < 3). A bootstrap analysis (10,000 iterations) revealed that the model was stable (see link here).

Table 2.3

Hierarchical Regression: Identification with environmental activists as criterion

Predictor	*B*	*B* 95% CI [LL, UL]	*Beta*	*Beta* 95% CI [LL, UL]	Fit	Difference
(Intercept)	35.33***	[32.24, 38.42]	-0.03	[-0.11, 0.10]		
Age	-0.08	[-0.16, -0.00]	-0.10	[-0.21, -0.00]		
Political conservatism (social issues)	-0.25	[-1.06, 0.56]	-0.05	[-0.20, 0.11]		
Political conservatism (economy)	-1.60***	[-2.42, -0.77]	-0.29***	[-0.44, -0.14]		
					R^2 = .12***	
(Intercept)	27.578	[23.32, 31.84]	0.00	[-0.10, 0.10]		
Age	-0.127**	[-0.21, -0.05]	-0.17**	[-0.27, 0.06]		
Political conservatism (social issues)	-0.044	[-0.83, -0.75]	-0.01	[-0.16, 0.14]		
Political conservatism (economy)	-1.41***	[-2.22, -0.61]	-0.26***	[-0.40, -0.11]		
MES	0.17***	[0.10, 0.24]	0.27***	[0.16, 0.37]		
					R^2 = .19***	
						ΔR^2 = .064***
(Intercept)	27.842	[23,65, 32.04]	0.00	[-0.98, 0.10]		
Age	-0.142***	[-0.22, -0.06]	-0.18***	[-0.29, -0.08]		
Political conservatism (social issues)	-0.160	[-0.94, 0.62]	-0.03	[-0.18, 0.12]		
Political conservatism (economy)	-1.42***	[-2.21, -0.63]	-0.26***	[-0.40, -0.11]		
MES	0.114**	[0.04, 0.19]	0.18**	[0.06, 0.29]		
SES	0.117***	[0.05, 0.19]	0.19***	[0.08, 0.30]		
					R^2 = .21***	
						ΔR^2 = .028***

Note. B represents unstandardised regression weights. B*eta* indicates the standardised regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. * indicates p < .028. ** indicates p < .01. *** indicates p < .001. Only values of p < .009 are considered significant. Age in model 2 and MES in model 3 satisfied this criterion.

2.4.2.2 Frequency of activist behaviours. In support of our first two pre-registered hypotheses, both SES and MES scores significantly related with frequency of reported activism (see Table 2.2). Inclusion of MES scores at Step 2 significantly enhanced the model's predictive power. Including SES scores at Step 3 additionally contributed to the overall model (see Table 2.4). Thus, as predicted, having an expansive self and moral concern was predictive of engaging in environmental activism.

Results of the multiple regression indicated that the full model explained 26% ($r^2 = .257$) of the variance and significantly predicted activism engagement $F(2, 321) = 22.17$, $p < .001$. A medium effect size ($f^2 = .325$) (Cohen, 1988) was observed for the full model, with no issues of multicollinearity (all VIFs < 3). A bootstrap analysis revealed that the model was stable (see link here).

Table 2.4
Hierarchical Regression with activism frequency as the criterion

Predictor	*B*	*B* 95% CI [LL, UL]	*Beta*	*Beta* 95% CI [LL, UL]	Fit	Difference
(Intercept)	26.52***	[21.65, 31.39]	0.01	[-0.10, 0.11]		
Age	-0.01	[-0.13, 0.12]	-0.01	[-0.11, 0.10]		
Political conservatism (social issues)	-0.82	[-2.10, 0.46]	-0.097	[-0.25, 0.06]		
Political conservatism (economy)	-2.33***	[-3.63, -1.03]	-0.27***	[-0.42, -0.12]		
					R^2 = .12***	
(Intercept)	10.90**	[4.35, 17.44]	0.00	[-0.09, 0.11]		
Age	-0.10	[-0.22, 0.02]	-0.09	[-0.18, 0.02]		
Political conservatism (social issues)	-0.4	[-1.61, 0.81]	-0.05	[-0.19, 0.10]		
Political conservatism (economy)	-1.97**	[-3.20, -0.74]	0.23**	[-0.37, -0.09]		
MES	0.34***	[0.24, 0.44]	0.34***	[0.24, 0.44]		
					R^2 = .22***	
						ΔR^2 = .10***
(Intercept)	11.35***	[4.93, 17.76]	0.01	[-0.08, 0.10]		
Age	-0.13	[-0.25, -0.01]	-0.11	[-0.20, -0.01]		
Political conservatism (social issues)	-0.60	[-1.79, 0.59]	-0.07	[-0.21, 0.07]		
Political conservatism (economy)	-1.98**	[-3.18, -0.77]	-0.23**	[-0.37, -0.09]		
MES	0.25***	[0.14, 0.36]	0.25***	[0.13, 0.36]		
SES	0.20***	[0.10, 0.30]	0.21***	[0.10, 0.32]		
					R^2 = .26***	
						ΔR^2 = .03***

Note. B represents unstandardised regression weights. B*eta* indicates the standardised regression weights. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. * indicates $p < .028$. ** indicates $p < .01$. *** indicates $p < .001$. Only values of

$p < .009$ are considered significant. Political conservatism on economy, in model 2 & 3, and MES in model 3 satisfy this criterion.

2.4.2.3 Signing the CEE bill. At Step 1, the model (X^2(3, N = 327) = 15.52, p = .0014) significantly outperformed the null model. However, none of the individual predictors were significant. Inclusion of MES scores at step 2 did not improve the model (X^2(1, N = 327) = 2.21, p = .137), nor was the MES a significant predictor (p = .14). Similarly, adding in SES at step 3 did not improve the model (X^2(1, N = 327) = 1.03, p = .311), and the SES was not a significant predictor (p = .31) (see Supplements Study 2). Thus, neither self nor moral expansiveness predicted support for the CEE bill above the contribution of age and political orientation.

2.4.3 Discussion

The results of Study 2 demonstrate the role of moral and self-expansiveness in understanding pro-environmental activism. We found that individuals with wider moral circles, coupled with a more expansive sense of self, were significantly more likely to identify as activists and actively engage in pro-environmental activism. This evidence highlights the value of expansive self-concepts and moral concern in fostering activist engagement. The exploratory work on self-expansiveness also underscores its unique contribution, alongside moral expansion. These results contribute to our understanding of expansiveness, both as a stable moral dimension and self-oriented construct. They also hint at a possible mechanism for promoting pro-environmental action—namely, the cultivation of an expansive self-concept. However, neither measure was sufficient for predicting signing of the CEE bill. Below, we discuss possible reasons for this null result, including the complexity of factors that impact on individual pro-environmental actions.

2.5 General Discussion

The current research extends perspectives on moral expansiveness and self-identification to pro-environmental behaviour. It also explores the relationship between moral concern and identification processes, thereby enhancing our understanding of moral expansiveness. We discuss each of these contributions in turn.

Study 1 provided some evidence for the intricate relationship between identification processes and moral expansiveness. Overall, individuals with an expansive self-concept also tended to be morally expansive. However, the relationship between identification and moral concern varied based on entity groupings. Concern for nature-related entities was particularly related to identification processes, with greater concern shown when the entity comprised a more central part of the self. This finding is consistent with past work that has shown that identification with nature (Mackay, Cristoffanini, et al., 2021b) and time spent in nature (DeVille et al., 2021) relate to taking greater prosocial action for the environment. Human targets benefited least from identification processes. Such targets may rely less on identification process for moral concern due to anthropocentric values (e.g., speciesism) ensuring that human targets are prioritised irrespective of identification processes (Kopnina et al., 2018).

Another finding is that some entities were important for a person's self-concept but lacked moral relevance. Technological objects had quite high self-expansion scores, second only to family, yet were rated substantially lower on moral concern (just above villains). Despite being non-sentient, these objects were granted *some* moral relevance. Furthermore, the extent to which participants identified with them strongly coincided with how much concern they were conferred. This highlights the importance of objects to a sense of self (Belk, 1988; 2016), but it also challenges the notion that mind attribution is a strict requirement for moral consideration (see Gray et al., 2007; Gray et al., 2012).

Our findings suggest that identification may be sufficient to confer moral consideration for some non-sentient entities. An excellent illustration of this is "place attachment" (Altman & Low, 1992; Devine-Wright & Clayton, 2010; Scannell & Gifford,

2010) and “place identity” (Proshansky et al., 1983), whereby identification with and attachment to a territory or geographic space can feed into a sense of moral responsibility for the place and impact environment protecting behaviours (Carrus et al., 2005; Raymond et al., 2011; Rozin & Wolf, 2008).

2.5.1 Interplay of Self and Moral Expansiveness in Environmental Activism

Study 2 explored the importance of an expansive self and morality for environmental activism using both self-report and real-time measures of activism. Extending the moral expansiveness literature (Crimston et al., 2016), we found that moral expansiveness is significantly associated with having an environmental activist identity and engaging in related forms of activism. This offers evidence for the view that expanding one’s moral circle (Crimston et al., 2016; Singer 1981) can encourage pro-environmental action.

Likewise, individuals with more expansive selves tended to engage in more environmental activism and identify more strongly as activists. Given the relative stability of the self-concept over time, expansion of the self-concept, especially in relation to natural entities, may impact environmental action in the longer term. Our findings on the expansive self supplements existing research which emphasises the critical role of identity for pro-environmental behaviour (Clayton, 2003; Vesely et al., 2021; Whitmarsh & O’Neill, 2010).

Self-expansiveness contributed a small but significant amount of explanatory power beyond moral expansiveness, providing further distinction between these constructs. Nonetheless, as we observed in Study 1, these constructs are somewhat correlated, therefore, their role within pro-environmental action is bound to be complex and, to some degree, interwoven. Thus, efforts to promote pro-environmental action will benefit from considering pathways to either or both a more expansive self or moral circle.

2.5.3 Limitations and Future Directions

There were several limitations to this research. Firstly, it is important to recognise that the SES, although informative for our exploratory purposes, has not undergone extensive validation procedures typical of psychometric scales. We encourage other researchers to conduct further validation studies to determine how self-expansiveness may show discriminant and convergent validity in relation to other relevant variables and processes (e.g., connectedness with nature).

The correlational nature of the design limits causal inferences. We have examined expansiveness as a tendency which varies between individuals, however, it might also be looked at as a product of a particular set of experiences. While we propose a direction from an expansive self-concept to pro-environmental behaviours, like moral concern, identity can be conceived both as a predictor and an outcome (Devine-Wright & Clayton, 2010). It is possible that engagement in environmental activism shapes the extent to which individuals include entities in both their self-concept and moral circles.

Evidence suggests that cultural context significantly influences the extent of people's moral circles. For instance, societies with higher levels of generalised trust and perceptions of a strong social fabric have been reported to exhibit greater moral expansiveness (Kirkland et al., 2022). Place attachments, likewise, are a cultural force shaping the way groups of individuals value different localities and relate to landscapes both for their identity and moral values (Basso, 1996), and therefore will be an important source of group-level variation in moral concern.

The SES provides a broad sense of the expansiveness of a person's sense of self. However, it does not provide a detailed measure of a person's identification with specific targets (e.g., animals), which may be multi-faceted (Amiot et al., 2019). We observed ceiling and floor effects for a few of the entity groups, particularly Family (ceiling) and

Villains (floor), for both moral and self-expansiveness ratings. This reduced variability restricted their relevance within correlational analysis. Nonetheless, it would be faulty to conclude from this that these groups are unimportant for identity or moral valuation. Furthermore, our ability to generalise the results are constrained both by the UK context that we studied, and the set of entities used within the tasks. Future work should continue to test self-expansion in other cultural contexts and using additional targets of concern.

Future research should continue to explore ways of reliably assessing environmental activism within cross-sectional studies that do not rely exclusively on self-report. Our behavioural measure of environmental activism – signing the CEE bill – yielded low levels of willingness across the sample. This suggests that there may have been circumstantial reasons not to sign the bill that made signing an unlikely action in this context (e.g., doubt in the efficacy of bills, distrust of the website, etc.). To better understand pro-environmental activism, and whether self or moral expansiveness have predictive utility for real world pro-environmental behaviours, future research could examine other forms of action that pro-environmental advocates take (e.g., attending a protest event).

Finally, the SES is agnostic about what factors promote entity identification or how such identification influences moral concern. These are important directions for future research, particularly within the context of pro-environmental action, where increasing identification with natural entities could foster greater interest in pro-environmental action. To facilitate self-concept expansion, future research could explore several potential pathways. One strategy is to promote the recategorisation of the self. For example, emphasising shared qualities between humans and animals (Bastian et al., 2012) or highlighting our interconnectedness with nature might expand individuals' sense of self to include these broader ecological systems. In addition, participation in groups that value particular entities, such as wildlife conservation organisations or environmental activist groups, could reinforce identification with these entities thereby expanding moral concern and stimulating more active engagement in pro-environmental behaviours.

2.6 Conclusion

Our exploration of moral and self-expansiveness offers insights into the psychology of pro-environmental activism. We found that the self-concept can include a wide range of entities and that inclusion of entities in the self-concept is an important factor in moral circle inclusion—especially with regards to natural entities. Crucially, we found that expansive moral circles and expansive self-concepts are predictive of environmental activist identity and activity, pointing to the potential of expansiveness as a pathway for responding to global challenges.

Chapter Bridging Page: From Expansiveness to Scientist-Activism

Paper 1 presented an exploration of self-expansiveness, a multi-dimensional and inclusive understanding of the self, examining its relationship with moral expansiveness, and their individual and combined contributions to environmental activism. Study 2 highlighted that while both constructs are valuable, social identity, specifically activist identity, emerged as a more significant correlate of environmental activism and it alone predicted take-up of the Climate and Ecology Bill. While individuals with more expansive selves and moral circles identified more as activists and self-reported more engagement, this did not translate into action. One of the promises of the MES is that it describes both the relative breadth and depth of individual moral circles while also acting as a predictor of real-world prosocial behaviours. With respect to my research, it is on this latter point that both the MES and SES failed. Greater self and moral expansiveness were positively associated with activist identity. Activist identity was associated with the behavioural measure leading some weight to the utility of self and moral expansiveness. However, it is possible that an individual's sense of self and moral circle expands and deepens through engaging in environmental activism and identifying as an activist rather than the other way around. For example, engaging in activism due to general concern about climate change and undergoing the self-learning required to be an advocate could lead to an appreciation of the interconnection of issues as diverse as climate change, animal welfare, deforestation, and air pollution, leading to a new sense of self and expanded moral circles. Of course, the truth is likely more complex with these processes dynamically affecting one another i.e., a tendency towards expansiveness increases likelihood of caring about environmental issues which through action encourages an expansion of self and moral concern, and so on. Future work could unpack how these processes unfold but for this thesis, a strategic choice was made to park the work on expansiveness. The evolving fieldwork and emerging literature trends highlighted the significance of scientist-activism, a niche yet impactful subset within environmental movements. This trend underscored the need for a nuanced examination of the interplay between scientific identity and activism, motivating a strategic shift in research focus.

The decision to pivot to scientist-activism was guided by multiple factors. The limitations identified in the expansiveness research, particularly the limited predictive power of the Self-Expansiveness Scale (SES) in real-world activism, coupled with the compelling emergence of scientist-activists, presented a unique research opportunity. This shift was further reinforced by the feedback received through the peer review process of Paper 1. The paper underwent two rounds of reviews, first at the European Journal of Social Psychology and later at the Journal of Environmental Psychology. The feedback from these reviews was instrumental in both improving the paper and highlighting its limitations, particularly regarding the validation of the Self-Expansiveness Scale (SES). Reviewers suggested further conceptual development and additional validation for the Self-Expansiveness Scale (SES). While some critiques were addressed, others highlighted the scale's inherent limitations and the need for more validation studies. Psychology suffers from a proliferation of constructs and measures with a majority only being used once or twice. This has been called the "toothbrush problem: no self-respecting psychologist wants to use anyone else's" which Elson and colleagues argue is fragmenting psychology and preventing standardisation (Elson et al., 2023). This observation, along with the peer review process, underscores that the value of the SES is as an exploratory concept rather than a psychometric instrument for widespread use. The SES's contribution lies in illustrating the relationship between identification and moral concern processes in environmental activism. As such, investing time and money into further scale validation were deemed inadvisable. Furthermore, the extended timelines of the peer review process (7 months for the first review, and almost 5 for the second), combined with the concurrent development of research on scientist-activism, also influenced the decision not to pursue extensive revisions to the SES within the timeframe of this thesis.

Post-thesis, my plan is to publish the findings on the SES, shifting the focus from its use as a measurement tool to its theoretical implications, acknowledging both its contributions and limitations. This is important for two reasons. First, the research offers insights into the interplay of identity and moral concern in environmental activism. Second, all research findings should be published even where results are not favourable. Acknowledging and publishing results whether they are successful or unsuccessful allows the scientific community to fully assess the utility of a tool like the SES, guiding future research more effectively and preventing duplicative efforts.

The upcoming papers examine the nuanced dynamics of scientist-activists, exploring how their scientific identity intersects with and influences their activist roles. Each paper applies a unique methodology: surveys for quantitative insights (Paper 2), interviews for in-depth qualitative perspectives (Papers 3 & 4), and ethnographic fieldwork to capture the real-world intricacies of scientist-activism (Paper 5). This diverse methodological approach was chosen to enrich understanding of how scientific identity interacts with and influences environmental activism, offering fresh perspectives on environmental social movements.

Chapter 3: Paper 2 Scientists' Identities Shape Engagement with Environmental Activism

Note: The paper in this chapter is the revised version submitted to Nature Communications Earth and Environment, following acceptance for publication: https://www.nature.com/articles/s43247-024-01412-9. The format of this paper in the thesis differs from the published version. In Nature publications, the structure typically follows an Introduction, Results, Discussion, References, Method, format. In contrast, this thesis version adheres to a more conventional academic format, with the Method section preceding the Results. This alteration was made to maintain consistency with the overall thesis format. It should be noted that the Limitations section is normally included with the Method in Nature journals while the Future Directions section is included before the Conclusion. This may be somewhat different from psychology journal formats. In this version, I have moved the Limitations to be just before the Future Directions to be more in keeping with more typical formats. In addition, the text is written in American English due to the journal requirements.

Abstract

Scientists are increasingly joining environmental movements. As knowledge producers and influential figures in society, scientists are uniquely positioned to drive change. The present study explored how “scientist identity” shapes engagement in environmental activism. Participants were 329 scientists from 41 countries. Scientist identity content, specifically perception of the science-activism relationship, was a stronger explanatory variable than strength of identification as a “scientist”. Perceiving a harmonious relationship between science and activism, endorsing environmental stewardship as a scientist’s duty, and believing objectivity and impartiality remained uncompromised by activism, each had significant correlations with engagement. These components formed a composite variable, which remained a robust explanatory variable of engagement even when accounting for the influence of activist identity. Scientists embracing scientist-activist compatibilism were also less inclined to view new technologies as a panacea for the climate crisis. This research underscores the vital role of scientist identity content in shaping climate actions and perspectives.

Keywords

Climate change, science, identity, science-activism compatibility beliefs, activism

3.1 Introduction

Climate change and biodiversity loss pose major threats to both human (IPCC, 2022) and ecological (IPBES, 2019) systems. Yet there is a significant gap between the scientific consensus (IPCC, 2023; Lynas et al., 2021; Myers et al., 2021) and policy action to change the trajectory (IPCC, 2023; SEI et al., 2023; United Nations Environment Programme, 2023). Beyond solely conducting research, scientists are now actively participating in environmental social movements to translate scientific knowledge into tangible actions (Capstick et al., 2022; Gayle, 2022; Tormos-Aponte & Frickel, 2020), often explicitly invoking scientist identity by wearing white lab coats. While there is a rich history of individual scientist-activists like Albert Einstein, Jane Goodall, and Carl Sagan, the climate crisis has brought to the forefront the question of whether scientists should engage as a collective in advocacy and activism. Involvement presents a dilemma, as the scientific community traditionally emphasizes objectivity and neutrality, discouraging overt political engagement (Betz, 2013; Castree, 2019; Lackey, 2007; Nelson & Vucetich, 2009; Nielsen, 2001; Sedlak, 2016). Consequently, politically active scientists find themselves challenging established scientific norms. This paper examines the associations between identity processes and climate action among environmentally concerned scientists.

3.1.1 Scientists and Environmental Social Movements

2017's worldwide March for Science was a catalyst for scientist-activism, with demonstrators marching in defence of scientific research and evidence-based policymaking (Reardon et al., 2017). It marked a significant moment in the broader discussion concerning the role of scientists as advocates and activists. This was not a one-off event. Scientists have engaged in diverse actions, blocking fossil fuel infrastructure (Oza, 2023), leaking the IPCC Report (Scientist Rebellion, 2021), and symbolically pasting scientific papers to government buildings (Gayle, 2022). Not only are climate and earth systems scientists engaged in action

(Vidal Valero, 2023a). Groups like Scientists for Extinction Rebellion (S4XR, 2023) and Scientist Rebellion (S4XR, 2023) include various natural and social scientists underscoring the interdisciplinary nature of environmental activism and highlighting the collective commitment across scientific disciplines. Furthermore, diverse scientific societies recognize the imperative for action. For example, the American Psychological Association has highlighted psychologists' critical role in research, community outreach, and advocacy, demonstrating widespread recognition of the urgency to address environmental challenges and the need for interdisciplinary collaboration (APA, 2022). These examples underscore how scientists are challenging conventional expectations of what it means to be a scientist.

3.1.2 The Scientist Identity: Detached Observer or Public Actor?

Scientist identity encompasses perceived norms, responsibilities, and values associated with being a scientist. Traditionally, scientists have been represented as impartial observers, conducting research, and offering evidence-based knowledge to inform policy-making and societal decision-making. Historically, the separation of science and advocacy, rooted in ideals of objectivity and impartiality, was argued to maintain science's integrity by reducing the influence of politics (Merton, 1973). More recent arguments similarly stress separation of science and advocacy as crucial for upholding the integrity (Betz, 2013; Nielsen, 2001), and credibility (Castree, 2019; Lackey, 2007; Nelson & Vucetich, 2009; Sedlak, 2016), of scientific inquiry. However, the robustness of the science on the adverse global effects of climate change (IPCC, 2023) has emboldened others to challenge these social norms arguing that scientists have a social and intellectual responsibility to act, and that maintaining scientific detachment is morally and intellectually unsustainable (Capstick et al., 2022; Gardner et al., 2021; Rodgers, 2023). Furthermore, academics have long critiqued this division since science inherently intersects with social, cultural, and political dimensions (Haraway, 1988; Isopp, 2015; Latour, 1987; Oreskes, 2020). Nonetheless, scientists' perceptions of these norms affect what they feel it is acceptable to do. Interviews with IPCC authors highlighted a tension between their desire to be politically active while adhering to values of objectivity and scientific credibility (Gundersen, 2020). Earth and environmental scientists expressed fears they would lose credibility amongst their peers for speaking up in public (Oppenheimer et al., 2019).

Despite these tensions, there is increasing evidence of widespread support for scientist advocacy and activism both from the public (Cologna et al., 2021) and within academia (Cologna et al., 2021; Dablander, Sachisthal, Cologna, et al., 2024a; Latter et al., 2024), suggesting a shift in how the scientist identity is conceptualized. However, engagement in activism is much lower than individual researchers' willingness to engage (Dablander, Sachisthal, Cologna, et al., 2024a; Latter et al., 2024). In line with the wider social psychological literature (Fritsche & Masson, 2021; Klandermans & Stekelenburg, 2014; Mackay et al., 2021a; Sparks, 2021; Vesely et al., 2021), two large scale UK (Latter et al., 2024) and international (Dablander, Sachisthal, Cologna, et al., 2024a) surveys both highlighted the role of negative perceptions of personal and collective efficacy, uncertainty about what to do, being connected with activists, and identification as an activist as factors moderating activism engagement. High workloads (Latter et al., 2024), inflexible institutions (Latter et al., 2024), and feelings of responsibility (Dablander, Sachisthal, Cologna, et al., 2024a), are additional factors for researchers. This emerging trend raises critical questions about the intersection of scientist identity with activism, prompting an examination of how the traditional scientist identity, rooted in objectivity and impartiality, aligns or conflicts with the inherently political nature of activism.

3.1.3 Activism and Social Identity

To understand the motivations driving scientists to engage in climate action, it is helpful to draw from the collective action literature. Identity processes are central to political engagement (P. G. Klandermans, 2014). Social identity theory posits that identification with a particular social group, along with group norms and values, shapes behavior and actions (Reicher et al., 2010; Tajfel & Turner, 1979). From a social-identity perspective, identifying as both a scientist and activist is likely to entail unique challenges, since the values associated with each may be perceived in conflict. Environmental activist identity, as a shared politicized social identity (van Zomeren et al., 2008), is critical for shaping motivations, behaviors, and self-perceptions of individuals engaged in environmental social movements (Mackay, Cristoffanini, et al., 2021a; Mackay, Schmitt, et al., 2021; Turner-Zwinkels, Postmes, et al., 2015). However, as a politicized identity, it may be perceived as at odds with the supposedly apolitical scientist identity, with its emphasis on objectivity and impartiality, creating a unique tension for environmentally concerned scientists. This raises the question of how scientists, engaged to a greater or lesser extent in advocacy and activism, manage the relative inter-identity fit between being a scientist and being an activist (Turner-Zwinkels, Postmes, et al., 2015).

3.1.4 The Current Research

The key question pursued in this research concerns whether core scientific values of objectivity and impartiality are perceived as compromised by activism, and whether this perceived tension relates to a scientist's degree of engagement in activism. We looked at this in several respects. First, we examined whether scientist identity—both strength of identification and the specific contents of a scientist's beliefs--played a unique role in motivating action, beyond the influence of other relevant factors , including perceptions of psychological closeness of climate change (Sparks, 2021b), personal and collective pro-environmental identities (Mackay, Schmitt, et al., 2021; Vesely et al., 2021) social (Klandermans & Stekelenburg, 2014; Mackay et al., 2021a) and ingroup norms (Mackay, Schmitt, et al., 2021), having activist friends (Klandermans & Stekelenburg, 2014), and a sense of collective efficacy (Fritsche & Masson, 2021; Mackay, Schmitt, et al., 2021). Within academia, high work demands and potential negative perceptions from colleagues and academic institutions (Gardner et al., 2021) may also pose barriers to action. Second, we employed a qualitative approach (thematic analysis) to explore the content of scientists' beliefs about the interplay between science and activism.

Finally, we explored how scientists' identity might relate with endorsement of 'techno-solutionism' (Morozov, 2013) i.e., the idea that all problems, including social, political, and cultural, are best solved by technology (S. F. Johnston, 2018). Techno-solutionism might attract certain scientists as a more controllable and less disruptive approach to addressing complex issues like climate change. From this viewpoint, climate change mitigation could be achieved via a 'technical fix' (Weinberg, 1994) without the need for action outside the remit of science. Consequently, 'techno-solutionism' could act as a countervailing force to collective action, as far as scientists are concerned.

3.1.5 Study Aims and Hypotheses

This pre-registered study aimed to understand the role of a scientist's social identity on activism engagement. Our research offers valuable insights into the determinants of scientists' involvement in climate change activism and their perceptions of the interplay between science and activism.

We hypothesized that:

1. Stronger identification with a scientist identity will be positively associated with greater engagement in climate change activism.
2. Stronger identification with an activist identity will be positively associated with participation in climate change activism.
3. Increased perceptions of compatibility between science and activism will be positively associated with participation in climate change activism.
4. Participants who strongly identify as scientists but perceive incompatibility between science and activism will be more likely to endorse techno-solutionism as a response to climate change.

To explore the relationship between a scientist’s identity, both in terms of strength and content, and engagement in environmental activism, a sample of 329 natural and social scientists from 41 countries (41.64% UK; 14.29% USA; 7.3% Germany; 4.56% Australia; 3.65 % Ireland) was recruited. Approximately half the sample (53%) indicated they were part of an activist group, such as Extinction Rebellion, Greenpeace, and Scientist Rebellion. Participants responded to measures of the strength of their identification with a scientist identity, the strength of their identification with an activist identity, their beliefs about the compatibility of science and activism (reflecting the content of their scientist identity, including values related to objectivity, impartiality, and a scientist's duty to advocate for the environment), their perceptions of whether activism compromised a scientist’s reputation or credibility, and their level of engagement in environmental activism. In addition, a measure was included to assess beliefs about ‘techno-solutionism’. Last of all, participants reported the impact of other engagement factors including perceptions of action efficacy, personal connections with activists (having activist friends or family), work commitments, and family commitments (see Methods for full list). These items were included to explore the relative impact of scientist identification when considered against more traditional structural impediments to action. Open-ended questions were included to provide additional context regarding perceived obstacles to, and benefits of, action.

To determine the relative importance of each variable for engagement, we built a set of regression models. These aimed to examine the association between our measured variables and the frequency of environmental activism, as well as the willingness to endorse techno-solutionism as a response to climate change. This allowed us to analyze not only the relationships between the measured variables and the outcome measures, but also the relative explanatory weight of each variable within the model. Given the approximately even split between activist-group-member scientists and non-activist-group-member scientists, we conducted additional analyses to compare the factors influencing scientists' activism between these two distinct groups. This comparison helped explore differences and assessed the robustness of our analyses, as group membership serves as another measure of activism engagement. Additional analyses were performed to examine differences between the natural and social sciences (see Supplements).

3.2 Method

This study was preregistered on the open science framework and reports of all measures, manipulations, and exclusions, as well as data, analysis code, and materials are available for download here.

3.2.1 Sample

Power analysis, based on a recent meta-analysis of studies examining identity correlations with climate-friendly intentions and behaviors (Vesely et al., 2021), determined a required sample size of 374 participants for correlations at 0.15 and above, with a 90% statistical power and a significance level of 0.05 (Brysbaert, 2019). Gpower was used for sample size calculation.

Participants were recruited via opportunity sampling on Twitter and via various scientific societies and were not paid for participation. Recruitment aimed for diversity among natural and social scientists concerned about climate change and who participated or not in climate-related advocacy and activism. Responses were collected between 12/02/2022 and 01/10/2022. Twitter was, at the time[12], as a hub for scientific communication and connecting scientists (Stokel-Walker, 2022), served as a suitable platform for recruiting scientists. Academic societies and environment centers were also targeted, including the Centre for

[12] Since its takeover and subsequent change to X many scientists have now left the site(Vidal Valero, 2023b), though this occurred after data collection had ceased.

Climate and Social Transformations at Cardiff, the Lund Sustainability Institute, and the Lancaster Environment Centre.

We specifically targeted scientists and social scientists concerned about climate change, whether engaged in activism or not. This focus was crucial for examining activism attitudes and behaviors within the scientific community. Although it excluded unconcerned or indifferent scientists, it aligned with understanding motivations and barriers to activism among those aware of and concerned by the issues. Additionally, both natural and social scientists were recruited to reflect the diverse representation seen in movements like Scientists for Extinction Rebellion and Scientist Rebellion, ensuring a comprehensive view of scientific activism on climate change and representing a wide range of scientific perspectives on environmental activism.

Four-hundred and fifty-four participants opened the survey, and 329 participants completed it (54.1% female, 40.7% Male, 2.4% Non-binary, 2.7% preferring not to say, M_{age} = 40.11 years, SD = 12.03, range = 22 - 77). 68 of these did not consent to participate and returned their submission. A further 23 consented but did not answer any questions. Finally, another 34 started but answered only a couple of questions before returning their submission. These partial responses were not considered for analysis. This criterion was essential to ensure a comprehensive assessment of the variables relevant to the research project. Given recent recommendations concerning alpha levels (Maier & Lakens, 2022), to increase confidence in the observed results, by minimizing Type 1 error rates, a sample-standardized alpha was calculated[13]:

$$\alpha stan = \alpha orig / \sqrt{\frac{N}{100}} \tag{1}$$

[13] In the equation $\alpha stan$ is the sample-adjusted significance level, $\alpha orig$ is the original significance threshold, and N is the sample size. This adjustment accounts for sample size differences to control for inflated Type I error rates (false positives).

After removing incomplete responses, the final sample was sufficiently powered (90%) to find correlations of .19 at the revised alpha level.

Participants were from 41 countries (41.64% UK; 14.29% USA; 7.3% Germany; 4.56% Australia; 3.65 % Ireland) and resided in 32 countries (51.37% UK; 11.55% USA; 5.17% Australia; Germany 3.95%; Canada 3.34%). In the recruitment of our study participants, we acknowledge that the UK is overrepresented in our sample. This is reflective of the UK's prominent role in recent climate activism and the establishment of key global activist groups such as Extinction Rebellion (of which Scientists for Extinction Rebellion are a part) and Scientist Rebellion. These movements have gained substantial traction and mobilized many scientists. As their discipline, 92 participants listed psychology (28% of sample), 62 biology (20%), 43 earth science (13%), 42 sociology (13%), and 25 engineering and technology (8%) (see Field Descriptives and Disciplines files on the OSF in the Tables folder). One-hundred and fifty-nine participants reported natural science as their primary discipline and 169 reported social science. Ninety participants listed two academic disciplines, and 28 listed three. The mean political ideology score on economic issues was 1.73 (*SD* = 0.96), and on social issues was 1.43 (*SD* = 0.82), scales ranging from 1 (Very liberal) to 4 (Moderate) to 7 (Very conservative).

3.2.2 Data Validation

To ensure data integrity, validity checks were implemented, including only complete responses for core measures and a CAPTCHA verification step to prevent automated bot participation. The high response rate for open-ended questions underscored participant engagement, with 292 participants identifying hindrances to action and 275 elaborating on perceived benefits, aligning directly with study objectives. Finally, a paired t-test revealed a significant difference between scientist (M = 5.26, SD = 1) and activist identity strength (M = 4.73, SD = 1.27), $t(328) = 6.36$, $p < .001$, reinforcing confidence in the recruitment strategy's effectiveness in targeting scientists with varying degrees of identification with environmental activism.

3.2.3 Measures

Note. A variety of scale formats were employed, including validated measures such as the social identity scales, climate risk perceptions, and activism engagement measure, alongside new items. The diverse nature of these measures prevented standardization to a common scale. However, correlations and regression results, including standardized weights, were analyzed to assess variable relationships. The use of a 5-point Likert scale for new items aligned with the established format of the climate risk perceptions scale, ensuring coherence and comparability across survey responses.

3.2.3.1 Scientist Identity Strength. The relative strength of scientist identity was measured using eight items adapted from a validated measure of social identity (Cameron, 2004), e.g., "I have a lot in common with scientists", half of which were reverse scored. Options were scored from 1 (Strongly Disagree) – 7 (Strongly Agree). Higher scores indicate stronger identification. The scale had excellent internal consistency (α = .91), with a mean of 5.26 (*SD* = 1), indicating a moderate level of identification as scientists.

3.2.3.2 Environmental-activist Identity Strength. The relative strength of environmental-activist identity was measured using eight items adapted from a validated measure of social identity (Cameron, 2004; Mackay, Cristoffanini, et al., 2021a), half of the which were reverse scored, e.g., “The idea that I am an environmental activist rarely enters my mind”. Options were scored from 1 (Strongly Disagree) – 7 (Strongly Agree). Higher scores indicate stronger identification. The scale had good internal consistency (α= .86), with a mean of 4.73 (*SD* = 1.27), suggesting agreement with activist identity, although falling between "neither agree nor disagree" and "somewhat agree."

3.2.3.3 Scientist-activist Compatibility. Four statements, generated by the authors, assessed views on the compatibility of being both a scientist and activist: "If I engaged in environmental activism, this would compromise my ability to be objective" (reverse-scored); "It is the responsibility of a scientist to remain completely impartial, and engagement in environmental activism is a great risk to this impartiality" (reverse-scored); "Being a scientist requires taking a stand for the environment"; "You can be both a scientist and an environmental activist". Options were scored from 1 (strongly disagree) to 5 (strongly agree). Principal components analysis and reliability testing found that the four statements functioned as an internally consistent index (α = .76; loadings ranged from .70 to .84, see Supplements for details). Higher scores indicate higher science and activism compatibility (*M* = 4.2, *SD* = 0.70, range: 1 - 5). Two other statements assessed concerns that engaging in activism would jeopardize one's reputation or credibility as a scientist: "If I engaged in environmental activism, others would see me as biased" (reverse-scored); "Engaging in environmental activism does not jeopardize my reputation as a scientist". Reliability testing found that both statements had an acceptable level of reliability as a two-item measure (α = .66; loadings ranged from .79 to .85, see OSF repository for full details). Higher scores indicate that activism does not affect a scientist's reputation and credibility (*M* = 3.21, *SD* = 0.92).

3.2.3.4 Climate Change Risk Perceptions. As a control measure, the perceived risk of climate change was assessed using two items adapted from validated items (van der Linden, 2015) rated on a 1 (strongly disagree) to 5 (strongly agree) scale of agreement, "Do you believe you will be negatively affected by climate change in your lifetime?" (*M* = 4.66, *SD* = 0.54, range: 2 - 5); "Do you believe those close to you, such as your friends and family, will be negatively affected by climate change?" (*M* = 4.73, *SD* = 0.51, range: 2 - 5).

3.2.3.5 Activism-engagement. Activism-engagement was assessed using an adapted version of the activism orientation scale (Corning & Myers, 2002) to measure self-reported frequency of environmental activist behaviors. Participants were asked, “How often do you engage in the following activities related to environmental activism?”, followed by 20 items completing this stem, e.g., “Display a poster or bumper sticker with an environmental message”. Respondents indicated how often they engage in each behavior using a scale with points of 0 (never do this), 1 (rarely do this), 2 (sometimes do this), or 3 (often do this). Higher scores indicate higher levels of activism. The scale demonstrated excellent internal consistency ($\alpha = .91$). The mean score was 1.45 (SD = 0.56), falling between “rarely” and “sometimes”, indicating a moderate level of activism involvement.

3.2.3.6 Techno-solutionism. To assess techno-solutionist inclinations, participants were presented the statement: “Inventing new technologies is the only way to successfully tackle climate change” and provided their level of agreement from 1 (strongly disagree) to 5 (strongly agree) (*M* = 2.04, *SD* = 1.06, range: 1 - 5). The item was phrased strongly (new technologies are the ‘*only way*’) to avoid ceiling effects, since most individuals likely agree that new technologies are important for tackling climate change. Formulated this way, agreement scores represented an endorsement of new technologies as the sole or primary solution. Two other statements related to “changing political systems” (*M* = 3.84, *SD* = 1.14, range: 1 - 5) and “changing human behavior” (*M* = 3.84, *SD* = 1.14, range: 1 - 5) were included, with similar strong phrasings. These items were included to provide alternatives to techno-solutionism as it was expected that scientists who viewed science as compatible with activism would show preference for political rather than technical solutions (see Supplementary Materials for details).

3.2.3.7 Other Engagement Factors. Other possible barriers [14]to activism were identified from the authors’ fieldwork with environmental activists and scientists and previous

[14] Note: The term "barriers," as initially described in the methods section, has been reevaluated to better reflect the complexity of factors influencing engagement in environmental activism. In the paper, these factors are

studies of volunteering and activism engagement (Gardner et al., 2021; Klandermans & Stekelenburg, 2014). Participants were asked, “Have you experienced any of these barriers to participating in any form of environmental activism?” and they indicated how much each item affected their participation in activism on a scale of 1 (no impact) to 5 (very significant impact). These included: *Work commitments, Family commitments, Financial limitations, Transport access, Concerns about visa/residency, Unsure about the effectiveness of activism, Unsure about what actions you can take, Don't know any family, friends, or colleagues engaged in climate action, Lack of interest in activism, Fears/worries about what other people might think of you, Lack of energy, and Concern about Covid-19.* Concern about COVID-19 was included as a control measure if required. The twelve items did not form a reliable index ($\alpha = .62$) nor did a principal components analysis reveal any reduced item indexes. Therefore, the items were tested individually.

3.2.3.8 Open Response Questions. Respondents were given an opportunity to write responses to two questions, ‘3 things that prevent people like you from taking action’ and ‘3 things that people like you gain from taking action’.

3.2.3.9 Demographic Questions. Measures of ethnicity, gender, age, and political orientation were included as demographic variables. Political orientation on social and economic issues were assessed using a 1 (left/liberal) to 7 (right/conservative) Likert scale.

3.2.4 Procedure

All materials were presented to participants via Qualtrics. After providing informed consent, participants completed the scientist and activist identity scales (administered in a counter-balanced order), followed by scientist-activist compatibility, climate change risk

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referred to as "additional factors" to emphasize their contribution to shaping activism participation. This adjustment acknowledges that while the items previously labelled as barriers remain relevant, other variables such as activist identity and scientist-activist compatibilism may also negatively impact engagement and could be conceptualized as barriers in specific contexts. Thus, using a broader term ensures clarity and inclusivity in discussing the various influences on activism engagement.

perceptions, activism-engagement, solutions to climate change, pragmatic barriers, activist group membership, and, lastly, demographics. Item presentation within each scale was randomized using Qualtrics' randomization tool.

3.2.5. Analysis Plan

3.2.5.1 Regression Models. The pre-registered analysis plan required the use of appropriate logic models (dependent on the distribution of the data) to assess relationships with activism and techno-solutionism. Activism frequency scores were normally distributed. However, techno-solutionism was positively skewed. Standard multiple regression was used with activism as the outcome measure. A cumulative link model (Agresti, 2012) was used with techno-solutionism as the outcome measure, which treats the outcome variable as an ordinal variable without assuming equidistance between response categories (Bürkner & Vuorre, 2019). Where multiple testing was performed, i.e., to assess the unique contribution of variables in hierarchical tests, the alpha level was Bonferroni corrected to minimize Type I error rates. Please see the equation[15] below:

$$(\alpha new = \alpha orig/n)$$

Predictors were chosen based on their relationship with each dependent measure[1]. Activist identification was expected to significantly relate to activism-engagement. We were interested in which variables contributed beyond activist identity and climate change risk perceptions. Thus, the multiple regression was performed in three steps. In step one, we constructed a model including risk perceptions, scientist-activist compatibility, pragmatic barriers, and age. In step two, we included activist identity to assess which predictors were robust to the influence of activist identity. In step three, we reduced the number of variables (choosing only those that were significant in the latter model) to determine the leanest model

[15] This equation calculates a Bonferroni-corrected significance level αnew, αorig is the original significance threshold, and n is the number of tests performed. This correction controls for inflated Type I error rates in multiple testing.

that explains the most variance. The same stepwise procedure was used for the cumulative link model. To check the stability of the model, we performed bootstrapped regressions with 10,000 iterations, to confirm the model's reliability (see Supplements for output). The same stepwise procedure was used for the cumulative link model.

3.2.5.2 Outliers. A comprehensive outlier diagnostic was performed, examining leverage, Cook's distance, and covariance ratios. A small subset of the data (approximately 2.7% of the sample, or 9 cases) were flagged as potential outliers. However, upon further analysis, including examination of large residuals and overall distribution, we determined these cases did not significantly alter the model's findings. Despite a slight improvement in fit (Adjusted R-squared value of 0.598, compared to 0.52 in the original model), we opted to retain the full dataset, prioritizing data integrity and generalizability. All analyses, including the outlier analysis, are documented and accessible on the Open Science Framework (OSF) for transparency and reproducibility purposes.

3.2.5.3 Comparison between Activist-group-member and Non-activist-group-member Scientists. Approximately half the sample (53%) reported their membership of an activist group. To explore the effects of group identification processes, we compared activist-group-member scientists with non-activist-group-member scientists. To assess the significance of mean differences between the groups for each variable, we performed a Welch's t-test. This test was chosen due to the unequal sample sizes and the assumption of unequal variances. As a robustness check, given the ordinal nature of Likert items, we also performed a Wilcoxon rank sum test to examine potential differences. The use of both parametric and non-parametric tests ensured the robustness and reliability of our findings. We then employed regression models, as outlined above, to determine the distinct contributions of each variable.

3.2.5.4 Principal Components Analysis. A principal components analysis (PCA) was conducted to determine if beliefs about science and activism, and the various additional factors, fit together into respective sub-scales (see Supplementary Tables). PCA is useful for reducing complex datasets into fewer components (Abdi & Williams, 2010; Shlens, 2014). We also ran a parallel analysis using the Parallel Analysis Engine (Vivek et al., 2017) to determine the number of factors to retain by simulating 100 random datasets. The ‘psych’ (Revelle, n.d.) software package in R Studio, with ‘oblimin’ rotation, was used for conducting the PCA on the dataset.

3.2.5.5 Thematic analysis of open responses. We collected 292 responses to the question, '3 things that prevent people like you from taking action,' and 275 responses to the question, '3 things that people like you gain from taking action.' To analyze open-ended responses, we employed thematic analysis (Braun & Clarke, 2006, 2019) to gain deeper insights into the quantitative findings and uncover unexpected insights. Several factors guided method choice. Thematic analysis is well-suited for uncovering the processes that shape meanings and assumptions (Braun & Clarke, 2013) and extracting general patterns. Thematic analysis offered flexibility in identifying patterns across the entire dataset. Our analytical approach was primarily inductive, focusing on data-based meanings. We define themes as patterns of shared meaning, united by a central concept or idea (Braun et al., 2014; Braun & Clarke, 2013). We have been diligent and transparent in this process to ensure the robustness of our findings. We invite other researchers to conduct their own analyses on the open responses, as we have made them available for examination after removing any identifiable data and detaching them from other survey components.

We adhered to a structured process. Initially, we familiarized ourselves with the data by carefully reviewing all responses, generating an extensive list of unique codes. These codes were then organized within an Excel spreadsheet, and responses corresponding to each code were marked with '1' for reference. Subsequently, we searched for potential themes by grouping related codes, considering their conceptual coherence, distinctiveness, and alignment with our research questions. A critical review of these themes followed to ensure they made sense and remained distinct. As part of the refinement process, we assigned meaningful names to each theme and provided brief descriptions to offer context. Throughout this analysis, we maintained flexibility to revisit earlier steps as necessary to maintain thoroughness.

3.2.5.6 Software for analyses. All statistical analyses were performed in R (R Core Team, 2021b) using RStudio (RStudio Team, 2021). Main analyses were conducted using the following packages; base R, 'car' (Fox et al., 2019), 'HMisc' (Harrell Jr., 2021), 'matrixTests' (Koncevicius, 2021), ordinal (Christensen, 2022), 'psych' (Revelle, n.d.) and 'QuantPsyc' 1.5 (Fletcher, 2012) packages.

3.3 Results

The data used to generate these results, along with the R code written to run the analyses, are publicly available (Finnerty, 2024a, 2024b).

3.3.1 Activism Engagement

Contrary to Hypothesis 1, scientist identity did not significantly correlate with activism engagement, $r(327) = .08$, $p = .17$. The belief that activism can harm a scientist's reputation and credibility did not significantly correlate with activism engagement, $r(327) = -.09$, $p = .09$. Consistent with Hypothesis 3, endorsement of scientist-activist compatibilism contributed to engagement. Believing objectivity and impartiality were uncompromised by activism (scores for objectivity and impartiality were reverse-scored for analysis, as detailed in the methodology section), endorsing environmental stewardship as a scientist's duty, and that it is possible to be a scientist and an activist, were all positively associated $r(327) = .25$ to $.36$ (all p's $< .001$). Principal components analysis revealed these different aspects of scientist-activist compatibilism formed a single composite variable showing good internal consistency ($\alpha = .76$) and had a strong association with activism engagement, $r(327) = .42$, $p < .001$. The sample broadly agreed that activism and science were compatible (*Mean* = 4.2, *SD* = 0.70, range 1

(Strongly Disagree) – 5 (Strongly Agree)), with 18 participants (5.5%) expressing disagreement, and a further 6 (1.82%) expressing neither agreement nor disagreement (see Method for more detail).

A final model $R^2 = .52$, $F(4, 324) = 90.13$, $p < .001$, including age, scientist-activist compatibilism, level of interest in activism, and activist identity was significantly associated with engagement (see Table 3.1). All variables in the final model were robust to multiple testing and the influence of activist identity (all variables satisfied the Bonferroni corrected alpha level of .009 for the final model). A large effect size (Cohen, 1988) was observed for the model. There were no issues of multicollinearity (all VIFs < 3). To check the stability of the model, we performed bootstrapped regressions with 10,000 iterations, revealing all confidence intervals closely mirrored the original model's findings (see Supplements), further affirming the model's reliability.

Consistent with Hypothesis 2, activist identity contributed the largest amount of variance in activism engagement, but other factors explained additional variance. In addition to the positive effects of age, and accounting for the level of interest in activism, scientist-activist compatibilism was a significant explanatory variable. Scientist-activist compatibilism exhibited no significant relationship with scientist identification ($r = .02$, $p = .70$), indicating the distinct nature of scientist identity strength from identity content. Furthermore, an interaction analysis was performed to investigate the interplay between scientist identity strength, scientist-activist compatibilism, and activism engagement, finding no interaction (see Supplements).

All other potential engagement factors were assessed for relationships with activism engagement (see Table 3.2). Uncertainty about the effectiveness of action, uncertainty about which actions to take, and not having personal connections with activists, were negatively correlated with activism engagement. Experiencing family commitments, and the impact of

COVID-19, were positively correlated with engagement. Financial and work commitments, transport access, and visa and residency concerns exhibited weakly positive but non-significant correlations with engagement.

3.3.2 Techno-solutionism

Most participants disagreed with (n = 243, 74%) or expressed uncertainty about techno-solutionism (n = 50, 15%), while 11% (n= 36) endorsed it. Contrary to Hypothesis 4, scientist-identity strength was not associated with techno-solutionism, $X^2(1, N = 329) = 2.67$, OR = 1.02 [1.00, 1.05], $p = .10$. However, higher scientist-activist compatibility scores were uniquely associated with a lower likelihood of techno-solutionism (see Table 3.3), $X^2(1, N = 329) = 36.76$, OR = 0.80 [0.74, 0.86], $p < .001$, supporting Hypothesis 4 that scientists who viewed science and activism as incompatible were more likely to endorse techno-solutionism. In comparison, higher scientist-activist compatibility scores were uniquely associated with a higher likelihood of support for changing political systems as the sole solution $X^2(1, N = 329) = 11.12$, OR = 1.13 [1.05, 1.22], $p < .001$.

3.3.3 Comparison of Activist-group-member Scientists with Non-activist-group-member Scientists

Compared to activist-group-member scientists, non-activist-group-member scientists expressed significantly less interest in and engaged less in activism (see Table 3.4 for all results). They also tended to be younger, significantly identified less as activists, were more uncertain about action effectiveness, were less likely to construe the scientist identity as compatible with activism, were more worried of what others might think of them, and were relatively more supportive of techno-solutionism (though on average still disagreed with it).

Scientist identity strength did not differ between the activist-group-member and non-activist-group-member scientists. However, for activist-group-member scientists, scientist-identity strength correlated with activism, $r(172) = .25, p < .001$. This was not the case for non-activist-group-member scientists, $r(153) = -.01$, $p = .91$. Scientist-identity strength showed a significant independent association with activism (see Table 3.5). The overall model was significant, $R^2 = .31$, $F(6, 167) = 13.78$, $p < .001$. A large effect size(Cohen, 1988) was observed for the model. There were no issues of multicollinearity (all VIFs < 3). When including activist identity, the overall model improved $F(7, 166) = 20.75$, $p < .001$, a large effect size. However, scientist-identity strength was no longer significant, which further highlights the important role of activist identity for activism engagement.

3.3.4 Thematic Analysis: Scientist Identity and Activism

As identity content played a more important role than identification strength, we explored identity content within the qualitative data. Thematic analysis of open responses (see Supplementary Notes 6 & 7) on factors preventing action (n = 292) and benefits gained from action (n = 275) revealed diverse constructions of scientist identity in relation to activism. Here we focus on five key constructions shaping the way our participants respond to the tension between science and activism.

3.3.4.1 Traditional Views on Scientist Identity. Several respondents voiced concerns aligning with traditional notions of scientific objectivity and research integrity. One respondent emphasized the fundamental principle, "A researcher/scientist should be objective, and activism threatens scientific integrity," underscoring the perceived risk of activism compromising scientific impartiality. Another echoed this sentiment, "Scientists should produce quality research and information, not shout around," highlighting a commitment to the primacy of rigorous scientific inquiry over vocal advocacy. By highlighting the values associated with being a scientist—such as objectivity, impartiality, and a focus on quality research—these individuals delegitimize activism within the scientific community, framing it as antithetical to established norms and practices and which can lead to "bad science".

3.3.4.2 Activism as a Professional Obligation. In contrast, others articulated activism is not only compatible but being a scientist compels action. One respondent spoke of activism as being not merely a personal choice, but a professional and ethical obligation:

> For me, it is a moral duty. I would not feel I was doing right by my responsibilities as a scientist, as someone who understands the risks, if I was not doing my best to create change, and activism is an effective avenue for this.

This sentiment reflects a perspective that sees activism as a natural extension of the scientist's role in society, driven by a sense of duty to address pressing issues based on scientific evidence. Similarly, another participant emphasized advocacy as being part of their professional mandate, "Impact: I feel the responsibility to try to do something as part of the mandate of my job, as my salary is paid by public moneys, and it would be unethical not to say what I see." For others, activism is seen not only as a responsibility but enhances the integrity and credibility of their scientific endeavors rather than compromising them, "Seeing that I am willing to put my body and energy in this fight makes my work more credible and compelling."

3.3.4.3 Managing the Reputation of the 'Scientist'. Some individuals expressed concern that activism may impact *perceptions* of scientific objectivity, particularly when scientists advocate in a professional capacity. One respondent raised the issue of the perceived compromise in objectivity when scientists advocate as scientists, rather than as private individuals:

> Perception of reduced objectivity: this is a sticky one, but I do think there's a cost to engaging too much in activism as it involves making statements which are value-based or worded too strongly. Nothing wrong with making these statements but often we make these 'as Scientists' so as to give our actions and words more weight. But the weight comes in part from a perception of objectivity which is based on being more cautious

> in our communications, which creates a tension. Some activist/scientists have recently tried to dismiss this tension, which I think is unhelpful.

For others, their personal pro-environmental values do not inherently bias their research, but they recognize the potential impact on their credibility:

> I believe my work is meaningful, and that it contributes to helping society be better positioned to deal with climate change[...] A big part of my credibility, I think, is that I can provide analysis from arms length. I don't believe my values about environmental issues are a cause for bias, but given the existing social and political context around climate and environmental issues I do believe that perception of me as an activist would undermine the contribution I can make through my research. Many people who are not sold on climate action see activists as part of an out group. I see my role as including bridging that divide (from both directions), and being perceived as on neither side is critical to that.

This underscores the contrast between their personal conviction that these values do not compromise their work and the perceived public perception, which may associate activism with bias or lack of objectivity, at least among particular social groups.

One respondent, a professional ecologist actively engaged in activism, highlights the challenges faced when activism intersects with scientific identity. They express frustration at being labelled a “tree hugger” and the consequent erosion of their credibility as a serious scientist, “it really annoys me as I am a professional with many years of study and experience behind me.” They express the desire “If only there was a professional and scientific way of protesting!", permitting them to advocate while preserving scientific integrity.

3.3.4.4 Supporting Rather than Participating in Activism. Another perspective manages this tension by supporting rather than participating in activism, “I believe it's better if scientists actively support activists rather than being activists, e.g. Scientists for Future.

Different groups have different roles to play and we need coalitions that include as many roles as possible, rather than just activists.” They suggest that scientists take on a role aligned with the traditional view of scientists as information providers to support activists, rather than being advocates themselves. As an example, they mention Scientists for Future, a collective of concerned scientists providing scientific information to inform the global climate movement, which contrasts with Scientists for Extinction Rebellion and Scientist Rebellion. Another perspective further emphasized support over participation, “I choose to financially support larger environmental organizations, such as the RSPB and the Woodland Trust, who I believe are more effective influencers, and so I 'contract out' my activism to others.”

3.3.4.5 Counterpoint: Techno-Solutionist Perspective. Rejecting activism as a solution, one respondent advocated for a techno-solutionist approach to environmental challenges. This perspective sidesteps the perceived tension between advocacy and science, reflecting a dedication to technical solutions which, as a scientist, they are uniquely equipped to work on:

> I have decided a better use of my time is to get people off this rock. Only when we have billions of people living in a innumerable number of free space habitats will we truly add resilience to the human species. Moving heavy industry off Earth is the only way to turn this planet into an environmental preserve. The faster the better.

3.4 Discussion

The current research highlights the importance of scientist-identity construction for both activism engagement and inclination toward techno-solutionism.

3.4.1 Scientist Identity, Environmental Activism, and Techno-Solutionism

Our findings demonstrate that the strength of a scientist's identification as a “scientist” did not significantly correlate with activism across the sample, nor did concerns over potential damage to a scientist's reputation and credibility. A more notable factor was how scientists formulated the content of their scientist identity. While our results are consistent with prior studies indicating a strong link between pro-environmental identity and environmental activism (Mackay, Schmitt, et al., 2021; Vesely et al., 2021), they also reveal that scientist-identity content contributes additional variance. Those who considered activism to be compatible with science, felt a responsibility as a scientist to protect the environment, believed that activism does not compromise scientific objectivity and impartiality, reported greater engagement in activism. Furthermore, belief in scientist-activist compatibility was largely orthogonal to identifying as a scientist. Overall, these results suggest that the relationship between scientist identity and environmental activism is far from straightforward and hinges significantly around scientist identity construction. Arguments for (Capstick et al., 2022; Douglas, 2009; Oppenheimer et al., 2019) and against (Lackey, 2007; Nelson & Vucetich, 2009) scientist advocacy illustrate diverse conceptualizations of the scientist identity.

The qualitative responses illustrated diverse scientist identity constructions. Some aligned with traditional norms of objectivity and research integrity, viewing activism as incompatible with established norms and practices citing compromised objectivity, integrity, and research quality. Conversely, others viewed activism as a moral responsibility for scientists as a natural extension of their role. Moreover, analysis revealed more complex perspectives which grappled with balancing objectivity, integrity, and a desire for impact. Despite an insignificant statistical relationship, scientists expressed concern about credibility when advocating for environmental causes. This is seen in nuanced identity formulations, neither entirely for nor against scientist activism but sensitive to context. They recognized the tension of engaging in activism while maintaining objectivity and acknowledged the risk of undermining public perception of impartiality. To safeguard credibility, some scientists preferred to distance themselves from activism, preferring instead that scientists serve as information providers rather than advocates, aligning with traditional scientific roles. Meanwhile, others engaged in activism expressed a desire for a more professional and scientific approach to advocacy to manage this tension. These perspectives highlight how scientist identity construction can either delegitimize or legitimize action, depending on how values of objectivity, credibility, and professional duty are invoked. This emphasizes the importance of understanding the unique ways in which scientists construct their identities given the role they play in whether and how scientists act.

Despite these challenges, our findings demonstrate that many scientists do engage in activism. This aligns with recent evidence suggesting a majority of scientists and researchers support the idea of increasing advocacy efforts (Dablander, Sachisthal, Cologna, et al., 2024a; Latter et al., 2024). For example, a survey of more than 9,000 researchers found that a majority strongly supported researcher climate advocacy (51%), albeit this dropped to 36.7% for protest specifically (Dablander, Sachisthal, Cologna, et al., 2024a). These findings may reflect a form of pluralistic ignorance (Allport, 1934) , with individual scientists privately supporting advocacy but perceive less support among their peers. Meanwhile, the above research indicates a potential gap between individual perceptions and broader attitudes within the scientific community. This suggests that the perceived tension between activism and scientific credibility might not be as widespread among scientists as some fear. Furthermore, concerns about public trust and credibility appear to be unfounded. A recent 67 country study (N = 71,417), found that there is moderately high trust in scientists and that a majority believe scientists should be engaged in society and more policymaking (Cologna, Mede, et al., 2024).

While our participants, in general, did not strongly support techno-solutionism, those who viewed their scientist identity as incompatible with activism tended to endorse techno-solutionism more frequently. While this research has a large proportion of activist group members, which might partly explain the low number endorsing this perspective, other research on scientist attitudes found, using less absolutist phrasing, that 43.5% strongly disagreed that climate change will be largely solved by technology compared with 27.5% who agreed, providing support for the observation (Dablander, Sachisthal, Cologna, et al., 2024a). While emerging technologies such as novel forms of carbon capture and storage (Smith et al., 2023), solar geoengineering (Irvine et al., 2019), and nuclear fusion (Mathew, 2022) are touted as potential solutions, scaling them up poses ethical (Biermann et al., 2022; Hamilton, 2013) and practical challenges (Clifford, 2022; Smith et al., 2023). Some argue that putting too much stock in technological "myths" that have yet to deliver can promote inaction (Peeters et al., 2016). For instance, exposure to mitigation solutions like greenhouse-gas removal may discourage measures to mitigate climate change such as reducing emissions (McLaren et al., 2021). This emphasizes the importance of scientists' self-conception in shaping the strategies they support for addressing climate change.

Although the strength of scientist identity was not associated with engagement in activism across the entire sample, a notable distinction emerged when examining scientists who reported involvement in an activist group as part of their climate change activism. Within this subgroup, strength of scientist identity was associated with increased engagement in activism. One possible explanation is that through involvement in activism, scientists' identity becomes intertwined with their activist identity. This may be particularly true within activist groups that utilize the "scientist" identity. For example, when UK scientists protested planned fossil fuel expansion, they wore white lab coats with the message "I'm a Scientist" alongside their pro-environmental message "New Oil and Gas = Death" (Gayle, 2022). This foregrounding of the scientist identity during action may help facilitate the integration of scientist and activist identities.

3.4.2 Other Factors Impacting Environmental Activism

Our findings revealed that older individuals were more likely to actively participate in climate activism. This finding aligns with potential challenges faced by younger scientists, such as academic precarity, including contract insecurities, power-imbalances, heavy workloads (Albayrak-Aydemir & Gleibs, 2022), and lack of seniority (van Eck, 2023), which may limit opportunities for activism. Conversely, more established scientists might feel secure enough to act on longstanding convictions, possibly invigorated by the recent wave of climate activism. Another explanation could be that older adults feel a sense of legacy and inter-generational obligation, implying that this is a different part of a life-cycle rather than a generational divide (Nemčok & Wass, 2021).

Several other factors, identified in prior research, correlated negatively with activism, including uncertainty about action effectiveness, lack of knowledge about what to do, and not knowing other activists. The present findings combine with past research to emphasize the importance of collective efficacy (van Zomeren et al., 2008), personal efficacy (Meijers et al., 2023), and proximity to activist networks (Latkin et al., 2022) and a supportive social context (Klandermans & Stekelenburg, 2014) in fostering pro-environmental behaviors and climate advocacy (Latkin et al., 2022; Mackay, Schmitt, et al., 2021).

The weak relationship activism had with other factors proposed as barriers suggests that motivated scientists find ways to manage potential limitations (Klandermans & Oegema, 1987; Klandermans & Stekelenburg, 2014). Financial and work commitments, transport access, visa and residency concerns, and fears about others' perceptions, did not significantly hinder scientists' activism. This aligns with previous research showing that, despite potential impediments, scientists are politically active. For instance, a survey on general political advocacy with the Union of Concerned Scientists found that scientists were far more politically active than the general public (Tormos-Aponte & Frickel, 2020). Half of respondents had attended one or more demonstrations, in addition to other forms of advocacy such as petition signing and financial donations.

Rather than posing strict barriers to activism, the present study found *positive* associations between activism and both family commitments and experiencing COVID-19 impacts. One interpretation of these relationships is that highly engaged activists are more attuned to the inherent tensions between activism and potential barriers, such as the time demands of activism conflicting with family responsibilities. Of course, the present study cannot establish whether activists experience these impediments more often than non-activists. Active and non-active individuals may experience the same impediments to action (Klandermans & Stekelenburg, 2014), but it is plausible that certain factors, such as scientist identity content, might play a role in motivating action, although this is speculative.

3.4.3 Limitations

While this study provides insights into the relationship between scientist identity, scientist-activist compatibility beliefs, and activism engagement, certain limitations should be considered when interpreting the study's findings. The study encountered uncertainties and potential biases related to data collection and analysis. Opportunistic sampling may have influenced the sample composition and introduced several limitations. While this method facilitated recruitment, it also led to a sample that leaned heavily towards scientists with activist affiliations, potentially biasing the findings towards individuals already inclined towards environmental activism. While this bias facilitated comparisons between activist and non-activist scientists, future research could include a more diverse range of participants to capture a broader spectrum of perspectives and experiences.

Additionally, the geographical skew in the sample, with a predominant representation of scientists from the Global North, particularly the UK, may further limit the generalizability of the findings. While the sample predominantly consisted of scientists from the Global North, particularly the UK, this overrepresentation is somewhat justified given the region's prominence in recent climate activism involving scientists The emergence of groups like Scientists for Extinction Rebellion and Scientist Rebellion, originating in the UK, underscores the significance of this region in climate activism within the scientific community. Nevertheless, this geographical skew limits the study's global applicability, particularly given the greater vulnerability of Global South regions to climate hazards (IPCC, 2022). The study may not fully represent the experiences and viewpoints of scientists in the Global South, where contextual differences could significantly influence patterns of social movement participation. Moreover, the opportunistic sampling strategy may have contributed to the overrepresentation of certain fields and disciplines while underrepresenting others. Efforts were made to include scientists from diverse backgrounds, but this approach may have inadvertently skewed the sample composition.

The correlational nature of this research precludes ascertaining causal relationships. Although the findings suggest a positive relationship between the strength of scientist identity and activism-engagement among activist group-affiliated scientists, further research is needed to understand this relationship and the role of core scientific values. Longitudinal studies could shed light on how scientist identity, its compatibility with activism, and the perceived legitimacy of climate action evolve and influence each other over time. While scientists joining social movements may initially perceive science and activism as compatible, their subsequent experiences could shape this perception and long-term engagement.

Although there was no significant relationship between reputational concerns and activism engagement, future research could examine their potential impact further, especially in the context of publicly visible actions. The complexity and depth of the open responses indicate that there may be additional factors influencing engagement beyond what was captured by the quantitative analysis, indicating the need for further qualitative research to explore other factors.

Lastly, the political bias observed in our sample towards both social and economic issues is worth mentioning. While the results remain valid within this context, extending research to more politically diverse samples could yield a more comprehensive understanding of the factors influencing scientists' activism-engagement.

3.4.4 Future Research Directions

This study has identified several promising avenues for future research. Identity processes are central to the understanding of "political-protest participation, serving as antecedents, mediators, moderators, or consequences of such actions" (P. G. Klandermans, 2014). Politicization involves identity content change which can affect the actions an individual is willing to take(Turner-Zwinkels, Zomeren, et al., 2015). For scientists, the question is how the process of becoming politically aware and engaged corresponds with changes in identity content. Researchers could explore how the process of politicization influences the content of scientist identity and how identity content change influences the actions taken. The open responses suggest there are a variety of different identity constructions, which are associated with diverse degrees of engagement. By examining diverse constructions of scientist identity, researchers could uncover how different values, beliefs, and experiences influence scientists' approaches to climate change.

Expanding the sample to include a broader spectrum of scientists, including those less engaged in activism, would enhance representativeness, and provide deeper insights into the relationship between scientist identity content and action. In addition, a larger and more diverse sample would enable investigation into potential differences in preferences for solutions across different fields. This broader approach could shed light on whether certain fields, such as those focused on technological solutions, exhibit distinct perspectives on environmental challenges and activism.

Finally, it was not possible to determine whether aligned identity content preceded or proceeded from engagement given the design. Longitudinal research could examine the dynamic nature of identities by tracking changes in scientists' identities before and after engagement in climate action. For example, interviews and ethnographic fieldwork could illuminate how individual scientists navigate and reconcile core scientific values of objectivity and impartiality with their moral convictions, shedding light on the complex interplay between scientist identity content, moral responsibility, and motivations for climate action. By doing so, researchers could better understand the temporal relationship between changes in identity content and engagement in climate action among scientists. In addition, this will allow researchers to examine how these changes relate to other established factors including collective efficacy, personal efficacy and proximity to activist networks and supportive social dynamics in fostering engagement among scientists.

3.5 Conclusion

This study offers important insights into factors shaping scientists' engagement in climate change activism. This research underscores the important association between scientists' identity contents, encompassing values of objectivity, impartiality, and a sense of duty to address environmental issues, and their public climate change actions and perspectives on techno-solutionism. In conclusion, this research offers a crucial starting point for a more comprehensive understanding of the complexities of scientists' identities as scholars and activists in a world confronting the escalating threats of climate change.

3.6 Data Availability Statement

All anonymized data (Finnerty, 2024b) are available in the Open Science Framework repository: https://osf.io/w8qje/.

3.7 Code Availability Statement

All computer code (Finnerty, 2024a) generated for analyses are available in the Open Science Framework repository:

https://osf.io/wvb7m/?view_only=5e4ed30bfed749448e2c41af3b3a66ea.

Table 3.1

Comparison of multiple regression models with activism-engagement as criterion

Explanatory Variable	*b*	*b* 95% CI [LL, UL]	*Std. Error*	*beta*	*beta* 95% CI [LL, UL]	*Std. Error*	*r*	Fit	Difference
(Intercept)	-9.71	[-21.92, 2.51]	6.209	0	[-0.09, 0.09]	0.046			
Impact on self	2.6	[-0.43, 5.63]	1.542	0.13	[-0.02, 0.27]	0.075	.19***		
Impact on close others	-0.02	[-3.26, 3.22]	1.646	0	[-0.15, 0.15]	0.076	.23***		
Age	0.25***	[0.15, 0.34]	0.049	0.26***	[0.16, 0.36]	0.051	.24***		
Scientist-activist compatibility	1.26***	[0.85, 1.66]	0.205	0.32***	[0.22, 0.42]	0.052	.42***		
Uncertainty about effectiveness of action	0.04	[-0.92, 1]	0.487	0	[-0.1, 0.11]	0.052	-.20***		
Family commitments	0.83	[0.09, 1.57]	0.376	0.1	[0.01, 0.2]	0.047	.17**		
Lack of interest	-2.56***	[-3.66, -1.46]	0.561	-0.25***	[-0.35, -0.14]	0.054	-.38***		
Uncertainty about which actions to take	-0.68	[-1.64, 0.29]	0.491	-0.07	[-0.18, 0.03]	0.053	-.15**		
Not knowing others taking action	-0.02	[-0.95, 0.9]	0.471	0	[-0.1, 0.1]	0.05	-.15**		
								R^2 = .32 ***	

(Intercept)	-12.57	[-22.81, -2.33]	5.204	0.01	[-0.07, 0.08]	0.038			
Impact on self	2.29	[-0.25, 4.83]	1.291	0.11	[-0.01, 0.23]	0.062	.19***		
Impact on close others	-0.91	[-3.62, 1.81]	1.38	-0.04	[-0.17, 0.08]	0.063	.23***		
Age	0.14***	[0.05, 0.22]	0.042	0.14	[0.06, 0.23]	0.044	.24***		
Scientist-activist compatibility	0.48**	[0.11, 0.84]	0.184	0.12	[0.03, 0.21]	0.046	.42***		
Uncertainty about effectiveness of action	0.4	[-0.41, 1.2]	0.409	0.04	[-0.04, 0.13]	0.044	-.20***		
Family commitments	0.38	[-0.24, 1.01]	0.317	0.05	[-0.03, 0.13]	0.04	.17**		
Lack of interest	-1.27**	[-2.22, -0.32]	0.482	-0.12	[-0.21, -0.03]	0.046	-.38***		
Uncertainty about which actions to take	-0.39	[-1.2, 0.42]	0.412	-0.04	[-0.13, 0.04]	0.044	-.15**		
Not knowing others taking action	0.01	[-0.77, 0.78]	0.394	0	[-0.08, 0.08]	0.042	-.15**		
Activist identity	0.61***	[0.51, 0.71]	0.052	0.56	[0.46, 0.65]	0.048	.70***		
								$R^2 = .52$***	$\Delta R^2 = .20$***
(Intercept)	-5.61	[-12.64, 1.43]	3.577	-0.5	[-1.08, 0.08]	0.295			
Age	0.13***	[0.06, 0.21]	0.038	0.14***	[0.06, 0.22]	0.04	.24***		
Scientist-activist compatibility	0.47**	[0.12, 0.82]	0.179	0.12**	[0.01, 0.07]	0.016	.42***		

Lack of interest	-1.25**	[-2.13, -0.37]	0.447	-0.12**	[-0.19, -0.03]	0.04	-.38***		
Activist identity	0.62***	[0.52, 0.72]	0.051	0.57***	[0.48, 0.66]	0.047	.70***		
								R^2 = .52***	ΔR^2 = .00

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. * indicates p < .03. ** indicates p < .01. *** indicates p < .001.

Table 3.2

Activism engagement correlations with barrier items

Means, standard deviation and Pearson correlations for activism frequency and barrier variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Activism frequency	1.45	0.56	___	___	___	___	___	___	___	___	___	___	___	___
2. Work commitments	3.23	1.32	0.12	___	___	___	___	___	___	___	___	___	___	___
3. Financial commitments	2.20	1.24	0.08	0.24***	___	___	___	___	___	___	___	___	___	___
4. Transport access	1.98	1.09	0.10	0.2***	0.48***	___	___	___	___	___	___	___	___	___
5. Unsure about effectiveness of action	2.67	1.20	-0.2***	-0.03	-0.03	-0.05	___	___	___	___	___	___	___	___
6. Family commitments	2.53	1.41	0.17**	0.36***	0.15**	0.12	-0.01	___	___	___	___	___	___	___

7. Visa residency concerns	1.64	1.28	0.05	0.12	0.18***	0.21***	-0.05	0.06	___	___	___	___	___	___
8. Worried about others might think about you	1.96	1.04	-0.06	0.15**	0.03	0.01	0.18***	0.12	0.02	___	___	___	___	___
9. Lack of interest	1.86	1.08	- 0.38***	-0.13*	-0.08	-0.08	0.41***	-0.07	0	0.21***	___	___	___	___
10. Unsure about which actions to take	2.60	1.20	-0.15**	0.16**	0.24***	0.24***	0.3***	0.07	0.1	0.23***	0.19***	___	___	___
11. Lack of energy	2.88	1.23	0.04	0.3***	0.23***	0.23***	0.12	0.07	0.01	0.11	0.01	0.19***	___	___
12. Covid-19	2.48	1.30	0.16**	0.27***	0.29***	0.31***	-0.06	0.16**	0.11	0.08	-0.11	0.14*	0.23***	___
13. Don't know any friends or family involved	2.05	1.19	-0.15**	-0.02	0.22***	0.19***	0.16**	0.02	0.02	0.16***	0.18***	0.36***	0.23***	0

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

Table 3.3

Comparison of cumulative link models with support for 'inventing new technologies is the sole way to successfully solve climate change' as the criterion

Explanatory Variable	*b*	*b* 95% CI [LL, UL]	*Std. Error*	*z*	*Odds ratio*	*Odds ratio 95% CI [LL, UL]*	*Log Likelihood*	χ2	AIC	R 2
Impact on close others	0.22	[-0.2, 0.44]	0.317	0.70	1.25	[0.67, 2.35]				
Impact on self	-0.28	[-0.47, 0.17]	0.298	-0.92	0.76	[0.42, 1.36]				
Age	0	[-0.23, 0.18]	0.009	-0.24	1	[0.98, 1.02]				
Scientist-activist compatibility	-0.22***	[-0.85, -0.42]	0.039	-5.78	0.80	[0.74, 0.86]				
							-418.80	38.51***	853.60	0.04
Impact on close others	0.24	[-0.38, 0.88]	0.32	0.75	1.27	[0.68, 2.41]				
Impact on self	-0.27	[-0.86, 0.32]	0.298	-0.90	0.76	[0.42, 1.37]				
Age	0	[-0.02, 0.02]	0.009	-0.01	1	[0.98, 1.02]				
Scientist-activist compatibility	-0.21***	[-0.29, -0.12]	0.043	-4.81	0.81	[0.75, 0.88]				

Activist identity	-0.01	[-0.03, 0.01]	0.012	-0.87	0.99	0.97, 1.01]				
							-418.42	39.27***	854.84	0.04
Scientist-activist compatibility	-0.23***	[-0.3, -0.15]	0.037	-6.06	0.80	[0.74, 0.86]				
							-419.23	36.76***	848.46	0.04

LL is the log-likelihood. AIC and BIC are the Akaike Information Criterion and Bayesian Information Criterion, respectively, which weigh model fit against model complexity, in related though somewhat different ways. The χ^2 values pertain to the likelihood ratio test comparing the given model with the null model; all three are significant at $\alpha = .0001$. The R^2 values reported are McFadden's pseudo- R^2 values, which for any model M are defined as 1 minus (log-likelihood of M/log-likelihood of null model) LL and UL indicate the lower and upper limits of a confidence interval, respectively.

* indicates $p < .03$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 3.4

Comparison of key variables by group membership

	Part of a group (N = 174)		**Not part of a group (N = 155)**			
	M	*SD*	*M*	*SD*	*T Test (Welch)*	*Wilcoxon rank sum test*
Explanatory Variable						
Scientist Identity	5.2	1.04	5.31	0.96	1.05	NA
Activist Identity	5.29	1.07	4.11	1.2	-9.31***	NA
Scientist-activist compatibility	4.37	0.57	4.01	0.79	-4.59***	NA
Impact on self	4.69	0.54	4.63	0.54	-1.07	12572
Impact on close others	4.79	0.47	4.66	0.55	-2.26*	11883*
Age	42.19	12.89	37.66	9.92	-3.61***	NA
	Part of a group (N = 174)		**Not part of a group (N = 155)**			
	M	*SD*	*M*	*SD*	*T Test (Welch)*	*Wilcoxon rank sum test*
Dependent measures						
Activism engagement	1.76	0.46	1.10	0.44	-13.21***	NA
Inventing new technologies is the only way to successfully tackle climate change	1.87	0.93	2.23	1.16	3.11**	15762***

Changing political systems is the only way to successfully tackle climate change	3.96	1.09	3.7	1.17	-2.1	11702
Changing human behaviour is the only way to successfully tackle climate change	3.59	1.17	3.75	1.17	1.22	14564

	Part of a group (N = 174)		**Not part of a group (N = 155)**			
	M	*SD*	*M*	*SD*	*T Test (Welch)*	*Wilcoxon rank sum test*
Additional Engagement Factors						
Work commitments.	3.34	1.28	3.12	1.36	-1.53	12198
Financial limitations.	2.26	1.2	2.14	1.29	-0.98	12480
Transport access	2.14	1.12	1.81	1.02	-2.74**	11192**
Unsure about the effectiveness of activism.	2.48	1.18	2.88	1.19	3.06**	16079**
Family commitments.	2.62	1.41	2.43	1.41	-1.25	12342
Concerns about visa/residency.	1.6	1.23	1.68	1.34	0.61	13881
Fears/worries about what other people might think of you.	1.84	0.97	2.1	1.1	2.24*	15228
Lack of interest in activism.	1.56	0.86	2.21	1.18	5.61***	17846***
Unsure about what actions you can take.	2.49	1.14	2.73	1.26	1.81	14862

Lack of energy	2.9	1.2	2.85	1.27	-0.37	13158
Concern about Covid-19.	2.52	1.24	2.43	1.37	-0.63	12696
Don't know any family, friends, or colleagues engaged in climate action.	1.98	1.13	2.12	1.25	1.11	14035

Wilcoxon rank sum tests were performed for all Likert items as an additional robustness check under the assumption that any relationships present should appear using both parametric and non-parametric tests * indicates p < .03. ** indicates p < .01. *** indicates p < .001.

Table 3.5

Comparison of multiple regression models with activism frequency as criterion for activist group members (N = 174)

Explanatory Variable	*b*	*b* 95% CI [LL, UL]	*Std. Error*	*beta*	*beta* 95% CI [LL, UL]	*Std. Error*	*r*	Fit	Difference
(Intercept)	-11.74	[-26.7, 3.22]	7.576	0.38	[0.27, 0.49]	0.057			
Impact on self	2.05	[-1.2, 5.3]	1.645	0.1	[-0.06, 0.26]	0.08	0.14		
Impact on close others	0.91	[-2.85, 4.67]	1.906	0.04	[-0.13, 0.21]	0.088	.23***		
Age	0.21**	[0.11, 0.31]	0.05	0.22	[0.12, 0.32]	0.052	.30***		
Scientist-activist compatibility	1.11**	[0.58, 1.65]	0.272	0.28	[0.14, 0.42]	0.068	.38***		
Lack of interest	-2.5**	[-3.9, -1.1]	0.707	-0.24	[-0.38, -0.11]	0.068	-.28***		
Scientist Identity	0.21**	[0.07, 0.35]	0.071	0.15	[0.05, 0.25]	0.051	.25***		
								R^2 = .31***	

(Intercept)	-11.9	[-25.3, 1.5]	6.786	0.25	[0.14, 0.36]	0.055			
Impact on self	2.55	[-0.37, 5.46]	1.475	0.12	[-0.02, 0.26]	0.071	0.14		
Impact on close others	-0.54	[-3.94, 2.86]	1.721	-0.02	[-0.18, 0.13]	0.079	.23***		
Age	0.13**	[0.04, 0.22]	0.046	0.13	[0.04, 0.23]	0.049	.30***		
Scientist-activist compatibility	0.67**	[0.17, 1.17]	0.253	0.17	[0.04, 0.29]	0.064	.38***		
Lack of interest	-1.8**	[-3.07, -0.53]	0.642	-0.17	[-0.3, -0.05]	0.062	-.28***		
Scientist Identity	0.08	[-0.06, 0.21]	0.067	0.05	[-0.04, 0.15]	0.048	.25***		
Activist identity	0.48***	[0.33, 0.62]	0.074	0.44	[0.3, 0.57]	0.067	.61***		
								R^2 = .44***	ΔR^2 = .13***

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardized regression weights. *beta* indicates the standardized regression weights. *r* represents the zero-order correlation. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively.* *indicates p < .03. ** indicates p < .01. *** indicates p < .001.*

Chapter 4: Paper 3 Between Two Worlds: The Scientist's Dilemma in Climate Activism

Note. This paper has been published in Nature Climate Action as part of the special collection 'Barriers and Pathways to Climate Action': https://www.nature.com/articles/s44168-024-00161-x. While Nature Climate Action has specific formatting guidelines and a word limit of 4500 words (excluding the Methods section), adjustments have been made to align with the thesis format. For example, the Method section in Nature publications follows after the Results and Discussion. The Limitations section is normally included with the Method in Nature journals while the Future Directions section is included before the Conclusion. This may be somewhat different from psychology journal formats. In this version, I have moved the Limitations to be just before the Future Directions to be more in keeping with more typical formats. In addition, the text is written in American English due to the journal requirements. Finally, some content that was placed in Supplementary Information has been included here as it relates to what sustains and motivates long-term commitment and higher cost actions e.g., civil disobedience.

Abstract

Environmental activism presents an ideological dilemma for environmentally concerned scientists, who must balance traditional scientific values of objectivity and impartiality with the urgency of the climate and ecological crisis. This paper presents a critical discursive analysis of interviews with 27 scientists from 11 countries. It details the linguistic repertoires scientists draw on, and the subject positions adopted, to manage this dilemma. We observed that scientists employ two strategies to reconcile their professional identities with their activism: redefining the scientist identity and reframing the work that scientists do. The subject positions adopted broadly serve to legitimize action, such as arguing that activism as a scientist is objective and rational, or that being a scientist conveys a moral duty to advocate for scientific information. By analyzing how scientists negotiate conflicting identities and values, this research offers valuable insights into fostering informed decision-making and action in addressing urgent environmental challenges.

Keywords

Climate change, science, identity, science-activism compatibility beliefs, activism

4.1 Introduction

Climate change and biodiversity loss are major planetary threats (IPBES, 2019; IPCC, 2022). Despite a well-established scientific consensus (IPCC, 2023; Lynas et al., 2021; Myers et al., 2021), policy action remains limited (IPCC, 2023; SEI et al., 2023; United Nations Environment Programme, 2023). At the same time, scientists are increasingly engaging in environmental social movements, aiming to translate scientific knowledge to effect change (Capstick et al., 2022; Gayle, 2022; Tormos-Aponte & Frickel, 2020). However, engaging in advocacy and activism presents a dilemma for scientists. Traditionally, the scientific community promotes impartiality and objectivity while discouraging advocacy (Betz, 2013; Castree, 2019; Lackey, 2007; Nelson & Vucetich, 2009; Nielsen, 2001; Sedlak, 2016). In contrast, others argue that the scientific community must act to raise the alarm and not simply produce research (Capstick et al., 2022; Gardner et al., 2021; Gardner & Wordley, 2019). This tension can be thought of as an ideological dilemma (Billig et al., 1988) for environmentally concerned scientists, who grapple with the question of whether to remain apolitical or to advocate for change. This paper explores the nuanced ways in which environmentally concerned scientists navigate this tension, examining the linguistic repertoires they employ, and the subject positions they adopt, to manage this dilemma.

4.1.1 Scientist Activism: Bridging Research and Action

The worldwide 'March for Science' in 2017 served as a catalyzing moment for scientist-activism, rallying scientists to defend research and evidence-based policymaking (Reardon et al., 2017). In the context of climate change, this movement has seen scientists engage in diverse forms of activism, from blocking fossil fuel infrastructure (Oza, 2023) to strategically leaking the IPCC report (Scientist Rebellion, 2021). Not limited to earth system scientists (Vidal Valero, 2023a), groups like Scientists for Extinction Rebellion (S4XR, 2023) and Scientist Rebellion (SR, 2023) have emerged, uniting natural and social scientists, underscoring the interdisciplinarity of environmental activism. Scientific societies, such as the American Psychological Association, also recognize the importance of scientists' advocacy in altering the trajectory (APA, 2022). These developments demonstrate scientists' departure from traditional roles, actively redefining what it means to be a scientist in the context of environmental challenges.

A note on terms. Advocacy is defined as the "act of persuading or arguing in support of a specific cause, policy, idea or set of values" (Pezzullo & Cox, 2022). Activism, as a distinct form of advocacy, is "the use of direct and noticeable action to achieve a result, usually a political or social one" (Cambridge Dictionary, n.d.). In this paper, we primarily use the term activism, as an active form of advocacy (J. Johnston & Gulliver, Robyn, 2022), reflecting the public actions taken by scientists and the framing used in the preceding survey (Finnerty et al., 2024b) and present interview research. We use advocacy where it appears in literature or by interviewees. The verb 'advocate' describes the act of supporting a cause, and when used without qualification below, it generally refers to activism. Furthermore, some scientists strategically choose the term advocacy over activism, as discussed in the results. Of course, these terms are often used interchangeably, reflecting conceptual overlap (J. Johnston & Gulliver, Robyn, 2022).

4.1.2 The Scientist's Dilemma

The scientist identity, traditionally characterized by objectivity and impartiality, is at a crossroads due to the scientific consensus on, and pressing global impacts of, climate change (IPCC, 2023). Critics challenge the long-held separation of science and advocacy which was believed to protect scientific integrity by minimizing political influence (Betz, 2013; Castree, 2019; Lackey, 2007; Merton, 1973; Nelson & Vucetich, 2009; Nielsen, 2001; Sedlak, 2016). They argue that strict detachment is morally and intellectually untenable (Capstick et al., 2022;

Gardner et al., 2021; Rodgers, 2023). Moreover, scholars have long questioned the dichotomy between science and advocacy, recognizing the intersections between science and social, cultural, and political dimensions (Haraway, 1988; Isopp, 2015; Latour, 1987; Oreskes, 2020).

Despite growing recognition of the legitimacy of scientist advocacy within public discourse (Cologna et al., 2021) and academia (Cologna et al., 2021; Dablander, Sachisthal, Cologna, et al., 2024a; Latter et al., 2024), actual engagement lags behind willingness (Dablander, Sachisthal, Cologna, et al., 2024a; Latter et al., 2024). Large-scale surveys have identified various factors influencing scientists' participation, including efficacy, workload, and institutional constraints (Dablander, Sachisthal, Cologna, et al., 2024a; Latter et al., 2024). Additionally, perceptions of scientific norms and their compatibility with activism contribute to the tension some scientists feel between political engagement and maintaining credibility (Gundersen, 2020; Oppenheimer et al., 2019). Central to this are identity processes (P. G. Klandermans, 2014), with environmental activist identity key to shaping participation in environmental social movements (Mackay, Cristoffanini, et al., 2021a; Mackay, Schmitt, et al., 2021; Turner-Zwinkels, Postmes, et al., 2015). However, this politicized social identity (Reicher et al., 2010; Tajfel & Turner, 1979; van Zomeren et al., 2008) contrasts with the supposedly apolitical scientist identity constructed in the wider discourse. Our research has identified that the perceived inter-identity fit (Turner-Zwinkels, Postmes, et al., 2015) between science and activism is a critical factor for how engaged scientists are (Finnerty et al., 2024b). Specifically, scientists who have reconciled the values of science with activism, and perceive a moral duty to act are more likely to engage in activism (Finnerty et al., 2024b). Diverse constructions of scientist identity can either support or hinder action (Finnerty et al., 2024b), emphasizing the importance of understanding how scientists construct their identities and position themselves within the wider discourse.

4.1.3 Navigating Ideological Dilemmas: Discursive Strategies in Scientist Activism

Ideological dilemmas arise when conflicting views on a subject create opposing imperatives, leading to tension and contradiction that individuals must manage through complex negotiation and reconciliation. These dilemmas, rooted in everyday sense-making, have been explored across diverse topics, including political ideology (Billig et al., 1988), race (Billig et al., 1988; Iatridis & Kadianaki, 2023; Reisigl & Wodak, 2000), gender (Kelan, 2009; Venäläinen, 2020), moral norms (Dixon et al., 2006), and populist national (Pettersson, 2017) and environmental discourse (Tormis et al., 2024). However, the dilemmatic nature of scientists' engagement with environmental issues remains underexplored. The tension between traditional scientific norms and perceived moral imperatives for environmental advocacy presents a unique dilemma for environmentally concerned scientists. How scientists respond to this dilemma may be reflected in the language they use. When scientists choose their words, they engage in rhetorical thinking, consciously or unconsciously, that positions themselves in relation to the wider discourse (Billig, 1987). The choice of metaphors, framing, and persuasive strategies becomes pivotal in navigating these ideological tensions.

In this study, we examine the nuanced ways environmentally concerned scientists manage this dilemma through interpretive linguistic repertoires and subject positions. Linguistic repertoires are culturally shared ways of talking about and understanding the world, which subjects may draw on and adapt in conversation in context-specific ways (Edley, 2001). Subject positions refer to relational, social locations, that individuals may construct for themselves or others, drawing on these repertoires to position themselves in relation to the wider discourse (Edley, 2001; Wetherell, 1998). By analyzing how scientists employ these discursive strategies, we aim to catalog their management of the dilemma and gain insight into the argumentative functions of their talk (Billig, 1987; Potter & Wetherell, 1987), providing insight into the strategies employed to reconcile conflicting identities and values.

4.2 Method

This study was preregistered (please see here for anonymized version of the preregistration for peer review). Interview data are not publicly available as this would render the participants identifiable. However, those interested may contact the authors to discuss the analysis. Additionally, the survey from which the interview sample was drawn, including its pre-registration, measures, manipulations, and exclusions, as well as data, analysis code, and materials are available for download here. The study received ethical approval from the University of Lancaster. Participants provided written informed consent prior to commencing the study. Participants received no compensation.

4.2.1 Data Collection and Recruitment

Natural and social scientists were recruited to the study via an advert included in a survey on scientist activism engagement. An invitation to be interviewed was included at the end of the survey. Seventy-seven participants, out of a final sample of 329, responded to the advert.

Participants were recruited to the survey via opportunity sampling on Twitter and via various scientific societies and were not paid for participation. Recruitment aimed for diversity among natural and social scientists concerned about climate change and who participated or not in climate-related advocacy and activism. Survey responses were collected between February 2022 and October 2022. Interviews were conducted from June 2022 through to December 2022. Twitter was, at the time[16], a hub for scientific communication and connecting scientists (Stokel-Walker, 2022), and so served as a suitable platform for recruiting scientists. Academic societies and environment centers were also targeted, including the Centre for Climate and Social Transformations at Cardiff, the Lund Sustainability Institute, and the Lancaster Environment Centre.

[16] Since its takeover and subsequent change to X many scientists have now left the site (Vidal Valero, 2023b), though this occurred after data collection had ceased.

We specifically targeted scientists and social scientists concerned about climate change, whether engaged in activism or not. This focus was crucial for examining activism attitudes and behaviors within the scientific community. Although it excluded unconcerned or indifferent scientists, it aligned with understanding motivations and barriers to activism among those aware of and concerned by the issues. Additionally, both natural and social scientists were recruited to reflect the diverse representation seen in movements like Scientists for Extinction Rebellion and Scientist Rebellion, ensuring a comprehensive view of scientific activism on climate change and representing a wide range of scientific perspectives on environmental activism.

To ensure that as wide a range of viewpoints, experiences, and contexts were captured the following selection strategy was adopted to choose interviewees. In the survey we included a climate advocacy/activism behavior frequency scale. We calculated descriptive information about advocacy/activism frequency. We divided participants into low, average, and high engagement categories of activism. Fourteen did not engage in any higher risk/higher responsibility activist behaviors. We aimed to interview 8 - 10 of them (approximately a third of the final interview sample), and a similar number from average and high activism subsets. Participants were chosen at random from each subset using a random number generator. If a participant opted not to be interviewed another participant was randomly selected from these subsets until data collection ceased.

We aimed to conduct a minimum of 25, and maximum of 30, interviews of approximately one hour in length. This was within the resources of the team and ensured a high likelihood of saturation being reached. Saturation, broadly, as noted by Saunders et al (2018, p. 1893), can be conceptualized as having been reached on “the basis of the data that have been collected or analyzed hitherto, further data collection and/or analysis are unnecessary.” (Saunders et al., 2018) Saturation may be reached when there is enough information to replicate the study, the ability to obtain new information has been attained, and further coding is no longer feasible (Fusch & Ness, 2015). However, a variety of approaches exist in terms of both its conceptualization and application (Saunders et al., 2018). Given these different approaches, and to assure the quality and rigor of our research, we applied the following strategy. Saturation, at the level of data collection, often refers to the number of interviews required until no new information emerges (Saunders et al., 2018). Applying an 'informational redundancy' approach (Francis et al., 2010; Guest et al., 2006; Sandelowski, 2008), we determined whether additional interviews were required once the minimum was reached. In contrast to grounded theory approaches, this is a data saturation approach rather than a theoretical saturation approach (Saunders et al., 2018). Two additional interviews were conducted to be certain that interview content did not differ substantially from the previous entries.

4.2.2 Sample

27 natural and social scientists were interviewed (59% Male, M_{age} = 40.19 years, *SD* = 12.93, range = 24 – 77). Members of direct-action groups[17] identified more as activists, felt more strongly that science and activism were more compatible, were older, and engaged much more frequently in activism. Nine (33.33%) were members of direct-action groups that used the scientist identity as part of their actions such as Scientists for Extinction Rebellion and Scientist Rebellion (usually denoted by wearing a labcoat). Of those, just 2 (7.4%) were from social science backgrounds. See Table 4.1 for full sample description.

[17] Note these comparisons are purely descriptive and are not of statistical analyses. These are used to identify differences in profiles between members of direct-action groups and non-members.

TABLE 4.1 Sample description.

Number of Participants	27
Gender Distribution	Male: 59% 41% Female
Age (Years)	*Mean* = 40.19, *SD* = 12.93, Range: 24 - 77
Nationality	UK: 44.44%, USA: 11.11%, Australia: 7.4%, Belgium: 7.4%, Ireland: 7.4%, Estonia: 3.7%, Germany: 3.7%, India: 3.7%, Malta: 3.7%, South Africa: 3.7%, Spain: 3.7%
Country of Residence	UK: 74.07%, Australia: 11.11%, Ireland: 7.4%, Austria: 3.7%, Spain: 3.7%
Educational Attainment	PhD: 59.26%, Masters: 37.04%, Bachelors: 3.7%
Political Ideology (Economic)	*Mean* = 1.58, *SD* = 0.64 (Scale: 1 = Very liberal, 4 = Moderate, 7 = Very conservative)
Political Ideology (Social)	*Mean* = 1.46, *SD* = 0.65 (Scale: 1 = Very liberal, 4 = Moderate, 7 = Very conservative)
Type of Science	59.26% (16) Natural Scientists and 40.74% (11) Social Scientists
Fields of Academic Study	Agricultural Sciences, Anthropology, Biology, Chemistry, Computer Science, Earth Science, Ecology, Engineering & Technology, Geography, Mathematics, Medical and Health Sciences, Psychology, Physics, Sociology
Disciplines Worked In	Aerosol Science, Applied Physics, Applied Psychology, Astrophysics, Atmospheric Science, Biogeochemistry, Cellular Biology, Climate Communications, Computational Biology in Cancer Research, Crystallography, Ecology, Environmental Science, Environmental Social Science, Genetic & Cancer Epidemiology, Global Health, Marine Ecology, Microbiology, Parasitology, Political Sociology, Social Movement Studies, Post-Growth Economics, Social and Health Psychology, Social Anthropology, Social Psychology, Science and Technology Studies/Geography, Synthetic Biology, Education
Membership in Direct-action Groups	48.14% were part of direct-action activist groups such as Scientists for Extinction Rebellion, Scientist Rebellion, Just Stop Oil, and Extinction Rebellion
Engagement in Arrestable Action	37.03% (10) had taken arrestable action, with 22.22% (6) participants having been arrested for their actions at least once
Membership in Scientist-led Groups	33.33% (9) were members of direct-action groups that used the scientist identity as part of their actions, such as Scientists for Extinction Rebellion and Scientist Rebellion.

4.2.3 Interview Procedure

Semi-structured interviews were conducted online via Microsoft Teams by the first author. The interviews aimed to investigate scientists' views of the climate and ecological crisis, their own actions, and activism. A semi-structured interview schedule which included topic lists and open-ended questions was used to guide each interview (see Table 3). The interview schedule served as a topic guide rather than a prescriptive set of questions, allowing for flexibility and adaptation to each interviewee. The opening question was used to orient to each interviewee, and questions were adapted as required to broadly ensure that the topics were covered.

The development of this schedule was informed by the research question, the prior survey research, systematically collected fieldnotes with scientist-activists, and the literature on scientist environmental advocacy. Data was prepared manually by transcribing the interviews verbatim. To protect anonymity, identifiable information such as names and specific locations were removed from the transcript. Interviews ranged from 36 to 118 minutes (*Mean* = 63.41 mins, *SD* = 20.50 mins).

The first author did not disclose his activism unless specifically asked about it, aiming to minimize potential bias in the interview process and ensure that participants felt comfortable expressing their genuine thoughts and opinions about activism. Where applicable, disclosure did stimulate insightful conversations about the role of activism in research. For further context on reflexivity and researcher positionality, see credibility strategies below.

TABLE 4.2 Interview schedule.

1.	Tell me about yourself / who are you?
2.	Would you describe yourself as a scientist / social scientist / academic? /How would you describe your job? Is this important for how you see yourself? How would you describe your role in society? What does success in your role look like?
3.	Would you describe yourself as an activist? Is this important for how you see yourself? What is the role of the activist in society?
4.	Do you see science and activism as compatible?
5.	What barriers do you think there are for others like yourself to act? Have you experienced any of these yourself? What effect did this have? How did you overcome it / them?
6.	Have you ever engaged in environmental / climate activism?
7.	What motivated you to do this initially?
8.	What motivates you now?
9.	How long have you been engaged in activism?
10.	What kinds of action have you participated in?
11.	How does it feel to take action?
12.	Have you experienced any challenges when taking action?
13.	Why have you not engaged in other actions?
14.	Where do you draw the line on the actions you take / How do you decide where your limits are? Do you feel that where you stand on this line might change in future? If so, how so and why?
15.	Is there anything else you do that you feel is effects positive change? Do you feel that these actions are effective?
16.	Which actions are particularly effective?
17.	Which actions do you think are ineffective?
18.	In which ways do you feel that your work is effective at tackling these issues?
19.	Do you know any / other climate activists? Do you take action with them?
20.	Are you a member of any groups? What has been your experience of being part of this / these groups? Are these groups important to you?

21.	How have your friends and family reacted to your activism?
22.	Do any of your friends and family join you in your activism?
23.	Some people describe climate change as a moral issue. What do you think about this?
24.	For individuals who identified as activists: Do you feel that how you live your life aligns with your activism? For individuals who did not identify as activists: Do you feel that your beliefs or actions regarding climate change align with your everyday life?
25.	In general, what is important to you in life? Does this/do these affect your actions?
26.	What is your worry for the future?
27.	What is your hope for the future? How do you think we get there?

4.2.4 Analysis

We drew on critical discursive psychology (CDP) concepts and principles, which underscore that individuals are both products of and active agents in shaping wider discourse (Edley, 2001; Potter & Wetherell, 1987). CDP provides a framework for examining how language constructs social identities, negotiates power relations, and challenges or reproduces dominant ideologies (Tileagă & Stokoe, 2015; Wetherell, 1998). CDP emphasizes the dynamic interplay between discourse and social practices, highlighting the role of language in shaping individual subjectivities and social realities.

We focused on scientist talk to explore how scientists draw on different linguistic repertoires to navigate ideological dilemmas (Billig et al., 1988) and articulate their social identities (Antaki et al., 1996). CDP posits that thinking and subject accounts are often rhetorical (Billig, 1987), therefore analysis of talk may reveal how speakers use language to manage dilemmas and positions themselves within the wider discourse e.g., to persuade or convince themselves or others that scientists can be activists.

CDP necessitates attention to both linguistic repertoires (Wetherell, 1998), culturally shared ways of talking about and understanding the world, and subject positions, the relational, social locations, that individuals may construct for themselves or others by drawing on these repertoires to position themselves in relation to the wider discourse (Edley, 2001; Wetherell, 1998). Specifically, we were interested in how the speakers utilized repertoires concerning science and the climate and ecological crisis and how they claimed subject positions, particularly those incorporating the scientist identity, to manage the dilemma.

All analysis was completed by the authors following standardized steps for discourse analysis (Potter & Wetherell, 1987). Analysis started with several rounds of reading and coding the transcripts This included multiple rounds of reading and coding transcripts, focusing on how scientists spoke about scientist and activist identities, their actions on environmental issues, moral values, and interpersonal relationships. We observed diverse perspectives on scientist activism, including varying conceptions of what it means to be a scientist and the actions scientists may take. To further this analysis, we applied an ideological dilemmas (Billig et al., 1988) reading of the talk and attended to the interpretative repertoires and subject positions used to manage the central dilemma. The final stage involved elaboration of the discursive functions (Potter & Wetherell, 1987) of each subject position for negotiating the central dilemma, such as legitimizing scientist advocacy.

Note. Although our pre-registration initially outlined the use of thematic analysis, as we began analyzing the data, it became evident that a discourse analysis approach would be more suitable for our research questions and objectives. The early stages of data analysis involved tagging and coding text, a process common to both thematic and discourse analysis methodologies. As we progressed with the analysis, it became increasingly apparent that the nature of the data, characterized by rich debates within the scientific community, necessitated a shift in analytical approach. Given the complexities of the discussions and the theoretical framework guiding our research, particularly focusing on ideological dilemmas and critical discursive perspectives, we determined that a discourse analysis methodology would better serve our research aims. Therefore, we proceeded with a discourse analysis approach to gain deeper insights into how scientists navigate ideological dilemmas and articulate their identities within the discourse surrounding environmental activism.

In presenting supporting quotes, we aimed to capture the richness and diversity of participants' perspectives on scientist advocacy in environmental discourse. While we strived to include a range of voices, it's important to note that some participants may be represented more prominently than others. This deliberate selection reflects our focus on providing comprehensive insights into the nuanced subject positions observed in the discourse. Our approach prioritized the depth and relevance of participants' contributions while ensuring a balanced representation of the overall findings.

Finally, the analysis presented in the paper concerns how scientists manage the outlined dilemma. However, when it came to what motivates scientists to stay committed long-term, and especially when considering whether to engage in high stakes action e.g., civil disobedience, other factors were more important (see Supplementary Note 1).

4.2.4.1 Credibility Strategies Employed. We employed several credibility strategies to bolster the trustworthiness and validity of our findings. Triangulation with other data sources was used to validate and enrich our interpretations. This involved cross-referencing information gathered from interviews with data extracted from diverse sources such as social media and media accounts. By doing so, we aimed not only to corroborate the insights gleaned from our primary sources but also to gain a deeper understanding of how the events discussed during the interviews were covered by external sources. This rigorous triangulation process allowed us to verify the accuracy of the information provided by participants and provided valuable insights into the unfolding of events as reported by media and other sources.

Member checking was employed at various stages to check interpretation with interviewees. For example, the lead author presented the findings and interpretations to both activist and non-activist scientists, soliciting their feedback and validation. This process ensured the accuracy and relevance of our interpretations while also addressing any potential biases or misunderstandings.

Reflexivity was a fundamental aspect of our approach to credibility. We acknowledged the primary researcher's subjectivity and potential influence on the data collection and analysis process. By practicing reflexivity, we aimed to maintain transparency and integrity in our research, recognizing and mitigating any personal biases that may have impacted our interpretations.

4.2.4.2 Reflexivity Statement. Our research team consists of individuals with diverse perspectives on environmental engagement. While our motivations and actions vary, all of us share a dedication to advancing environmental awareness and understanding. As the lead researcher of this study, I acknowledge my personal stake in the environmental issues explored. I am deeply concerned about environmental challenges and recognize the overwhelming scientific consensus on the urgent need for ambitious action to address climate change and related crises. This recognition, shared by the co-authors, coupled with our interest in this phenomenon from a psychological perspective, collectively motivated our investigation into how scientists navigate ideological dilemmas surrounding environmental advocacy.

Throughout the study, we recognized the potential influence of our personal perspectives on the research process. We approached this challenge by acknowledging our motivations and actions while striving to maintain methodological rigor and impartiality. Our reflexivity extended to methodological decisions, including triangulating data from multiple sources (including empirical research, diverse perspectives in the literature, and media coverage of scientist actions) and accurately representing the diverse viewpoints of interviewees without imposing our own biases or preconceptions onto their views.

It is important to recognize that, despite our efforts to maintain objectivity, our motivation to conduct this research stems from a belief in its necessity. Understanding how scientists navigate these ideological dilemmas is crucial for fostering informed discussions within the scientific community about responses to the climate crisis. By elucidating the diverse perspectives and strategies scientists employ in engaging with environmental issues, this research aims to enrich our collective understanding of effective approaches to addressing climate challenges. Such insights can facilitate a more nuanced dialogue among scientists, policymakers, and stakeholders, ultimately enhancing our ability to develop comprehensive and adaptive strategies that draw on scientific expertise while respecting individual and disciplinary perspectives. Our commitment to rigorous methodology, including triangulation with multiple data sources and reflexivity, underscores our dedication to producing credible and valuable research outcomes.

4.3 Results

Our analysis revealed two repertoires that scientists utilize for managing the dilemma of engagement (see Table 4.3). The first, 'Reconceptualizing Scientist Identity', addresses the perceived conflict between scientific objectivity, impartiality, and the moral imperative of activism, by reconfiguring the scientist identity. The subject positions adopted adapt or challenge traditional scientific norms, arguing for a nuanced understanding of scientists' roles in pushing for societal change. The second, ‘Reframing the Work that Scientists Do”, offers alternative perspectives on engagement, distinguishing advocacy from activism, and redefining research as activism. Together, these linguistic repertoires highlight the multifaceted ways in which scientists negotiate their identities and actions within the discourse of environmental activism.

4.3.1 The Scientist’s Dilemma in the Context of the Climate Crisis

Before we explore these repertoires, it is important to establish how interviewees construct the nature of their dilemma and why they see the traditional role of science and scientists as being insufficient:

> Extract 1
>
> Female, Doctoral Student, Sustainability Social Scientist
>
> The traditional linear perspective would be that we take the information, and we give it to people[...] to make better policies or technologies[...]. I very much do believe in the value of producing knowledge [...] but I also think it is limited[...] because it is not[...] resulting in the changes that we really need to see[...]. I think a lot of us are at this point now where we are thinking well okay, we are doing all this really interesting research[...] but is that translating into the situation overall getting better? And I guess the answer is no[...] on its own the research isn’t making that happen and I guess that is where the activism comes in.

In this account, the production of knowledge is not enough. Science may produce the knowledge base for dealing with the climate crisis – but that knowledge has not been translated into “better policies or technologies”. Consequently, other actions are required. This is developed in Extract 2:

Extract 2

Male, Doctoral Student, Air Quality

So, the traditional sense of what scientists I think do is that they tinker about with the world, find out how it works, and […] tell people about it. The telling people about it part is newer […]. [But] I don't think the job description of a scientist involves making change. Traditionally that goes through the policymaker. Right, so scientists find something out, they write about it and dangle it in front of policymakers […] that might be regarded as activism, the dangling bit [...] [But] People who go people into academia are not incentivized to make their findings, make their conclusions become actions[...] I think that scientists need to be ushered more towards making their conclusions acted upon.

Here it is the failure of policy makers to deliver on their traditional role of using scientific knowledge for change that is at the heart of the scientists' dilemma. Scientists are traditionally focused on knowledge discovery and informing policy makers – but if those charged with action are not delivering, then scientists need to ensure their knowledge is acted upon.

At the same time, while many scientists are drawn to activism due to the perceived limitations of policymakers' actions, there is a recognition that activism should not overshadow their science:

Extract 3

Female, PhD, Environmental Biotechnologist

So, I'm back in that corner of doubt about whether the science I'm doing is the right thing to be doing […]. But it also keeps me sane because I love my job and maybe doing both […] science and activism helps both of those things […]. I couldn't do what I'm doing at work if I wasn't doing the activism, because I would

> be so distracted by the state of the world that I wouldn't be able to pick up a pen. Yeah, I think they can be complimentary. Being an active scientist is complimentary to the activism, it helps people take you more seriously […]. It shouldn't be the truth, but I think it is and we all have that influence […]. And if there are no activist scientists in this lab, I'm calling myself it now, then no one's ever going to think, "Oh, I can do that." So, I'm here and I'm out.

These perspectives highlight the dilemma that engaged scientists must negotiate as they strive to effect meaningful change while preserving their core identity. Below, we present the strategies scientists employ within each of these repertoires to manage this tension.

Table 4.3. Linguistic Repertoires, Subject Positions, and Functions

Repertoire	Subject Position	Function
Reconceptualizing Scientist Identity	Activism is Objective and Rational	This position seeks to reconcile the perceived conflict between scientific objectivity and activism by framing activism as a rational extension of scientific inquiry. It posits that engaging in activism is a logical response to scientific findings, fulfilling the broader goals of scientific inquiry.
	There is no Objective Researcher	This position challenges the notion of objectivity by arguing that all researchers are influenced by personal perspectives and values. It suggests embracing subjectivity and acknowledging the impossibility of complete objectivity can lead to more honest and transparent science, thereby removing the perceived

		conflict between scientific objectivity and activism and making the case for scientist-activism.
	Activism is a Scientist's Moral Duty	This position asserts that scientists have a moral obligation to use their expertise and influence for the betterment of society. It emphasizes the ethical responsibility of scientists to advocate for policies and actions aligned with scientific evidence.
Reframing the Work that Scientists Do	Research and Teaching as an Activist Choice	This position holds that research and related teaching can be a form of activism in particular circumstances, blurring the lines between traditional research and activist endeavors.
	Advocacy not Activism	This position distinguishes actions they take as advocacy rather than activism, thereby distancing themselves from the more contentious connotations of activism.

4.3.2 Reconceptualizing Scientist Identity

The dominant approach observed entails a reconceptualization of the scientist identity, aimed at harmonizing scientific norms with engagement. This process involves several strategic maneuvers: firstly, utilizing scientist identity content by framing activism as objective and rational to align it with scientific values; secondly, critiquing traditional notions of the objective researcher to counter accusations of compromised integrity; and finally, imbuing the scientist identity with a moral imperative to advocate for the dissemination of scientific information.

4.3.2.1 Activism is Objective and Rational. This subject position frames activism as objective and rational, aligning with scientific norms:

> Extract 4
>
> Female, PhD, Environmental Biotechnologist
>
> I think that people who are not acting on information that science has generated are not being good scientists, they're not being objective, because what is scientific information for? […] it's to be acted upon and turned into something useful. And we're following science by doing the activism that we're doing.

This framing legitimizes action as objective and a natural extension of scientific inquiry. In fact, activism is proposed as a requirement of good science. Moreover, the interviewee counters criticisms that her activism distracts from her scientific responsibilities:

> Extract 5
>
> Female, PhD, Environmental Biotechnologist
>
> My boss when he was giving me a dressing down the other week was saying that, "You're distracted," and I couldn't really deny that occasionally I am distracted, but I tried to say like, "Why aren't you distracted?" No, I'm not distracted by activism, I'm actually distracted by the state of the world and the anxiety and the fear that that provokes, the activism helps with that. I said this a bit more gently but, "Who's not behaving rationally here?"

She defends her activism as a rational response to the climate crisis, countering critiques of activism and her alleged distraction from science. The interviewee also touches upon the power dynamics within scientific institutions, hinting at the challenges faced by scientists who step into activism. The reference to a "dressing down" by a superior reveals the tension between individual agency and institutional norms, highlighting the need for scientists to navigate these power structures as they engage in activism.

4.3.2.2 There is no Objective Researcher. A second way scientist identity is reconceptualized to fit with activism is through challenging the notion of the possibility of objectivity – given that scientific writing is a form of persuasion.

Extract 6

Male, Professor, Astrophysics

I think as soon as you are out there writing publicly, then you are doing a form of advocacy, even if you don't realize you are. So, I don't think it is possible for anyone to be truly objective in how you present anything, so I think any form of public engagement is a form of activism […]. Maybe it is very difficult to not let it influence your scholarship, but as long as you are open about that then I don't particularly see a problem. I think the truly objective researcher probably doesn't actually exist – nothing we do is truly objective […]. Anyone who is engaging publicly should at least think about how it influences their scholarship, but I don't see any reason why you should suddenly go oh I am being so active in the public sphere I should stop being a scholar.

This narrative challenges the notion of complete objectivity and advocates for a culture of transparency in scientific communication. It recognizes the difficulty of maintaining impartiality but emphasizes the importance of being open about the influences that shape research. The professor's view is that engaging with the public is not antithetical to scholarly pursuits; on the contrary, it encourages a deeper consideration of the interconnectedness of public engagement and academic scholarship. A similar perspective is echoed by another participant, who emphasizes the inherent motivation underlying research:

Extract 7

Female, Senior Lecturer, Health Psychology

> I think you see this tension between, you know, our training as scientists, which is like, “Oh, you’re a neutral, you just study the processes, you study the mechanisms,” but that’s really not true[...] you study so that people can be better and survive[...]. It’s always with an interest, you know. So, if people say there’s a conflict of interest if you have kind of outcome hopes basically, of course there is.

This participant underscores the motivational underpinnings of research, suggesting that scientific pursuits are intrinsically linked to the goal of improving society. These perspectives present an alternative view of the scientist, one that embraces the inherent values guiding their work, and in so doing seeks to legitimize scientist-activism. While this perspective may empower scientists to engage publicly, some argue that it may increase polarization:

> Extract 8
>
> Male, Master’s Graduate, Sustainability Social Science
>
> I do recognize that science loses trust of those social groups that have kind of already lost it and then you push further into polarization by being scientists and being activists, and that I guess really requires us to interrogate what knowledge is and why we feel confident to act on the knowledge we have and why we feel confident the other side is wrong. So, I do recognize that there’s something there that makes reconciliation a little bit difficult.

This perspective raises critical questions about the implications of blurring the boundaries between science and activism. It presents both an opportunity and a challenge. In one sense it challenges the status quo and liberates scientists to be activists. In another, it may undermine public trust in science, which may be influenced by perceptions of objectivity and impartiality.

4.3.2.3 Activism is a Scientist's Moral Duty. This subject position asserts that activism transcends mere choice – it's a moral imperative incumbent upon scientists as truth-tellers:

> Extract 9,
>
> Female, Retired Meteorologist.
>
> "As scientists we need to show people the truth[...]. Well, I feel like it's the morally – morally to me it's the right thing to do."

This retired meteorologist's conviction sets the stage for a broader discussion on the moral responsibilities of scientists. Her perspective underscores the ethical dimension of science where activism is seen as an extension of the scientist's commitment to truth. Building on this is the view that a scientist's duty arises from their expertise in rendering complex information accessible to the public:

> Extract 10
>
> Male, Postdoctoral Researcher, Infectious Diseases
>
> Scientists should take the first step[...] we are generally more aware of how to interpret the literature[...] distil it into layman language and, you know, raise awareness. We are trained for it, so we have the tools, so we should take the first step[...] and we also have the moral responsibility to do that because […] we have to stick up for science and climate change is all about, you know, pushing people to listen to the science.

For some respondents, their status as scientists with specialist knowledge and expertise places a moral obligation on them to sound the alarm:

> Extract 11
>
> Male, PhD, Ecologist

> I'm not just any scientist, I'm an earth scientist. I specifically know about what's happening to the planet and[...] my knowledge compels me to act[...]. I think it also gives me a particular responsibility[...] to be visibly doing something because[...] I worry that there might be people out there thinking "well, if it was really that bad then the scientists would be freaking out. But the scientists aren't freaking out, so clearly, they can't even believe their own words." So, I think it's important that we act like it's an emergency[...]. If I was to tell you now in this interview that I can smell smoke coming up the stairs and I think my house is on fire, but then I just carried on giving the interview, you, of course, would not believe me when I say my house is on fire[...]. I think it's important that scientists are visibly freaking out.

This ecologist's viewpoint adds depth to the discussion, suggesting that the visibility of scientists' concern is crucial in validating the urgency of environmental crises. Other non-earth systems scientists share similar sentiments that scientists have a duty to be activists:

> Extract 12
>
> Female, Senior Lecturer, Health Psychology
>
> I felt a sense of personal urgency and insight and bewilderment at the fact that we don't act on this[...]. Given my professional privilege, I have the space to follow up on this[...]. I find it […] a moral imperative to educate ourselves and instigate action as much as we possibly can within our spheres of influence[...]. So, it's that personal, moral, and also scholarly sense that all came together[...]. I just feel a strong sense of responsibility [...] to do the right thing.

This extract articulates a holistic view, where personal ethics, professional privilege, and scholarly responsibility converge to form a strong sense of moral duty. Her words encapsulate the collective sentiment that activism is not just a choice for scientists but an ethical obligation.

4.3.3 Reframing the Work that Scientists Do

The second repertoire, "Reframing the Work that Scientists Do," presents alternative perspectives on how scientists may engage in ways that manage the dilemma. This repertoire includes strategic maneuvers such as reframing research and teaching activities as a form of activism to effect change in ways more compatible with most scientists' daily work. Others strategically adopt an "Advocacy, not Activism" stance, to push for change while avoiding the perceived risks or constraints associated with direct action.

4.3.3.1 Research and Teaching as an Activist Choice. This approach offers a strategic approach for scientists to enact change through their research and teaching activities, while also addressing concerns about personal and professional risks associated with more confrontational forms of activism. As exemplified by a doctoral candidate below, this perspective highlights the deliberate decision to research environmental issues as an activist choice:

> Extract 13
>
> Female, Doctoral Student, Moral Psychology
>
> The choice for me to focus on environmental issues in my work I think is also a very like activist choice because I kind of make sure that my career is contributing to the good stuff and not the stuff that's destroying the earth.

This sentiment underscores the potential of research as a vehicle for change, bridging the gap between academia and activism. Similarly, a Senior Lecturer below emphasizes the impact of their educational initiatives in fostering activism among students:

> Extract 14
>
> Male, Senior Lecturer, Degrowth

The actions I'm involved in – writing and publishing[...] I think things become cultural through social cues[...] I run a unit […] I take them through 13 weeks of degrowth literature, and then I look at the structures that hold developed world lifestyles in place[...] I'm just making a documentary with students about their learning experience at the moment, and I'm hoping that little documentary would be a good form of activism.

The senior lecturer's initiatives demonstrate how teaching can mobilize the next generation, equipping them with the knowledge and skills necessary to address environmental challenges. His work maintains his professional identity while fulfilling his moral duty to contribute to societal change. While the previous extracts illustrate activism through research and education, the following extract presents a unique case where an academic not only engages in activism through civil disobedience but also integrates this experience into his teaching:

Extract 15

Male, Senior Lecturer, Global Health

Up until recently I guess I was a climate activist[...] So, I think at the time it really informed my academic profile. I was able to draw on lived experiences and… bringing that into my work, and I think it changes the perception of the academic from a student perspective; they do actually see that an academic is doing something in the real world in real time, it's not just the fact that they are writing about stuff and publishing stuff they are actually physically doing something […]. I would be giving public talks and lectures on the topic from an activist perspective, really drawing on my research.

Taken together, these extracts capture how adopting this position allows scientists to advocate for change in a manner that aligns with their profession. However, transfiguring research and teaching as activism requires conscious effort to bridge the gap:

Extract 16

Female, Doctoral Student, Moral Psychology

I think academia and activism is definitely compatible. I do think they are different things though. Too many academics just assume that their work alone is enough to kind of reach people, and it's not. Academia is, in large part, inaccessible to a lot of people [...]. I think it takes personal work to make it compatible.

This doctoral student's insight emphasizes that while academia and activism can be harmonized, it necessitates intentional work to make academic research accessible and impactful beyond the ivory tower. It's a call to action for academics to actively engage in making their work understandable and relevant to the broader public, thereby fulfilling the potential of their activist values.

4.3.3.2 Advocacy, not Activism. The subject position "Advocacy, not Activism" is informed by two related but distinct considerations: the recognition that claiming an activist identity often requires substantial effort and engagement in actions commonly associated with activism (e.g., protests); and the awareness that the activist label can carry a stigma. Scientists adopting this stance strategically frame their environmental efforts as advocacy without fully aligning with the traditional activist identity, allowing them to contribute to change while preserving their professional identity, autonomy, and sidestepping the negative associations linked to activism:

Extract 17

Male, Professor, Astrophysics

> In a way – I am not great at being the classical activist right – going out in the street and campaigning, but I think as soon as you are out there writing publicly, then you are doing a form of advocacy [...] I do think that even just writing publicly or speaking publicly is a form of activism, even if it is fairly mainstream activism, rather than slightly more [...] what is the right word [...] slightly more extreme, I don't know, I don't want to use extreme in a pejorative sense, but you know what I mean.

This professor initially frames his actions as advocacy rather than activism, but then adjusts it to a subtly broader definition of activism to include milder actions such as public communication of science.

In Extract 18, the doctoral student's nuanced use of terminology—distinguishing between advocacy and activism, and outreach and formal or "official" advocacy—serves to strategically position his environmental engagement within the academic sphere:

> Extract 18
>
> Male, Doctoral Student, Molecular Biology
>
> I've signed, you know, petitions, things like that. I'm trying to do as much outreach as I possibly can[...]. Like when we were making the members of the general public play board games and […] they would talk to the parents about[...] biofuels, about climate change and ability, and how[...] dire the situation was. It's not official advocacy. It's just I'm trying to reach the people. I didn't do much formal advocacy, but I have joined a few marches, signed a few things. But[...] I considered most of the advocacy I do is in the periphery of my work, using my work[...] to credibilize myself and to to reach the right people.

By labelling his public outreach efforts as informal advocacy, he circumvents the potential stigma associated with activism, while leveraging his academic credibility to effectively communicate and influence public discourse on climate change. Taken together, this subject position underscores a deliberate and strategic approach by scientists to advocate for environmental issues while maintaining their professional integrity, autonomy, and credibility, providing accessible and flexible engagement, and consciously avoiding the stigma and biases often associated with traditional activism.

4.3.4 High-Cost Action and Action Maintenance

Examining the talk of scientists, it became clear that while ideological dilemmas shape the initial engagement of scientists, it is not what are discussed when considering sustained engagement and higher risk actions. This section describes some of the most prominent factors discussed when scientists talk about their commitment to action. For some, it is a moral obligation to family and future generations:

> Extract 19
>
> Male, PhD, Retired Marine Biologist and Educator
>
> I have this obligation as a father and as a grandfather to do whatever I can to … well, I have this image of what my grandchildren's life will be like if we don't turn this around. It's a horrific image that I … I do not contemplate very often, I wall it off. But I see their lives as if you don't stop this, their lives will be filled with misery, death and short. So, it's a testing – this is the time when my entire life seems to have come to this focus where I have this do I do whatever I can? Or do I stand, hold back at some level and [...] in which case [...] I lose self-respect. It's a test of my character. I understand it sounds pompous, but truly that's the way I think, you know[...] am I a hypocrite or am I not? Am I willing to do whatever it takes or am I not? When I go in court and I decide what I want to say to the

magistrate, and do I worry about what the consequences of alienating will be? I can't, I can't. I have to just do the best I can. It's a moral obligation.

This moral sense is used by some to critique or challenge the discourse that what is legal is moral:

Extract 20

Female, Doctoral Student, Moral Psychology

I'm a moral psychologist[...] I think whether something's moral or immoral kind of depends as who's designating it as moral or immoral[...] so much of the discussion on whether this is right or wrong, moral or immoral, is decided by people who already have a lot of power.

This position is then used by others to legitimize civil disobedience:

Extract 21

Male, Doctoral Student, Air Quality

When I realized that the only way to make change is to break the law it shattered this idea that I've grown up with, which was that the law, umm, represented the good, and even the idea of good and bad was, was shattered through activism.

Moreover, community support emerges as a crucial factor in sustaining engagement and providing the necessary encouragement to persevere through challenges. Scientists acknowledge the importance of solidarity and camaraderie within activist circles, recognizing that shared experiences and mutual support can bolster their resolve:

Extract 22

Male, Doctoral Student, Air Quality

It's all community based, right? I, I can take a lot more on and I can take a lot more personal cost if I'm with others who will support me. But when I'm on my own, I have to take less personal cost. It's it's like I can deal with more slaps to the face if, if I'm with people who are, you know, kind of support me through it. If I'm on my own, then I can take fewer slaps.

Community, along with a sense of shared identity, is mentioned by others as integral to motivating actions where they might be arrested. For one scientist contemplating whether they would engage in civil disobedience again, it is critical:

Extract 23

Male, Senior Lecturer, Global Health

Interviewee

I think the big difference is not being within a community of activists. So, I think the first step would be to start to do that. And I think once that happens[...] that's when you've broken the inertia, and I think once you're within that community you start to feel more – I will start to feel more – empowered and you start to feel like you're not alone, and I'll start to feel the way that I felt. I mean it's a bit like going to war. I mean I don't like the war metaphor for lots of reasons but it is a bit like going to war where you start to identify with people and you want to support them and then you start to see them putting themselves on the line and you just feel like you have to put yourself on the line too because it's the right thing to do. I don't think about it, I don't try to rationalise it; at some point I just think, "Okay, enough is enough, I have to do this now", and then I guess I'll do it.

Interviewer

And is that what you felt before in 2019?

Interviewee

Yeah, I did. I could almost feel it welling up inside me and then I was kind of thinking, "Okay, this is going to happen", so you just kind of brace yourself really. Before you know it, you're in a police van and there you go.

Additionally, these bonds play a crucial role in preventing burnout by providing mutual support and guidance:

> Extract 24
>
> Male, PhD, Cancer Biologist
>
> I think that network is actually very good at telling you what you need to not do[...] definitely been times where I've picked up the phone and gone, "Agh!" And then I've been told, "Don't do this thing, do this thing. Don't do this thing." I've had a lot of support from people who actually say what's most important, what's most strategic, is what's going to keep you from burning yourself out and having a horrible time. And so, actually, there's a lot of strength in that community.

These perspectives highlight that sustained engagement in activism transcends mere ideological considerations and is grounded in obligations to family, moral values, and the support of communal networks.

4.4.5 The Authors' Dilemma

Of course, we are not above such considerations ourselves. The researcher is not 'a fly on the wall'(Geertz, 1973). To enhance the credibility and depth of our analysis we reflected on our own positionality as researchers throughout the process(Berger, 2015; Olmos-Vega et al., 2023). As environmentally concerned psychologists, we grapple with questions about our commitments and actions. Within our team, there is no consensus on which actions are most effective or appropriate, and how to reconcile these with our academic roles. This diversity among us mirrors the varied perspectives of our interviewees, helping us to understand the ideological dilemmas faced by scientists. For example, some of us engage in direct actions on environmental and other issues, including protests, and are comfortable with describing these actions as activism. While others align with the

Strategic Environmental Advocacy position by refraining from such actions and carefully using terminology to distinguish advocacy efforts, such as public talks and blogging, from activism.

4.4 Discussion

This research highlights the repertoires scientists draw on to manage the dilemma between their professional identity as scientists and activism. We observed that scientists employ two strategies to reconcile their professional identities with their activism: redefining the scientist identity and reframing scientists' work. Scientists adopt varied subject positions in relation to these repertoires to manage the inter-identity fit (Turner-Zwinkels, Postmes, et al., 2015) between science and activism, accommodating engagement. The following discussion details the nuanced subject positions scientists adopt and their implications for scientist-activism.

Identity construction is context dependent and fluid (Edwards, 1998; McKinlay & Dunnett, 1998), and can be used for particular argumentative functions (Antaki et al., 1996; Antaki & Widdicombe, 1998; Billig, 1987). The three subject positions adopted in relation to the reconceptualizing scientist identity repertoire all broadly function to construct the scientist identity in ways that legitimize action. The first involves using scientist identity content, specifically scientific values of objectivity and rationality, to frame scientist-activism as a logical response to legitimize activism. Some scientists visibly invoke their identity through symbols like white lab-coats and peer-reviewed papers (Gayle, 2022), lending epistemic authority to social movements while staking a place for scientists. The second position critiques the notion of a truly objective detached researcher to humanize scientists and justify activism. It argues against accusations that scientist-activists are compromised, provided they are open about their motivations. It reflects critiques of the separation of science from society and how science is inherently bound up with the social, cultural, and political (Haraway, 1988; Isopp, 2015; Latour, 1987; Oreskes, 2020). Moreover, some argue science is a moral enterprise aimed at producing knowledge of benefit to society and that science as an institution can give moral leadership (Collins & Evans, 2017). This is reflected in the third subject position which emphasizes the moral duty of scientists to not only produce information but to advocate for it. This represents an evolution in the idea of the scientist as communicator (Guenther et al., 2016). This position, reflected in various perspectives (Capstick et al., 2022; Gardner et al., 2021; Rodgers, 2023), not only serves to legitimize scientist-activism by centering moral values in the scientist identity, but to compel other scientists to act. These positions represent broader challenges in the wider discourse to evolve traditional depictions of the scientist (Betz, 2013; Castree, 2019; Lackey, 2007; Merton, 1973; Nelson & Vucetich, 2009; Nielsen, 2001; Sedlak, 2016) to take a more active role (Capstick et al., 2022; Gardner et al., 2021; Rodgers, 2023). Additionally, these positions provide further support for previous research that found that scientist identity construction may be used to legitimize or delegitimize activism (Finnerty et al., 2024b).

The two subject positions adopted using the reframing the action repertoire broadly functioned to adapt actions taken to suit individual capacities, identities, and preferences. This allowed scientists to align their activism with their unique skills, self-perceptions, and personal inclinations. Firstly, scientists who reframed their research and teaching through an activist lens aimed to integrate their scientific expertise with their advocacy efforts. By contextualizing their research and teaching within the broader socio-political landscape, these scientists sought to amplify the relevance and impact of their work while doing so in ways that still closely aligned with the scientist identity. They embraced the activist label to some extent but did so in ways that were less contentious than stereotypical protest, thus requiring less identity reconstruction to accommodate the underlying dilemma. Secondly, scientists who redefined their actions as advocacy rather than activism aimed to differentiate their engagement in environmental issues from the more contentious connotations associated with activism. This strategic framing permits scientists to leverage their credibility and expertise while advocating for change within institutional and policy frameworks. By positioning themselves as advocates rather than activists, or as a milder activist than others, these scientists sought to bridge the gap between scientific research and policy action, while distancing themselves from more contentious types of political action. For example, some perspectives suggest scientists should support rather than participate directly in activism, acting as information providers to activist groups (Scientists for Future, n.d.). Scientists for Future (S4F) International exemplifies this approach, supporting the global climate movement by providing facts and materials based on reliable scientific data to stakeholders. This approach allows scientists to fulfill their roles as advocates for evidence-based policies while maintaining a perceived neutrality associated with the scientist identity.

These efforts to reimagine identity and reframe action reflect the dilemma within the discourse and a wider concern among environmentally concerned scientists about how advocacy might impact credibility (Gundersen, 2020; Oppenheimer et al., 2019; van Eck, 2023). Mixed sentiment on whether scientists should engage, and if so, whether they should use the scientist identity or not (van Eck, 2023), reflects the varied subject positions scientists adopted in our interviews. Although our previous research did not find credibility concerns to be a statistically significant barrier to engagement (Finnerty et al., 2024b), they remain a concern for scientists (Dablander, Sachisthal, Cologna, et al., 2024a; Finnerty et al., 2024b). However, this apprehension and the work undertaken to manage the dilemma may be disproportionate, given that a majority of scientists and researchers, and the public, support increased scientist advocacy (Cologna, Mede, et al., 2024; Dablander, Sachisthal, Cologna, et al., 2024a; Latter et al., 2024). This discrepancy suggests pluralistic ignorance where scientists privately support action but perceive other scientists as unsupportive (Finnerty et al., 2024b). The moderate to high public trust in scientists globally (67 country study, N = 71, 417) further underscores the potential for scientists to advocate for evidence-based policies without compromising their credibility (Cologna, Mede, et al., 2024).

Beyond ideological considerations, social identity, community and interpersonal bonds, and moral values emerged as critical drivers of engagement when scientists discussed sustained action and high-cost actions, consistent with previous research (Fritsche & Masson, 2021; Furlong & Vignoles, 2021; Mackay, Cristoffanini, et al., 2021a; Swann & Buhrmester, 2015). Moral obligations to family, future generations, broader societal concerns, and bonds with other activists are mentioned as motivation when scientists discuss undertaking high-cost actions, such as civil disobedience, despite potential risks to their professional standing. These factors underscore the multifaceted nature of scientists' motivations for activism and highlight the importance of considering personal and social factors alongside ideological beliefs.

4.4.1 Limitations

The study encountered uncertainties and potential biases related to data collection. Opportunistic sampling may have influenced the sample composition and introduced several limitations. The findings of this study are based on a sample primarily composed of scientists predominantly from affluent, industrialized countries in the Northern Hemisphere. While the sample predominantly consisted of scientists from the Global North, particularly the UK, this overrepresentation is somewhat justified given the region's prominence in recent climate activism involving scientists. Groups like Scientists for Extinction Rebellion and Scientist Rebellion both started in the UK indicating the importance of this region for scientist-activism. Nevertheless, this geographical skew limits the study's global applicability, particularly given the greater vulnerability of Global South regions to climate hazards (IPCC, 2022). Consequently, the perspectives and subject positions represented may be skewed towards this demographic, potentially limiting the generalizability of the results to a broader global context. Future research should aim to include a more diverse range of participants from various geographical regions and socioeconomic backgrounds to ensure a more comprehensive understanding of ideological dilemmas in scientist advocacy discourse. Finally, the cross-sectional nature of the study limits our ability to capture the dynamic processes of identity construction and engagement over time. Longitudinal research would provide deeper insights into how scientists arrive at and potentially evolve their positions on environmental activism over time.

4.4.2 Conclusion and Future Research Directions

This study provides important insights into how environmentally concerned scientists manage the ideological dilemma of balancing scientific norms with the urgency of the environmental crisis. By detailing the discursive strategies scientists adopt to manage conflicting identities and values, our research enriches understanding of this dynamic while offering a means for scientists to reflect on and identify pathways to environmental activism.

Future research would benefit from longitudinal studies that examine how scientists' identities and framing of engagement strategies evolve over time, especially considering evidence suggesting that scientist identity content affects the political actions scientists take (Finnerty et al., 2024b), and politicization involves identity content change (Turner-Zwinkels, Zomeren, et al., 2015). Expanding the research beyond a primarily

Western or WEIRD (White, Educated, Industrial, Rich, and Democratic) (Henrich et al., 2010; Muthukrishna et al., 2020) sample, by incorporating additional voices from the Global South and other underrepresented regions, would enrich understanding. Scientists from other cultural and socio-political contexts may perceive and engage in scientist-activism differently, potentially adopting distinct subject positions.

Our team's diverse perspectives on environmental activism reflect the broader ideological dilemmas faced by scientists, enriching our analysis and representation of participants' viewpoints. Recognizing our motivations and actions, we emphasize the importance of ongoing reflexivity in research. Future work should continue to explore researchers' positions, fostering nuanced conversations within the scientific community about climate crisis responses. This dialogue can enhance our ability to develop comprehensive strategies that integrate scientific expertise with societal needs.

Chapter 5: Paper 4 Climate Futures: Scientists' Discourses on Collapse versus Transformation

Note. This paper has been published in the British Journal of Social Psychology as part of the special collection “No time like the future? Towards a generative, prospective, and possibilities-focused ‘futures social psychology’”. This version represents the paper as published with format modifications for consistency within the thesis: https://bpspsychub.onlinelibrary.wiley.com/doi/10.1111/bjso.12840

Abstract

The climate and ecological crisis poses an unprecedented challenge, with scientists playing a critical role in how society understands and responds. This study examined how 27 environmentally concerned scientists from 11 countries construct the future in the context of climate change, applying a critical discursive psychology analysis. The degree to which the future is constructed as predetermined or transformable impacts both the urgency and scope of proposed actions. Along a temporal spectrum from fixed and inevitable to contingent and transformable, scientists drew upon shared discourses of social and ecological collapse. The degree of fixity or openness in scientists' talk about the future shaped the range of arguments available, demonstrating varying levels of argumentative flexibility when framing solutions to climate change. At the fixed end, the future was presented as beyond human intervention, echoing doomist discourse. By contrast, more open framings presented collapse not as inevitable but as transformable through human agency. Here, collapse discourses were presented as warnings, motivating arguments that drew upon a wide array of strategies from collective action to technological innovation. These constructions of the future highlight scientists' role in shaping societal discourse and framing what actions are seen as viable or necessary to address the climate crisis.

Keywords

Climate change, science, future, identity, activism, environmental discourse, uncertainty.

5.1 Introduction

The scientific community's discourse on the future is critical in shaping humanity's response to climate change (IPCC, 2023) and biodiversity loss (IPBES, 2019). As trusted actors (Cologna, Mede, et al., 2024), scientists have long been catalysts for driving societal progress and enhancing human welfare (Independent Group of Scientists appointed by the Secretary-General, 2019; IPCC, 2022; World Health Organization, 2023). However, the narrative of scientific progress, which has long promised a future of prosperity (Pinker, 2018; Porter, 2003), is challenged by this crisis. The environmental crisis introduces profound uncertainties (UNDP, 2022; World Health Organization, 2023). Within this context, there are a diversity of future perspectives within the scientific community. Optimism persists among some, arguing that scientific ingenuity can overcome these environmental hurdles (O'Neill, 2023; Ritchie, 2024). Others signal a time of planetary uncertainty and probable decline (Bradshaw et al., 2021). Recognising the urgency of these issues, a growing number of scientists are stepping beyond research roles to advocate for policy changes and participate in social movements, leveraging their expertise to guide humanity towards a more sustainable future (Capstick et al., 2022; Gardner et al., 2021; Oza, 2023). Although this group represents a minority within the broader scientific community, a global survey of over 9,000 researchers found that 23% of scientists report engaging in legal protests and 10% have participated in civil disobedience (Dablander et al., 2024). While these figures provide valuable insights, this may overrepresent scientists who are particularly concerned about climate change, suggesting the numbers may not fully reflect activism levels across the entire scientific community. Nevertheless, this is the most comprehensive data available on this issue to date.

Critical discursive psychology (CDP) (Edley & Wetherell, 2001; Wetherell, 1998) may provide a powerful framework for examining how scientists construct and negotiate the future. CDP as a method (Edley & Wetherell, 2001) enables analysis both of how talk reflects wider discourses and how participants employ these discourses in conversation, and position themselves in relation to them, for specific rhetorical purposes (Billig, 1987; Billig et al., 1988). Our research team recently used CDP to explore how scientists navigate the "ideological dilemma" (Billig et al., 1988) between maintaining scientific objectivity and engaging in activism (Finnerty et al., 2024a). Set against the background of scientists' increasing advocacy and engagement with social movements (Dablander, Sachisthal, Cologna, et al., 2024b; Finnerty et al., 2024b), the current study builds on this initial work to explore how scientists' discussions about the future are constructed and mobilised to support specific pathways for climate action.

5.2 Theoretical Background and Context

5.2.1 World-making, Social Movements, and the Future

Collective beliefs about what the world is, what it could be, and what it should be, profoundly influence the worlds we create (Power et al., 2023; Taylor, 2003). These shared visions, or social imaginaries – a shared understanding of social existence - inform expectations and guide our actions (Taylor, 2003). Climate change increases uncertainty about the future (IPCC, 2023; UNDP, 2022), fostering competing visions within climate change discourse that influence mitigation responses (Stoddard et al., 2021). Critics underscore how prevailing discourses and imaginaries regarding *technological optimism, business-as-usual,* and *doomism* have failed to significantly reduce global emissions or inspire meaningful climate action (Celermajer et al., 2024; Lamb et al., 2020; Stoddard et al., 2021). Technological optimism places faith in future emissions reduction technology (Lamb et al., 2020; Peeters et al., 2016) and business-as-usual assumes current practices are sufficient to adequately address climate change (Celermajer et al., 2024; Thierry et al., 2023). Conversely, the doomist imaginary adopts a fatalistic outlook, asserting the futility of action (Celermajer et al., 2024). By constraining how people imagine the future, these perspectives narrow what responses seem feasible or possible.

Amidst these discursive constraints, global environmental social movements which reject both status quo and fatalist visions have emerged. Groups like Extinction Rebellion and Fridays for Future mobilise around dire predictions for the future but advocate for collective, just, and equitable solutions to address these crises (Berglund & Schmidt, 2020; Extinction Rebellion, 2024a; Fridays for Future, 2024), predicated on a form of 'radical hope'(Stuart, 2020).

5.2.2 Scientists' Responses to the Environmental Crisis

Since 2017, some scientists have taken a more active role in environmental social movements, transitioning from research to direct action (Gardner & Wordley, 2019; Reardon et al., 2017). As part of groups like Scientists for Extinction Rebellion (S4XR, 2023) and Scientist Rebellion (SR, 2023), actions include obstructing fossil fuel infrastructure (Oza, 2023), leaking the IPCC report (Scientist Rebellion, 2021), and pasting scientific papers to government buildings (Gardner et al., 2022; Gayle, 2022). These bold steps, sometimes leading to arrests (Gayle, 2022; Oza, 2023), reflect their commitment to environmental causes. Competing conceptions of how scientists should conduct themselves in relation to the climate crisis presents a dilemma for environmentally concerned scientists (Finnerty et al., 2024a). This dilemma lies between upholding traditional scientific values and addressing the urgency of these crises. The traditional conception of the scientist — as impartial and objective, and discouraged from political action (Betz, 2013; Castree, 2019; Lackey, 2007; Nelson & Vucetich, 2009; Nielsen, 2001; Sedlak, 2016) — is challenged by critics who argue that this separation is morally and intellectually unsound given the scale of the problem (Capstick et al., 2022; Reardon et al., 2017; Rodgers, 2023). These tensions are reflected in diverse scientist identity constructions which can either support or hinder action. Survey research indicates that scientists who have reconciled the values of science with activism, and perceive a moral duty to act, are more likely to engage in activism (Finnerty et al., 2024b). This group of scientists is also less likely to support techno-solutionist approaches, which often emphasise future technological fixes over systemic change[18] (Finnerty et al., 2024b). Further interview research identified varied discursive strategies scientists use to frame and manage the "ideological dilemma" (Billig et al., 1988) between upholding traditional scientific values and addressing the urgency of these crises (Finnerty et al., 2024a). One unexplored aspect of scientists' talk involves scientists' constructions of the future, an area ripe for exploration as the climate crisis fundamentally involves anticipating and mitigating future impacts.

5.3 The Current Research

Interviews with 27 environmentally concerned scientists were conducted to understand their views on the climate and biodiversity crises and their actions in response. Initial analysis detailed varied scientist identity constructions and how these are used rhetorically to manage the dilemma of the scientist-activist (Finnerty et al., 2024a). Prompted by the 'Futures Focussed Social Psychology' BJSP open call, a second reading of these interviews focused on a different aspect of this discourse: how scientists construct and mobilise visions of the future. Humans are inherently future-oriented, with thoughts about the future often involving "preparation for action to bring about desired outcomes" (Baumeister et al., 2016). Yet, the uncertainties surrounding environmental-change trajectories and the most effective mitigation strategies (Biermann et al., 2022; Capstick et al., 2022; Castree, 2019; Chenoweth & Stephan, 2011; Hamilton, 2013; IPCC, 2023; Irvine et al., 2019; Mathew, 2022; Ritchie, 2024; Smith et al., 2023; Winkelmann et al.,

[18] Techno-solutionism, the belief that all problems, including social, political, and cultural issues, are best solved by technology (S. F. Johnston, 2018; E. Morozov, 2013) is broadly similar to what was referred to as technological optimism earlier (Lamb et al., 2020; Peeters et al., 2016). For further research on attitudes towards technology in the context of climate change, see (Cologna, Berthold, et al., 2024).

2022) pose critical dilemmas for scientists: which vision of the future to accept, how to tackle the challenges presented, and which solutions to trust? Here, we examine how scientists draw on available climate discourse to manage these uncertainties and construct the future through talk, and how these constructions are used to justify and critique responses to climate change. This analysis draws on critical discursive psychology (CDP) (Edley & Wetherell, 2001; Wetherell, 1998), which may be used to examine how talk reflects wider discourses and is employed rhetorically to construct meaning and navigate social dilemmas.

5.4 Method

The interviews were preregistered (see here for preregistration). Participants, recruited from a survey on their views on the climate and biodiversity crisis and their actions (Finnerty et al., 2024b), provided informed consent and were not compensated. To protect participant confidentiality, the interviews are not publicly available, but analysis enquiries can be directed to the authors. Ethical approval was granted by the Lancaster University Faculty of Science and Technology to conduct interviewees with scientists on their responses to the environmental crisis. The pre-registration details a planned thematic analysis. However, as data analysis progressed, we recognised that CDP (Edley & Wetherell, 2001; Wetherell, 1998) would offer insights into the rhetorical and social functions of scientists' talk, particularly given the focus on how they construct and mobilise visions of the future. Thus, while the initial tagging and coding of text overlapped with thematic analysis, we transitioned to CDP for a richer exploration of how language shapes and reflects broader discourses on climate change.

5.4.1 Participants

27 natural and social scientists were interviewed (59% Male, M_{age} = 40.19 years, *SD* = 12.93, range = 24 – 77). See Table 4.1 for sample description. Participants were recruited via an advert in a survey on scientist activism (see Supplements for recruitment strategy). Participants were identified by a number, their gender, and discipline. Interviews were conducted from June 2022 to December 2022. The international makeup of the sample reflects the global nature of the scientific community and the non-profit organisations organising scientists' responses to the climate crisis. However, we acknowledge that the UK is overrepresented in our sample, reflecting the UK's prominent role in recent climate activism and the establishment of key global activist groups such as Extinction Rebellion (of which Scientists for Extinction Rebellion are a part) and Scientist Rebellion. It is important to note that the sample includes a higher-than-usual proportion of participants engaging in direct action (37%), compared to a recent larger survey of over 9,000 scientists, where 10% reported direct action (Dablander et al., 2024). This activist skew reflects our recruitment strategy and the focus on environmentally concerned scientists but may not fully represent the broader scientific community.

5.4.2 Interviews

Semi-structured interviews were conducted online via Microsoft Teams by the first author. All interviews were conducted in English as all interviewees were fluent English speakers. They investigated scientists' views of the climate and ecological crisis, their actions, and views on activism (Supplementary Table 1). Two questions towards the end prompted participants to discuss the future. Additionally, given the interview context, discussions about the future naturally emerged throughout conversation. The schedule served as a topic guide rather than a prescriptive set of questions, allowing for flexibility and adaptation to each interviewee. The opening question was used to orient to each interviewee, and questions were adapted as required ensuring topics were broadly covered.

The first author did not disclose his activism unless specifically asked, to ensure that participants felt comfortable expressing their genuine thoughts and opinions about activism. Where applicable, disclosure did stimulate insightful conversations about the role of activism in research.

5.4.3 Reflexivity Statement

We recognise that, as researchers, we are not detached observers (Geertz, 1973), but active participants in environmental discourse. Throughout this study, we reflected on our own positionality as researchers to enhance the credibility and depth of our analysis. As environmentally concerned psychologists, we grapple with questions about our commitments and actions, much like our interviewees. Within our team, there is no consensus on which actions are most effective or appropriate, nor on how to reconcile these with our academic roles. This diversity among us mirrors the varied interviewee perspectives, helping us to understand the ideological dilemmas faced by scientists. Likewise, there is no consensus among us regarding what the future looks like, nor which actions should be taken to shape it. These diverse perspectives allowed us to approach the study without preference toward any specific future scenario or action strategy. Nevertheless, our motivation to conduct this research is driven by a belief in its importance. Understanding how scientists navigate the future is vital for fostering informed discussions within the scientific community about responses to the climate crisis. To manage the potential influence of our perspectives, we acknowledged our motivations while striving to maintain methodological rigour and impartiality to accurately represent participants’ views.

5.4.4 Analytic Approach

We examined scientists’ future constructions using a CDP approach. CDP attends to how language constructs identity, negotiates power relations, and challenges or reproduces dominant discourses and ideologies (Tileagă & Stokoe, 2015; Wetherell, 1998), acknowledging individuals’ dual role as shaped by and shapers of discourse (Edley, 2001; Potter & Wetherell, 1987). Our analysis focused on *interpretive repertoires*—culturally shared ways of talking about and understanding the world—and how these are employed in discussions about the future (Wetherell, 1998). CDP emphasises the rhetorical nature of thinking, with speakers using language to achieve specific aims (Billig et al., 1988). For instance, scientists may use language to argue for the necessity of direct action to avoid undesirable futures (Capstick et al., 2022). This makes it essential to examine the *subject positions* scientists adopt, which are the relational and social locations constructed for themselves or others to position themselves within the broader discourse (Edley, 2001; Wetherell, 1998). Our analysis paid close attention to metaphors, framing, and persuasive strategies.

All analysis was completed by the authors following standardised steps for discourse analysis (Potter & Wetherell, 1987). Analysis of the future-related interview content followed a previous analysis detailing how scientists balance traditional scientific values with the urgency of the climate and ecological crisis (Finnerty et al., 2024a). Analysis of future-related material involved several rounds of reading and coding the interview material, focusing on how talk about the future was constructed and used. We coded future-related material and examined how scientists' talk reflected broader social discourses and served as a form of social action (Edley & Wetherell, 2001) and performed specific rhetorical functions (Billig, 1987).

Given the uncertainties surrounding climate change and its potential impacts, we applied an "ideological dilemmas" lens (Billig et al., 1988) which facilitated an exploration of the conflicting imperatives and imagined futures within scientific and environmental discourses. This highlighted how scientists engaged with contrasting futures in the wider discourse (e.g., *dystopian and inevitable* versus *malleable and hopeful*), and how scientists position themselves in relation to them. The final stage involved elaboration of the rhetorical functions of subject positions (Billig, 1987), providing a comprehensive understanding of how scientists construct the future through their talk to support varied arguments.

Note. Scientists often drew on multiple interpretive repertoires, sometimes using different repertoires to serve distinct argumentative functions. This flexibility allowed them to position themselves variably depending on the context, reflecting the multifaceted nature of their engagement with future-oriented discourse.

5.5 Analysis

We observed that when scientists discuss the future in the context of climate change, they do so within distinct *temporal framings* – discursive constructions of time that organise their talk and support particular arguments. Our analysis identified three key temporal framings in scientists' future talk: *Fixed Futures*, *Delayed Futures,* and *Transformable Futures*. These framings revealed how scientists position themselves within climate discourse, make arguments about the future, and justify responses to climate change, reflecting their constructions on whether and how the future can be influenced.

The degree of fixity or openness in these temporal framings shaped what we term "argumentative flexibility"—the range of arguments available to scientists within each framing. At one end of the spectrum was the *Fixed Futures* framing, where the future is presented as a predetermined trajectory toward collapse. This was often characterised by a sense of inevitability and immediacy, as illustrated here:

Extract 1

7M Marine Ecologist

We've kissed it goodbye [1.5°C target]. I can see the feedback loops kicking in. I can see it in the methane, as the permafrost melts […]. I had a dream last night where I could see the flames from my house and the flames were moving towards me. Suffering and death, that's what we all have in our future and I just… unless this problem dissolves like mist and these seemingly insurmountable problems just disappear, I just don't see anything but a whole lot of suffering, a whole lot of chaos, and a whole lot of death.

Moving along the spectrum, the 'Delayed Futures' framing presented a negative trajectory, that "civilisation could collapse within the next few decades" (Extract 2, 22M Ecologist), but it maintained that these outcomes can be delayed through action. The future, while still trending negatively, was seen as having some degree of openness, allowing for the possibility of intervention.

Finally, at the other end of the spectrum was the 'Transformable Futures' framing, where the future is presented as flexible and shaped by human actions. This framing opened up discourses that emphasised the potential for change, arguing that the future is not fixed but rather contingent on present actions, e.g.:

Extract 3

15M Physics Professor

> Some of the rhetoric coming out of some of the groups is too extreme, getting to the point where the rhetoric is almost saying it is just now too late […]. It is never really going to be too late! Yes, the longer we leave it, the worse it is going to be but there will never be a point where […] we might as well give up.

Variability in how the future was framed revealed important insights into how scientists navigate their roles and responsibilities in the face of climate change and construct their vision for transforming the future (see Table 2). Each of these temporal framings drew upon similar repertoires, such as those concerning social and ecological collapse. However, the argumentative functions of how these repertoires were used shifted depending on the temporal framing. For instance, in a fixed future, talk tended towards doomism, that action is pointless because collapse is inevitable. Here actions like civil disobedience were justified more by moral conviction than by the action's efficacy. In contrast, a delayed future allowed for arguments grounded in the efficacy of collective action. Likewise, the transformable future framing opened up discourses regarding the efficacy of collective action, prefiguration, and techno-solutionism. Given the importance of temporal framing for organising scientists' talk about the future, below, we structured the results according to the spectrum of temporal framings, from fixed to transformable futures. This ordering is designed to highlight the progression of perspectives on the future within climate discourse, rather than be indicative of the prevalence of each framing.

5.5.1 Fixed Futures

The Fixed Futures framing was reflected in scientists' mobilisation of social and ecological collapse repertoires, representing a viewpoint where the future is perceived as unchangeable and imminent, evoking a sense of doom and inevitability (see e.g., Celermajer et al., 2024; Lamb et al., 2020). Extract 4 illustrates this fixed framing, where the speaker expresses a resigned acceptance of societal collapse:

Extract 4

18F Psychologist

About 10 years ago, I started preparing for the collapse of society […]. It's going to happen […] it's started. There is no evidence to show me that those in power will act […]. I realised that money and the elite will always be prioritised over the needs of the least […]. I've accepted that what is required to save humans is not going to happen […] but because I have children now, I have huge sadness about that […]. But I have accepted that that's going to happen, and it has started happening.

Here, the psychologist frames the future as inevitable, highlighting a pessimistic representation of human inaction and prioritisation of elite interests. This sense of inevitable societal collapse is central to the 'Fixed Futures' framing, where irreversible collapse is seen as already underway.

In response to this looming future, some scientists presented civil disobedience as a moral obligation. This was exemplified by a marine ecologist, who invoked an assumed societal collapse to justify civil disobedience and the construction of a moral identity:

Extract 5

7M Marine Ecologist

There is a risk of the system coming down on me very heavily […]. Yet I have this obligation as a father and as a grandfather to do whatever I can […]. I have this image of what my grandchildren's life will be like if we don't turn this around. It's a horrific image that I … I do not contemplate very often; I wall it off. […]

So, it's a testing – this is the time when my entire life seems to have come to this focus […]. Do I hold back at some level and […] in which case […] I lose self-respect. […] Am I a hypocrite or am I not? Am I willing to do whatever it takes? […] It's a moral obligation.

Despite recognising the possibility of severe repercussions, this scientist's rhetoric positions civil disobedience as a necessary and ethical response to the crisis, reflecting recent perspectives (see Capstick et al., 2022; Gardner et al., 2022). His talk highlights the tension between personal safety and moral responsibility, suggesting that failure to act would lead to a loss of self-respect and integrity. Interestingly, this commitment to civil disobedience is not rooted in its effectiveness. Rather, the speaker frames civil disobedience as an act of moral clarity, with the outcomes left to fate or higher powers:

Extract 6

7M Marine Ecologist

I have to concentrate on the process and leave the result to fate or higher power or God, or whatever you want to call it. I really can't judge the effectiveness of what I do […]. I have to be optimistic day by day when intellectually I'm very pessimistic. […] And I tell myself (laughing) […] that I may not be doing much for my grandchildren but I'm here to save the future for the rats, the worms, and the roaches at least.

Here, the focus shifts from tangible outcomes to the personal integrity of the process itself, underscoring a form of activism driven by ethical duty rather than a calculated expectation of success. Activism within this frame serves as a possible coping mechanism and a way to maintain personal integrity in the face of a bleak future.

Further complicating the response to a fixed future was how scientists talked about the 'burden of knowledge.' This concept reflects the ways in which scientists describe the impact of their understanding of potential societal or ecological collapse. One scientist, for example, presented his knowledge as a ‘curse,’ using this discourse to explain the need for distraction and coping strategies:

Extract 7

7M Marine Ecologist

It’s … you know, it’s a curse. It’s a curse to have the understanding I carry around, you know. I’ve never been a depressed person, but it’s depressing to think about, so I distract myself. I go almost no place without a book, alright. I always have a book, a book that will take me to another world – this Umberto Eco, Foucault’s Pendulum. A book that will take me out of this depressing world and take me into another world where I know I’m not going to die … and then that’s my way of turning off. I need to do this in order to keep functioning, so I’ve got these mechanisms that will allow me to continue the fight, continue functioning.

In this talk, the scientist frames his actions as part of a broader discourse on managing the burden of scientific knowledge. By portraying his knowledge as a 'curse,' he constructs a rationale for employing coping mechanisms, positioning these strategies as essential for continuing his work and engagement with the crisis.

His talk then shifted to considering a longer-term view of life on Earth to construct an argument about life’s resilience:

Extract 8

7M Marine Ecologist

I hope that things don’t get so bad that the rats, the roaches, and the worms won’t be able to survive, because 100,000 years after human beings are eliminated from the planet, life will … you can’t, we won’t be able to kill life. Life will bounce back. So, it will be a wonderful, beautiful world again, just we won't be in it and maybe that's all for the best. I grieve about the animals we're taking, the beautiful animals we're taking with us. But there will be other wondrous animals in the future that will evolve, you know. My brother's a geologist and he tells me, he says, "10 million years we'll just be this little strata in the rocks and that will be it".

This positions the scientist as someone who, while deeply concerned about the immediate future, finds a form of solace, albeit tinged with grief, in a longer-term, geological perspective. However, not all interviewees adopted such a position. Others responded to an envisioned fixed future by employing a discourse of practical action and self-sufficiency, focussed on preparing for the worst outcomes rather than preventing them:

Extract 9

18F Psychologist

10 years ago, I bought the house that I'm in, and I bought it for this specific purpose […]. We produce our own food […] we grow our own veg and we preserve it, we pickle it […]. I have two daughters, so I'm very aware that when society breaks down, women and girls are the most likely to experience sexual and physical violence […]. One of my jobs will be to teach them how to fucking kill somebody with their bare hands […]. People […] in cities are going to have to come […] looking for the resources that we have, and will my kids be able to protect themselves?

Her talk evokes a Hobbesian view of society, a return to a state of nature characterised by self-preservation and protectionism. Her presentation of social breakdown functions to justify investment in self-sufficiency and adopting a protective stance, providing motivation for teaching her daughters self-defence skills. Additionally, this future is invoked to justify her cultivation of a community that shares her concerns and values:

> Extract 10
>
> 18F Psychologist
>
> I have identified people who will live in my community, because you can't survive on your own […]. So, I have people who […] would be prepared to live here. So, I need a medical doctor, I have one, I have an architect […]. I have a group of people who believe the same thing as I do.

This is an exclusive notion of community, limited to trusted individuals with specific skills and shared values. It represents a closed community, united by a common concern for survival and a guarded stance against external threats. Others construct community so as to critique isolationist tendencies:

> Extract 11
>
> 13F Anthropologist
>
> I've been following these deep adaptation groups […] and preppers and survivalists […]. The morality of it all can be put aside when it's about survival […]. You can't really blame them […] if changes are not coming soon enough […]. They just try to prepare alone […] and that's completely unhealthy […]. Okay, fine, you managed to fend off a certain group of people, [but] doesn't it make more sense, and isn't it more moral […] to include as much people as possible who then wouldn't be interested in attacking you […]. I think one of the most moral ways of moving forward is probably community building… Only if we are creating [...] communal life which is capable of functioning without this sort of consumerist structures… can we hope to survive.

This discourse challenges the prepper-survivalist mentality by envisioning a communal life free from consumerist dependencies, and that aims to redirect the future from collapse. The emphasis on inclusive, cooperative communities is framed as both a moral and practical strategy for transformative resilience.

In summary, we see emerging within fixed-future accounts the tension between individual survivalism and collective resilience. On the one hand, the emphasis on self-reliance and preparedness reflects a view that the future is fixed and unchangeable, necessitating a shift towards self-sufficiency and exclusive communities. On the other hand, arguments for moral and ethical action underscores arguments for the necessity of continued activism and ethical responsibility, even when the outcome seems uncertain. These perspectives highlight the complex ways scientists mobilise repertoires of social and ecological collapse to navigate the challenges of a perceived imminent future.

5.5.2 Delayed Futures

The 'Delayed Futures' framing reflects talk which presents the future as trending negatively, but that the worst outcomes can be delayed. While the social and ecological collapse repertoires are still present, they are mobilised differently compared to the Fixed Futures framing. Instead of conveying inevitability, they are employed to justify and motivate action, particularly through collective endeavours such as protest. For example, one speaker used these collapse repertoires to argue that although societal collapse may eventually occur, activism can delay it, even if only within their lifetime:

Extract 12

22M Ecologist

Since I've got heavily into climate activism and found out so much more about climate, there's been a very selfish element that's coming into it as well, which is self-defence […]. Civilisation could collapse within the next few decades and quite simply, this might sound awful to say, but if I can postpone that until after I'm dead, I'll be really happy if I don't have to see it, and so honestly […] there's an element now I'm doing it, you know, to secure for […] my own comfort of my future, in addition to the moral things.

Here, the speaker emphasises that while collapse is a possibility, collective action is framed as an effective way to postpone it. This temporal framing allows for discourse around the efficacy of collective action, contrasting sharply with the resignation seen in the Fixed Futures framing. The speaker draws on social change discourse, presenting activism as a pragmatic response to the crisis. Moreover, this future framing, by allowing for talk on efficacy, enables the speaker to mobilise the notion of a moralised scientist identity present in the wider discourse (see Gardner et al., 2021; Gardner & Wordley, 2019). This notion posits that scientists' expertise incurs a moral obligation to act visibly in the public interest. The speaker in the following quote uses their identity as an earth scientist to emphasise the importance of visible action, a point also explored in earlier research (Finnerty et al., 2024a):

Extract 13

22M Ecologist

I'm not just any scientist, I'm an earth scientist. I specifically know about what's happening to the planet and [...] my knowledge compels me to act[...]. I think it also gives me a particular responsibility [...] to be visibly doing something because [...] I worry that there might be people out there thinking 'well, if it was really that bad then the scientists would be freaking out.' [...] I think it's important that scientists are visibly freaking out.

Here, the Delayed Futures framing allows the speaker to justify their activism and call for more engagement from fellow scientists, particularly by framing collective action as a means of delaying catastrophic outcomes. The sense of efficacy within this framing makes the argument for a moralised scientist identity possible.

5.5.3 Transformable Futures

'Transformable Futures' represents a temporal framing where the future is spoken of as contingent, open, and still subject to change. While scientists' talk characterised in this way did not ignore the backdrop of ongoing climate and ecological decline, it emphasised the potential for action to shape the trajectory of the future. The following speaker exemplified this framing:

> Extract 14
>
> 15M Professor Physics
>
> Some of the rhetoric coming out of some of the groups is too extreme, getting to the point where the rhetoric is almost saying it is just now too late […]. It is never really going to be too late! […] Yes, the longer we leave it, the worse it is going to be, but there will never be a point where […] we might as well give up […]. We don't know what the other world could have been – if we had been in a world where we had much more coal use it might have been much worse today than it is. […] Even though emissions are technically still rising they may well be rising more slowly than they might have done, which is a positive even if it is not quite what we wanted […]. It is partly the impact on younger people who might feel despondent, which I don't think is great. And partly the possibility that people do give up and go oh well, there is no point anymore, which I think is certainly not true.

This speaker framed the future as open and transformable to critique "extreme rhetoric" and reject doomism, thereby engendering hope by recognising incremental progress as valuable and affirming humanity's capacity to avert the worst outcomes of climate change. This position fosters an optimistic, if measured, outlook. Broadly speaking, this open framing permits a broader range of repertoires and arguments to be mobilised, with scientists drawing on wider discourses pertaining to collective action, community building, and technological solutions. Discussions of the future here do not discard social and ecological collapse repertoires but mobilise them differently. They serve as motivation for action rather than as evidence of inevitable doom. Talk of collapse is used to galvanise a sense of urgency, encouraging immediate and diverse responses to the climate crisis. The contingency of the future allows for a wider range of strategies to be discussed and employed, and the focus shifts from resignation to a more proactive engagement with the potential for change.

5.5.3.1 Collective Action and Prefiguration. One of the key repertoires mobilised within this more open framing was that of social change through collective action. Talk around collective action centred on the argument that widespread mobilisation and social movements have the power to alter the trajectory of climate change by creating more sustainable and compassionate systems. Speakers emphasised solidarity and collective affective states (e.g., outrage) as critical tools for change.

Extract 15

5F Sustainability Social Scientist

It just felt so good to be actively doing something and to be in this big, huge groundswell of people who were all really, really angry […]. This is the way forward, it is mass mobilisations, and it is solidarity with other people, and it is people who are angry, and it is not running away from that anger, but leaning into that anger […] that is our only chance really.

Here, collective anger is proposed as a force that can unite individuals and propel them into action. The speaker presents anger not as a destructive emotion but as a source of energy for sustained activism. The speaker further constructs a hopeful path forward through solidarity and mass mobilisation, highlighting the importance of community in fostering change.

Another speaker underscored the long-term, strategic nature of activism, viewing it as an investment in the future. The metaphor of "planting seeds" was used to argue that collective action may not yield immediate results but plays a critical role in shaping the future:

Extract 16

22M Ecologist

With awareness, with alarm-ringing type actions […] you're planting seeds, and you don't know where and when those seeds are gonna germinate into something […] that's going to be impactful. […]. Activism has put climate on the public agenda in a way that it never was before.

Here, the speaker situates activism as laying the groundwork for future impacts. This long-term perspective frames collective action as necessary, not only to address present concerns, but also to shape the future through the gradual development of awareness and systemic change.

Prefiguration, a concept emphasising the embodiment of desired social changes in the present, also emerged as a significant discourse within this temporal framing. This prefigurative approach underlines the necessity of practising the values and systems envisioned for the future in current actions. For example, some speakers articulated the importance of creating and sustaining communities that reflect the values of the future they want to see:

Extract 17

5F Sustainability Social Scientist

I hope that we can all maintain the relationships that we have built with each other and with these communities of people, and I hope that those relationships can just get stronger and stronger and that we create a genuinely regenerative movement… I hope that… we can all help each other and create really strong communities.

This speaker's talk draws on prefigurative discourse to suggest that by building stronger communities now, it is possible to lay the groundwork for a future that can thrive despite the challenges of climate change. This approach serves as a counter-narrative to social collapse, offering hope and a vision of resilience based on mutual support and cooperation.

Another speaker echoed this sentiment, extending the idea of prefiguration to systemic change:

Extract 18

6F Biologist

A lot of the negative things in the world, all the causes are quite interconnected. So, if we actually created better systems, less individualistic systems, and there's a culture of care about one another, I think that everyone would be happier. Even with all the bad stuff that is inevitably going to happen, I think a better world is possible… They could open so many possibilities to make life better for so many people and that feels great to think about. A human connection, that's what it's all about for me.

Here, the speaker's talk underscores the argument that prefigurative action can create new systems that prioritise care, cooperation, and happiness. This discourse links the openness of the future to collective efforts, reflecting a deeply hopeful perspective on what can be achieved through action and solidarity.

5.5.3.2 Technological Innovation as the Solution. In contrast to the focus on human-driven social change, other scientists framed the future as contingent on technological advancements. For them, the primary means of averting environmental catastrophe lies in the development and deployment of innovative technologies. That said, within this view, arguments on the role and sufficiency of technology diverged. Some participants expressed strong faith in the power of science and technology to provide solutions to climate change, suggesting that technological progress offers the most tangible and controllable means of shaping the future, echoing techno-solutionist discourse. As one speaker noted:

> Extract 19
>
> 24M Biologist
>
> My hope is that definitely we do have the technology. We do have the brain power to find solutions that can counteract climate change […] but I am aware of literature saying that is not enough, but I think that is more tangible […] because it's in the hands of […] scientists […]. If you want to look at it in a selfish way, it will raise profits and then that will push companies to actively invest in it […]. So, I have more hope on, you know, companies' greed (laughs) than their altruism, to be honest.

Here, the speaker presents technology as a concrete and predictable means of addressing the crisis, with economic incentives and scientific expertise as key drivers of change. Political action, by contrast, is critiqued as less dependable. The speaker further mobilised a defence of technological advancement against critiques that blame science for the current environmental crisis:

Extract 20

24M Biologist

Discussion with my parents would just be […] science screwed everything up. […] Their solution to everything would be to regress […] live life like people used to live a hundred years ago […]. Be at peace with nature, live with nature… not to use much of technology… and… science is the reason why we are facing whatever we are facing. They don't deny climate change, but they also wrongfully accuse science of being the reason for it.

This critique serves to counter the argument that to move forward, we must revert to a pre-technological era.

Such Panglossian techno-solutionist discourse was, contrastively, rejected by another speaker who considered it naïve to assume technology will be a panacea for environmental challenges, rather than one tool in the arsenal:

Extract 21

12M Biologist

I'm playing the argument of the technophile […] that eventually we will develop technologies who are going to save the situation without us having to change […] our way of life. So that's where carbon capture and carbon neutralisation come into play […]. That's my job, right? I'm trying to do that, and I can tell you […] unless we also reduce drastically our consumption of fossil fuels […] it's not gonna matter. Like it's taking us so much work to absorb a tenth of the CO2 emission we have emitted. […] I need the politicians to do the rest of the bulk work.

This speaker acknowledges the potential contributions of technological innovations, like carbon capture, while highlighting the need for complementary efforts, such as political action and changes in consumption patterns. This tempered view serves to critique the more extreme position that technology alone can save the future:

> Extract 22
>
> 12M Biologist
>
> The technological progress since the 70s has been incredible […] but the Keeling curve [graph of atmospheric carbon dioxide accumulation] is the perfect straight curve. […] If the progress we've had in 50 years hasn't been enough to make a dent in it, it's probably not safe to assume it's gonna make a dent in the next 50.

Here, the speaker's reflections on the limitations of past technological advances to reduce carbon emissions is projected into the future and serves as a critique of unbridled optimism about future technologies. Overall, the Transformable Futures framing contrasted sharply with the Fixed Futures framing, where social and ecological collapse were discussed as inevitable. Within a Transformable Futures framing, collapse repertoires were repurposed for different rhetorical purposes, for example, to argue that collapse is possible but not certain, and something that can be averted through collective action, systemic change, and/or technological innovation. This shift underscores how, depending on the perceived openness of the future, collapse discourses move from justifying resignation to motivating proactive and hopeful responses.

5.6 Discussion

The present study explored how environmentally concerned scientists talk about the future in the face of climate change. While there was consensus among scientists on the severity of the ecological crises, there was no uniform agreement on the precise contours of the future. The diversity of epistemic stances highlights the human element within scientific inquiry, and the indeterminacy that characterises current understanding of complex environmental and social systems. The present interviews revealed a variety of ways in which scientists talk about the future and position themselves in relation to available discourses of collapse (Celermajer et al., 2024; Lamb et al., 2020), techno-solutionism (E. Morozov, 2013), and collective action (Berglund & Schmidt, 2020; Fisher, 2024), and argue for responses ranging from individual survivalist strategies to collective action and faith in technological solutions.

5.6.1 Temporal Framings and Argumentative Flexibility

One key take-away is that the degree of fixity or openness in how scientists construct the future influences the range of arguments they present when considering potential solutions. Scientists' temporal framings—from *fixed and inevitable* to *contingent and transformable futures*—shaped how they mobilised shared discourses of social and ecological collapse. This variation in temporal framing shaped how scientists positioned solutions to climate change, with more fixed framings leading to a narrower set of potential actions, while more open framings allowed for greater argumentative flexibility. For example, in the Fixed Futures framing, the efficacy of collective action was downplayed or treated with scepticism. The future is presented as beyond the reach of human intervention, with individuals preparing for collapse through personal survival strategies or moral acts of defiance. In contrast, more open temporal framings were associated with talk of both collective action and technological innovation as solutions to the climate crisis. This contrast illustrates how open temporal frames can expand the argumentative flexibility available to scientists in shaping responses to the climate crisis.

5.6.2 Fixed Futures: Resignation and Moral Action

In the Fixed Futures framing, where collapse is presented as unavoidable, scientists' talk was characterised by a sense of inescapability and *inquiétude* (a feeling of unease or anxiety) (Roux & Lévêque, 2024). Empirical observations, such as methane release from melting permafrost and feedback loops, were invoked to emphasise that critical thresholds are being crossed. This sense of inescapability manifested in two distinct forms of argumentation. First, some scientists mobilised collapse repertoires to rationalise actions that, while proactive in terms of survival, disengage from collective efforts to alter broader societal or environmental trajectories. Echoing apocalyptic discourses (Hoggett, 2011; Lovelock, 2010), some envisioned a grim future of social collapse, a Hobbesian state of nature characterised by self-preservation and protectionism (Lloyd & Sreedhar, 2022). Prepping behaviours, for instance, were framed as a agentic response of self-reliance to the anticipated failure of political elites to prevent collapse, in line with other research (Garrett, 2021; Hoggett, 2011; Roux & Lévêque, 2024).

In contrast, collapse repertoires were used by others to justify civil disobedience, not as a means of averting disaster, but as a moral obligation to future generations. In this context, civil disobedience was framed more as a way to maintain personal integrity and ethical consistency (Jennings et al., 2015) than as a realistic attempt to reshape the future. Thus, within the Fixed Futures framing, scientists were able to mobilise both individualistic and collectivistic responses to the impending collapse. However, in contrast to the Delayed and Transformable Futures framings, the Fixed Futures framing confines action to a narrow set of options, each of which is marked by resignation to an inevitable collapse.

5.6.3 Delayed Futures: Activism, Ethics, and Scientific Duty

The Delayed Futures framing characterises talk which presented the future as trending negatively but still open to intervention. Within this framing, scientists' talk drew upon social and ecological collapse repertoires, similar to those found in the Fixed Futures framing. However, these repertoires were adapted for different rhetorical purposes aimed at delaying collapse. Discussions around collective action, including protest and civil disobedience, were framed as effective strategies for postponing the worst outcomes of the climate crisis, reflecting broader discourses on social change, as seen in movements like Extinction Rebellion (Berglund & Schmidt, 2020; Fisher, 2024). Rather than resigning to an inevitable collapse, this framing supports discourse that foregrounds the efficacy of collective efforts to influence the future's trajectory. By framing the future as somewhat malleable, it also enables the mobilisation of a moralised scientist identity (Capstick et al., 2022; Gardner & Wordley, 2019; Rodgers, 2023). In this context, scientists positioned themselves as having a moral duty—not only to understand and communicate the crisis, but to act visibly upon it, using their authority to encourage others to engage in activism (Finnerty et al., 2024a). This sense of responsibility was framed as a broader imperative for scientists to lead by example, using their unique position to influence public perception and policy. The Delayed Futures framing, therefore, opens up space for action-oriented arguments, where the scientist's role becomes central to delaying negative outcomes through collective and visible activism.

5.6.4 Transformable Futures: Collective Action, Prefiguration, and Technological Solutions

Finally, in the Transformable Futures framing, scientists' talk was characterised by the greatest degree of flexibility, allowing the future to be constructed as contingent on present actions. Collapse was not cast as inevitable but as a possibility that can, and must, be averted through human agency. The openness of the future was used to counter doomist discourse (Celermajer et al., 2024; Lamb et al., 2020). Rather than presenting a binary choice between 'catastrophe or salvation' (Garrard, 2020), some scientists used this contingency to offer counterfactuals, highlighting the potential for different outcomes based on present interventions. In this context, collapse was reinterpreted not as an unavoidable future but as a call to action, permitting arguments regarding collective action (Ojala, 2023; van Zomeren et al., 2019), prefigurative practices (Berglund & Schmidt, 2020; Yates, 2015), and technological solutions as viable strategies for shaping the future. This optimistic and proactive discourse stood in direct contrast to talk of inevitable social collapse, and, instead, counselled hope as a blueprint for building a better future.

While collective action and prefiguration dominated much of the talk about Transformable Futures, at least one scientist in the sample represented a stronger techno-solutionist perspective (see Celermajer et al., 2024; Johnston, 2018; Morozov, 2013). This scientist's discourse placed great faith in the power of scientific research and technological advancements for addressing the climate crisis, while simultaneously expressing doubt in individual and government–led solutions. The emphasis was instead on the role of technology in mitigating climate change, a position that reinforced the belief that science and industry, rather than activism, hold the key to future solutions. The techno-solutionist position might also reflect a particular construction of the scientist identity, one that refrains from activism and places faith in research, technology, and economic systems (Finnerty et al., 2024b). This approach aligns with more traditional notions of scientific detachment, neutrality, and objectivity (Betz, 2013; Merton, 1973).

Other scientists offered critiques of the techno-solutionist stance, for instance, by pointing to the past 50 years of technological progress, which, despite significant advancements, has not been sufficient to meaningfully reduce global emissions. This more critical stance on technology reflects the broader discourse on the limits of technological innovation, especially where solutions, such as carbon capture and storage or nuclear fusion, remain unproven or face significant ethical and practical challenges (Biermann et al., 2022; Clifford, 2022; Hamilton, 2013; Smith et al., 2023). For example, it has been argued by some that overemphasising technological "myths" could delay immediate actions, such as efforts to reduce fossil fuel dependency, by fostering a false sense of security (McLaren et al., 2021).

This tension between faith in technology and the critique of its limitations illustrates the breadth of arguments available within the Transformable Futures framing. While some scientists remained hopeful about the potential of technological advancements to drive change, others emphasised the need for a more comprehensive strategy that integrates both technological and socio-political approaches. This diversity of views underscores how an open-future framing allowed scientists to entertain a wider array of solutions—both technological and systemic.

5.7 Limitations

Our analysis has several limitations. First, the data primarily came from environmentally concerned scientists in affluent, industrialised countries in the Northern Hemisphere, limiting the global applicability of the study. Given the heightened vulnerability of the Global South to climate hazards (IPCC, 2022), expanding the research beyond a primarily Western or WEIRD (White, Educated, Industrial, Rich, and Democratic) (Henrich et al., 2010; Muthukrishna et al., 2020) sample would enrich understanding of how scientists from different cultural and socio-political backgrounds discuss the future. Additionally, the sample had a higher-than-average proportion of participants engaged in direct activism. While this activist skew provided valuable insights, it may not fully represent the broader scientific community. However, high levels of concern are common among scientists, and a significant minority do engage in direct action (Dablander et al., 2024), suggesting that our findings are still relevant to the broader scientific community. Lastly, the cross-sectional nature of the study limits our ability to track how scientists' future talk evolves over time. Longitudinal research could offer deeper insights into how this discourse shifts in response to changing conditions and events.

5.8 Conclusion: Future Talk and Scientific Discourse

Despite these limitations, this study revealed a diversity of discursive practices within the scientific community, highlighting the complexity of the climate crisis and the varied ways scientists construct the future. It underscores the importance of not just the knowledge scientists contribute to the global conversation about climate change, but also how they articulate potential responses based on their temporal framing of the crisis. The degree to which the future is seen as predetermined or contingent impacts both the urgency and scope of their proposed actions. Recognising these diverse temporal framings is critical for understanding the range of strategies that may be pursued in response to the climate crisis. Scientists play a critical role in shaping society's understanding and response to the climate crisis. As more scientists lend their expertise to social movements, such as Scientists for Future, and their legitimacy through activism in groups like Scientists for Extinction Rebellion and Scientist Rebellion, it is important to understand how they talk about the future. As we have seen here, the way scientists frame the future sets the boundaries of what actions are seen as possible, viable, or necessary. As trusted figures in public debates, scientists' activism blurs the lines between science, policy, and advocacy. Their engagement in social movements lends expertise and legitimacy to these causes, which in turn may shape climate policies and the public's understanding of what solutions are viable. How scientists frame the future—whether as fixed, delayed, or open to transformation—could potentially influence the focus of climate movements, impacting the urgency, scope, and type of responses pursued. For instance, if doomist or techno-solutionist discourses were to dominate public communications, they may shape public perceptions of what is necessary and achievable, potentially sidelining social and political action, which many scientists deem essential for addressing the climate crisis. This diversity in scientists' future talk underscores the importance of not just what scientists say, but how they say it. As their voices continue to shape climate discourse, understanding these framings will be crucial for ensuring a range of strategies remain in focus. As society grapples with the escalating climate crisis, recognising how scientists construct and engage with these futures will be key to shaping effective responses.

Chapter 6: Scientists as Activists: An Ethnography of the 'Critical Moments' in Scientists' Transition to Activism

Note: This ethnographic chapter is structured to present the findings in a narrative format that naturally incorporates reflective analysis and implications, characteristic of ethnographic inquiry. Results and discussion are merged to provide a seamless and comprehensive exploration of the themes and insights that emerged from the fieldwork. This chapter has not yet been peer-reviewed for journal publication. Following the submission of this thesis, I plan to adapt and submit the work to an appropriate journal that values the depth and style of ethnographic research in psychology and related interdisciplinary fields.

Abstract

The climate crisis has increasingly driven scientists to engage in activism. This ethnographic study examines how scientists transition into activism, reconcile their professional identity with activist roles, and sustain engagement over time. Drawing on two years of fieldwork with Scientists for Extinction Rebellion, this research captures the lived experiences of scientists transitioning into activism. Identity-aligned spaces offer emotional support, solidarity, and a sense of collective identity. These spaces help scientists navigate concerns about credibility, career repercussions, and the legitimacy of activism within scientific communities. The findings reveal how scientists strategically draw on their professional expertise and employ scientific symbols (e.g., lab-coats, papers) to legitimise and justify their actions. Over time, scientists come to see activism as a legitimate and necessary part of their identity. Activism reshapes their professional identity, reinforcing a moral duty to act while requiring ongoing identity management, leading to the development of a hybrid scientist-activist identity. Structured around a process-oriented framework, this study identifies critical moments in scientists' activist trajectories—from initial hesitations to sustained participation. These insights advance social psychological theories of collective action by exploring how professional identities evolve within movements, illuminating the psychological processes that sustain activism and the role of identity-aligned spaces for long-term engagement.

Keywords

activism, climate change, ethnography, identity, scientists, collective action

6.1 Introduction

Climate change and biodiversity loss are major planetary threats (IPBES, 2019; IPCC, 2022). Despite a well-established scientific consensus (IPCC, 2023; Lynas et al., 2021; Myers et al., 2021), policy action remains limited (IPCC, 2023; SEI et al., 2023; United Nations Environment Programme, 2023). In this context, grassroots climate movements have emerged as key drivers of change. A significant minority of scientists now engage in activism to effect change (Capstick et al., 2022; Dablander et al., 2024; Finnerty et al., 2024b). As trusted messengers (Gardner et al., 2021), scientists provide moral and epistemic authority to environmental social movements (Capstick et al., 2022). In protest settings, scientist-activists often leverage their scientific credentials, symbolised by the white lab-coat, both to reinforce their credibility and challenge perceptions of activism as unscientific. This shift—from neutral arbiter of knowledge to activist—represents a profound challenge to scientists' professional identities, which have traditionally been rooted in objectivity and impartiality (Finnerty et al., 2024a, 2024b).

Scientist-activists represent a unique and understudied group within climate activism. Traditional scientific norms emphasise detachment, impartiality, and non-partisanship (Betz, 2013; Douglas, 2009), while activism is emotionally charged, value-driven, and confrontational. Unlike other activists, scientist-activists bear the dual burden of maintaining professional credibility while asserting moral urgency in addressing climate change. This duality raises critical questions: How do they reconcile professional norms with the value-driven and emotionally charged context of activism? How do they manage public legitimacy in the face of expectations of scientific neutrality? And how do they come together as scientist-activists, forging a collective identity within climate activism?

This paper presents findings from a two-year ethnographic study of Scientists for Extinction Rebellion (S4XR), a primarily UK-based group of scientists aligned with the Extinction Rebellion movement. As both participant and observer, I engaged in meetings, marches, and demonstrations, documenting how scientists negotiate their roles as activists. While previous studies have explored scientists' attitudes toward activism and the ideological tensions they navigate (Dablander, Sachisthal, Cologna, et al., 2024b; Finnerty et al., 2024a, 2024b) there remains limited research on the lived experiences of scientist-activists engaged in direct action over time. Grounded in the lived experiences of scientist-activists, this ethnography offers a critical contribution to social psychological theories of collective action by exploring how scientist-activists negotiate and perform their professional and activist identities in real time. Unlike previous research that relied primarily on surveys or interviews, this paper captures the dynamic and ongoing process of identity performance, highlighting how scientist-activists manage inter- and intra-group dynamics, sustain commitment, and navigate the tension between professional and activist identities over time. Structured around a process-oriented framework, this study identifies critical moments in scientists' activist trajectories—from initial hesitations to sustained participation.

6.1.1 Scientists' Responses to Climate Change

The climate and ecological crisis has prompted some scientists to move beyond traditional roles in research and education, stepping into environmental direct action. Groups like Scientists for Extinction Rebellion (S4XR) and Scientist Rebellion (SR) engage in high-profile actions, including obstructing fossil fuel infrastructure, leaking IPCC reports, and pasting scientific papers on government buildings (Gayle, 2022; Oza, 2023; Scientist Rebellion, 2021). These actions, often resulting in arrests (Gayle, 2022;

Oza, 2023), challenge conventional expectations of scientific neutrality (Finnerty et al., 2024a). On one hand, traditional norms of objectivity and impartiality discourage political action (Betz, 2013; Castree, 2019; Douglas, 2009; Lackey, 2007). On the other, some argue that the scale and urgency of the crisis make this separation untenable (Capstick et al., 2022; Gardner et al., 2021). These tensions reflect diverse constructions of scientist identity (Finnerty et al., 2024b, 2024a), shaped by differing epistemological commitments and views on the duties of science in public engagement (Messling et al., 2025). Survey and interview research (Finnerty et al., 2024a, 2024b) demonstrates that some scientists engage with these tensions by insisting scientists have a moral duty that does not compromise their objectivity but rather extends their professional responsibility to communicate the science. Scientists who take this position also tend to reject techno-solutionist approaches, favouring collective action and systemic change over reliance on technological advancements alone (Finnerty et al., 2024a, 2024b). Scientists' constructions of the future—ranging from fixed and inevitable to contingent and transformable—further shape the urgency and scope of their proposed solutions (Finnerty et al., 2025).

At the heart of these dynamics is the extent to which scientists identify as activists (Dablander, Sachisthal, Cologna, et al., 2024b; Finnerty et al., 2024b), consistent with research on the centrality of identity in sustaining engagement in social movements (Mackay, Cristoffanini, et al., 2021a; Mackay, Schmitt, et al., 2021; Vesely et al., 2021). Historically, scientists have advocated for social, political, and environmental causes, and have even been arrested for their activism. Notable examples include Carl Sagan's protest against nuclear testing in 1986 (Applebome, 1986) and 1987 (Lindsey, 1987) and NASA climate scientist, James Hansen's multiple arrests, including for protesting the Keystone XL pipeline project (Goldenberg, 2013). However, the uniqueness of recent years lies in the heightened visibility and increased participation of scientists in direct action. Understanding how scientists come to adopt activist identities, feel empowered as part of activist groups, and act raises critical questions about the psychological and social processes underpinning this transformation.

6.1.2 Becoming a Scientist-Activist: Identity, Empowerment, and Change Over Time

Protests are dynamic spaces that both reflect society and act as spaces for social change (Drury & Reicher, 2000; Reicher, 2001). As Drury and Reicher (2000) argue, crowd actions are guided by shared social identities, aligning personal goals with the group's objectives fostering cohesion, solidarity, collective efficacy, and empowerment (Drury & Reicher, 1999, 2009; Reicher, 2001; Vestergren & Drury, 2022). In environmental movements, these identity processes are central to mobilising individuals and sustaining activism over time (Gulliver et al., 2023; Jansma, Bos, et al., 2024; Jansma, Van den Bos, et al., 2024; Landmann & Rohmann, 2020; Vestergren et al., 2018, 2024).

Collective action emerges from both intergroup and intragroup interactions, each of which shapes the identities and actions of participants. Intergroup dynamics often centre on interactions between activists and outgroups, such as governments, media, corporations, or police. These encounters can catalyse identity recategorisation, where individuals move from personal identities to a collective activist identity in response to perceived injustice (Drury & Reicher, 1999). For instance, moments of opposition or repression—such as clashes with police or corporations— can strengthen solidarity among activists and redefine group boundaries, fostering a unified activist identity (Drury & Reicher, 1999; Vestergren et al., 2017; Vestergren & Drury, 2022). Distrust in authorities and perceptions of injustice are linked with support for non-normative protest such as civil disobedience (Jansma, Bos, et al., 2024; Jansma, Van den Bos, et al., 2024).

Shared norms within movements define what it means to be an activist, shaping acceptable tactics, behaviours, and alignment with the movement's broader goals (Reicher, 2001). For participants in environmental protests, these norms provide a framework for integrating individual identities with the collective identity of the group. Environmental movements are broad coalitions that bring together diverse activist subgroups—including school strikers, Indigenous activists, faith-based groups, and scientists—each of which contributes distinct norms, values, and identity commitments.

These activist subgroups must navigate their roles within the broader movement, negotiating shared norms—such as commitment to nonviolent action or collective decision-making—and a collective identity. For example, faith-based organisations may appeal to moral and spiritual responsibilities grounded in faith (Christian Climate Action, n.d.), while scientists position themselves as knowledge providers leveraging their expertise to validate and amplify the movement's objectives (Finnerty et al., 2024a, 2025).

While diversity of perspectives can enrich the movement, it can also generate strategic conflicts over messaging and tactics. Scientists face unique challenges when participating in activism, as their professional norms—objectivity, neutrality, and rationality—may conflict with activist norms of emotional engagement, moral urgency, and disruption (Finnerty et al., 2024a). For instance, scientists may struggle with the certainty with which non-scientist activists present scientific evidence or the expectation that they make declarative statements without nuance. This can create tension, as boundaries between subgroups become more pronounced. For example, Extinction Rebellion may ground its activism in scientific evidence, but how scientists and activists talk about this evidence—its tone, content, and level of certainty—can differ, further complicating the negotiation of identity. This distinctiveness means that they must continually negotiate their identity within the broader collective, balancing their subgroup identity with the shared goals of the movement. that scientists must continually navigate their hybrid scientist-activist identity, balancing their professional norms with the broader movement's goals. This ongoing negotiation requires reconciling the tension between their roles as objective, rational experts and their involvement in activism, where emotions, urgency, and disruptive tactics often take precedence.

As scientists engage in collective action, their participation can reshape their social identities, fostering new forms of solidarity and responses to novel social dynamics (Drury & Reicher, 2000). For scientists, this process may give rise to a hybrid identity—a "scientist-activist" identity that integrates professional expertise with the moral and strategic goals of the movement. Symbolic actions, such as wearing lab-coats during protests, support this transformation by simultaneously affirming credibility and signalling alignment with activist values. Over time, these dynamics redefine what it means to be a scientist in the context of collective action, enabling individuals to reframe their activism as an extension of their professional responsibilities to act on the science (Finnerty et al., 2024a, 2024b).

Within activist groups, strong social bonds provide emotional reinforcement, trust, and intellectual validation, helping to sustain engagement over time (Gulliver et al., 2023; Vestergren et al., 2017, 2018). Shared, emotionally intense experiences tied to a common social identity strengthen solidarity and commitment to collective action (Neville & Reicher, 2011). Research indicates that both positive and negative emotions, linked to collective efficacy beliefs and injustice appraisals, enhance intentions to engage in activism (Agostini & van Zomeren, 2021b), including forest protection efforts (Landmann & Rohmann, 2020). A sense of injustice and belief in the efficacy of civil disobedience are associated with support for non-normative types of protest (Jansma, Bos, et al., 2024). Solidarity, trust, and mutual support ensure resilience in the face of external pressures, especially for high-risk activism. For movements like Extinction Rebellion, affinity groups formalise these dynamics. Small groups of 8–12 people work collaboratively to plan and execute actions, offering practical and emotional support during high-risk events like civil disobedience (Extinction Rebellion, 2024b). For scientists in S4XR, such structures provide spaces to process identity tensions, navigate challenges, and build resilience.

Participation in collective action is an evolving process that reshapes identities and reinforces long-term commitment. For scientists, the *inflection point*—their initial engagement in activism—often marks a critical juncture as they navigate the legitimacy and fit of their professional identity within the collective. Positive reinforcement—such as peer support or public validation—can foster empowerment, solidarity, and moral conviction, reinforcing their commitment to collective goals (Drury & Reicher, 2009). This creates a feedback loop: as individuals see the impact of their actions, their sense of agency and commitment grow, motivating further participation. Research highlights a bidirectional relationship between activism and moral conviction: participation strengthens moralised attitudes, which in turn drive continued engagement (Leal et al., 2024). Activism also catalyses biographical changes, such as new relationships and skill acquisition, which sustain long-term participation (Vestergren et al., 2017; Vestergren & Drury, 2022). For scientists, activism redefines professional identity, integrating collective action into their role thereby creating a moralised scientist identity (Finnerty et al., 2024a, 2025). This process underscores the reciprocal relationship between collective action and social change—just as activism reshapes scientists, their participation challenges traditional expectations of objectivity and neutrality, influencing how scientific engagement is perceived within society.

6.2 Method

This study employed ethnography, combining participant observation and autoethnography. These methods allowed for an in-depth understanding of the interplay between professional and activist identities in collective action. By participating in and observing the group's activities, the researcher documented both public actions and internal discussions. Autoethnography served as a reflective tool, critically examining the researcher's own positionality and identity negotiations in engaging with S4XR. Ethical approval was secured from Lancaster University's Faculty of Science and Technology ethics board (FST-2022-0731-RECR-4) and fieldwork was pre-registered prior to formal data collection.

6.2.1 Research Context

6.2.1.1 Extinction Rebellion (XR). Founded in the UK in 2018, Extinction Rebellion (XR) is a global environmental movement advocating urgent government action on climate change and ecological collapse (Extinction Rebellion, 2024a). XR emerged amid growing climate urgency, catalysed by events such the IPCC's 1.5 ºC report, the school strikes initiated by Greta Thunberg, and summer heatwaves (Berglund & Schmidt, 2020; IPCC, 2018). XR's protests have been credited with influencing the UK parliament's declaration of a climate emergency (Berglund & Schmidt, 2020; Reuters, 2019).

XR employs a decentralised organisational model (Holacracy[19]) granting significant autonomy to working and affinity groups, while national teams handle strategic direction and public image (Berglund & Schmidt, 2020; Extinction Rebellion, 2024a). This structure supports XR's diversity of tactics, from high-profile disruptions (e.g., blocking roads and government buildings) to strategies for finding common ground with the public. While XR's goals and strategies have evolved (Extinction Rebellion, 2020, 2021, 2022b, 2023b), reflecting internal debates between reformist and revolutionary approaches (Berglund & Schmidt, 2020), its core commitment to non-violent civil disobedience remains central.

6.2.1.2 Scientists for Extinction Rebellion (S4XR). S4XR, a subgroup of XR, comprises natural and social scientists who use their expertise and professional credibility to amplify XR's message (Scientists for Extinction Rebellion, 2023b). Unlike other XR subgroups, S4XR explicitly leverages scientific authority to reinforce the legitimacy of climate activism. The group employs symbolic actions, such as wearing lab-coats during protests and pasting scientific papers on government buildings, to highlight the scientific basis of XR's demands. S4XR has also played a key role in scientific outreach, producing accessible resources such as *The Emergency on Planet Earth* guide (Grossman & Scientists for Extinction Rebellion, 2020). S4XR have four core goals: (1) Facilitating scientist engagement in activism and civil disobedience (Gardner et al., 2022); (2) Providing visible scientific support for XR through media and public demonstrations (M. Green, 2019); (3) Enhancing XR's scientific communication efforts, bridging the gap between research and activism; and (4) Building connections between XR and scientific institutions.

[19] Holacracy is a decentralised management system where individuals assume multiple roles, have broad decision-making authority within their roles, and address issues in periodic governance meetings, replacing traditional top-down hierarchy with flexible roles within autonomous teams (Robertson, 2015).

6.2.2 Data Collection

6.2.2.1 Participant Observation. In conducting ethnography, a field-based methodology employing observation, participation, and interviewing (Hammersley & Atkinson, 2019), my aim was to explore the social worlds of scientist-activists, capturing how they construct meaning, negotiate identity, and engage in collective action (Charmaz & Mitchell, 2001). Participant-observation emphasises direct observation and participation, enabling a deeper understanding of social and cultural dynamics, generating insight into meaning-making processes by observing actions, interactions, and rituals in real-time (Howitt, 2019). I engaged with S4XR over two years, attending planning meetings, public demonstrations, and informal gatherings. Field notes (see Table 6.1) were recorded promptly after each event, organised into three columns: (1) description, (2) reflexivity, and (3) analysis. Minor notes made during events, alongside short audio recordings, supplemented fieldnotes, enhancing accuracy. To document identity performance, I supplemented fieldnotes with photography and video recordings, documenting the symbolic and strategic use of scientific markers (e.g., lab-coats). Additionally, I incorporated social media posts and news coverage (e.g., Gayle, 2022, 2022b), offering a multi-layered perspective on activist practices. This immersive approach provided insight into how scientists balance activism with professional identity, revealing how activism reshapes their sense of self over time.

6.2.2.2 Autoethnography. Autoethnography recognises that the researcher is not a "fly on the wall" (Geertz, 1973) but an embedded participant within the social worlds they study. It is both a method and an analytical approach, integrating personal experience with ethnographic research to explore social and cultural dynamics (Ellis, 2020; Poulos, 2021). By foregrounding subjectivity and reflexivity, autoethnography allows researchers to critically examine their positionality, emotions, and moral dilemmas, offering insights that may not emerge from participant observation alone. In this study, autoethnography was incorporated alongside participant observation to capture both the external realities of scientist-activism and the internal processes of identity negotiation. It served two key functions:

1. Acknowledge Researcher Positionality

   Recognition that my background as a scientist and activist shaped both my engagement with the field and my interpretation of events. My own experiences of identity negotiation, particularly concerns around legitimacy, objectivity, and professional risk, offered a parallel to the challenges faced by participants.
2. Providing an Additional Analytic Lens

   Autoethnography functioned as an interpretive tool, enriching the analysis by capturing the affective, cognitive, and moral dilemmas involved in scientist activism. These introspective accounts complemented participant observation, offering insight into internal processes of identity transformation that might not have been fully articulated by other participants.

To systematically document these reflections, I maintained a separate field diary in addition to the Reflexivity column in my fieldnotes. The diary captured emotional responses, ethical dilemmas, and shifts in perception regarding activism, identity, and professional legitimacy. This approach aligns with autoethnographic principles, which emphasise the situated and embodied nature of research (Poulos, 2021). It also aids crafting evocative narratives that stimulate ideas for future research (Poulos, 2021).

6.2.3 Data Analysis: A Narrative and Abductive Approach

This study employed an abductive approach (Timmermans & Tavory, 2012), in which analysis emerged iteratively from fieldnotes, participant dialogues, and additional data sources. Analytic themes were refined in dialogue with literature on scientist-activism (Dablander, Sachisthal, Cologna, et al., 2024b; Finnerty et al., 2024a, 2024b, 2025) allowing for a recursive interplay between observations and theory. Rather than applying a strictly inductive or deductive framework, this process engaged both emergent patterns in the data and conceptual developments in the literature, leading to the identification of key identity processes, symbolic actions, and mechanisms of sustained activist engagement.

Reflexive writing was integral to this process. Rather than coding data in isolation, meaning was constructed through narrative, with categories developing in tandem with the writing process. Key moments of activism, such as mass mobilisations, group actions, and interactions with police or the public, were treated as identity-relevant episodes, through which the lived tensions of scientist-activism became visible. This narrative-based approach (Riessman, 2008) ensured that analysis remained situated within the temporal and social context of activism, rather than being reduced to decontextualised themes. The final structure of the results—initial engagement, identity negotiation, and sustaining high-cost action—reflects this iterative process, whereby patterns in participation and identity transformation were identified through abductive reasoning, reflexive engagement, and theoretical refinement.

6.2.4 The Ethics of Activist Research

Ethical considerations in activist research extend beyond formal procedures to the situational, reflexive decisions required throughout data collection, analysis, and write-up (Guillemin & Gillam, 2004). This requires careful attention to issues of anonymity, researcher positionality, participant representation, and harm mitigation. Given the public nature of many scientist-activist actions, balancing transparency with participant protection presents a unique challenge (Vestergren & Drury, 2020). This section outlines the ethical strategies adopted in this study, including member checking, relational ethics, and selective attribution, to ensure rigorous and responsible research practices.

6.2.4.1 Ethics of Representation and Harm Mitigation. A central ethical challenge in researching public-facing activism is participant anonymity. Unlike other forms of qualitative research where anonymity is a standard expectation, S4XR members participate in high-profile actions where they are photographed, recorded, and interviewed in print, audio, and visual media. This visibility reduces expectations of confidentiality, yet while their actions are public, individuals may not wish to be named or directly quoted in an academic context. This creates a delicate balance to navigate concerning transparency and participant anonymity. A relational ethic of caring and compassion (Ellis, 2020; Poulos, 2008) was implemented so that published findings "do no harm" to those being studied. This study adopted the following strategies:

- Anonymisation where appropriate: While public figures and spokespersons were occasionally named where relevant (e.g., in discussing media representation of S4XR), individual participants were anonymised unless explicit consent was given.
- Selective Attribution and Paraphrasing: Where direct quotes could increase identifiability statements were paraphrased while preserving analytic integrity.
- Member Checking and Continuous Consent: Participants had opportunities to review findings, clarify meanings, and flag concerns regarding representation. This process also served as an ongoing form of continuous consent (Klykken,

2022). The group was regularly reminded of my dual role as a researcher and member, ensuring transparency throughout the study. Regular discussions and presentations allowed participants to shape how their actions and perspectives were documented, ensuring that participants remained active collaborators rather than passive subjects. For instance, a founding member provided critical feedback on my initial descriptions of the group's goals, leading to the revised goals now presented in this paper. By prioritising the activists' perspectives and maintaining ethical rigour, I ensured that participants remained active collaborators rather than passive subjects.

6.2.4.2 Taking Sides, Positionality, and Credibility. Different perspectives exist on what constitutes rigorous and credible qualitative research (Levitt et al., 2017, 2018; Poulos, 2021; Richardson, 2000; Tracy & Hinrichs, 2017). All stress the need for consideration of rigour, truthfulness, value, researcher positionality, and ethics. Taking sides in research is often viewed as a threat to objectivity, yet critical perspectives argue that neutrality is neither always desirable nor possible (Brown & Strega, 2005). Aligning oneself with the group under study, or "taking sides", may be a necessary step towards gaining access and building trust (Drury & Stott, 2001) particularly in situations where a minority group holds strong non-conformist beliefs (P. Green, 1993). Research on environmental protest similarly highlights the importance of shared values in fostering relationships, trust, and deeper understanding (Vestergren et al., 2018, 2019; Vestergren & Drury, 2020).

My alignment with Scientists for Extinction Rebellion (S4XR) was not a strategic decision solely for research purposes but a continuation of my existing activism. This taking of sides enabled deeper insight into activist experiences, revealing avenues for further inquiry (Drury & Stott, 2001), as reflected in my broader research

(Finnerty et al., 2024a, 2024b, 2025). However, this raises concerns about bias, as researchers may be perceived as advocates rather than neutral observers (Drury & Stott, 2001), potentially undermining researcher credibility and the validity of the research findings. At the same time, attempting to adopt a detached or neutral stance may restrict access, as researchers risk being seen as untrustworthy or duplicitous, limiting the quality of data collected (Drury & Stott, 2001).

While no perfect solution exists, it is critical to be transparent about researcher values, biases, and the challenges inherent in conducting fieldwork (Tracy, 2010; Tracy & Hinrichs, 2017). Rather than claiming neutrality, I incorporated autoethnography into the analysis to highlight how my positionality shaped both access to data and interpretation. This approach enabled me to account for the affective, cognitive, and moral dimensions of activism, treating my presence in the field not as a limitation but as a source of analytical insight (Poulos, 2021). Acknowledging that adopting a particular perspective may introduce bias and over-identification with participants, I mitigated this risk through triangulation with external data sources, including media reports, movement documents, and social media records (Drury & Stott, 2001). The extensive public documentation of many activist events, through traditional media, photography, and video, ensured that this research did not rely solely on insider perspectives, further strengthening analytic validity (Tracy, 2010; Tracy & Hinrichs, 2017).

Table 6.1 Fieldnotes Template

Observation Site	**Observation Date**	**Start Time**	**End Time**	**Writing Location**	**Writing Date**	**Start Time**	**End Time**

Description	**Reflexivity**	**Analysis**
Provide a detailed and contextualised account of key actions, statements, and interactions. Focus on who, what, where, when, and how to capture events accurately. Key Actions & Statements: • What actions took place? Who performed them? • What was said? Note key statements about identity, self, moral norms, or group belonging, particularly spontaneous remarks before, during, and after key actions. • What were the reactions of others (support, disagreement, silence, etc.)?	Critically reflect on your role, assumptions, influence on the setting and participants, and your own experiences. Researcher Presence & Influence: • What role did you take in the setting (active participant, observer, both)? • How did others respond to your presence? Did they adjust their behaviour, acknowledge you as a researcher, or treat you as a fellow activist? Personal Reactions & Biases:	Identify emerging patterns, contradictions, and preliminary themes emerging from the data. Key Themes & Patterns: • What stood out in this observation? Why? • How do actions/statements reflect scientist identity, moral norms, intergroup processes, or empowerment? Connections to Theory & Prior Research: • How do these observations relate to social identity theory, activism research, or past findings on scientist-activists? • Are there contradictions between scientist identity and activist identity?

Context & Atmosphere: • Where did the action take place? What was the physical and social environment? • What was the mood or emotional tone of the setting? • How did the wider social context (e.g., police presence, media, bystanders) shape the atmosphere? Group Interactions: • How did scientists interact with non-scientists (e.g., XR activists, police, media, public)? • Were there moments of tension, solidarity, conflict, or consensus-building?	• What assumptions did you bring into this observation? Were they challenged or reinforced? • How did your own background, identity, or prior experiences with activism or science shape your perspective? Emotional & Physical Responses: • How did you feel during the event? Were there moments of discomfort, alignment, or surprise? • Did the atmosphere impact your sense of identity as a scientist, activist, or researcher?	Questions for Further Exploration: • What needs to be followed up in future observations or interviews? • What alternative explanations could challenge initial interpretations?

6.3 RESULTS

Large-scale XR actions such as the April Rebellion in 2022 (Extinction Rebellion, 2022a), and the Big One in 2023 (Limb, 2023; Russell & Graham, 2023), provide critical contexts for understanding scientist activism and broader collective action dynamics. These events serve as rallying points for thousands of diverse individuals and groups committed to environmental activism. Beyond being platforms for dissent, large-scale actions can be 'identity-centring' events (Prosser, O'Neill, et al., 2023), where participants can consolidate their sense of belonging and envision alternatives to the status quo (Yates, 2015). Such alternatives include practices like using Citizens' Assemblies, fostering flat hierarchies, and promoting sustainable consumption. These spaces shape activist identities, reinforcing solidarity and agency (Drury & Reicher, 2009).

Despite the vibrancy of these events, environmental activism continues to be the preserve of a minority. Just one street over, the sounds and colours of demonstrations fade into the bustle of ordinary city life. As one scientist reflected:

> The only negative experience I had was getting slightly odd looks from people (and one person shouting that I was falling for a hoax) when I was away from the main protest area in an XR t-shirt on my way back to my accommodation[...] Hmm, this made me realise that there are still people who are suspicious of XR's approach and possibly also of the realities of climate change.

Another participant observed a different but related tension:

> I got the impression there were few members of the public around or engaging with Big One events[...] so, so we were mainly preaching to the converted. Maybe it was too big in terms of occupying a lot of closed roads so public footfall close by was reduced, too exclusive, or people were put off by the very negative images

> falsely portrayed in the right-wing media, which are wrong, you know[...] including downright lies about XR planning to disrupt the Marathon.

Providing identity-aligned spaces, such as those found at environmental protests, allows activists to enact and consolidate their identities. These spaces can foster unity and mutual support, empowering participants and encouraging further engagement (Hopkins & Reicher, 2017; Prosser, O'Neill, et al., 2023). Scientists participating in these events often emphasised the collective atmosphere and its empowering effects (Drury & Reicher, 2009):

> The Big One was great, so great. Being surrounded by so many people who feel the same about the current state of the world and the horrific inaction of the government was amazing. The atmosphere was brilliant and made me feel hopeful in spite of the challenges we face [...]. It was particularly cool to see so many scientists together calling for change.

Another participant added:

> The Big One had a festival atmosphere and was a fun place to be. People were friendly, open and umm, approachable, so it was easy to have conversations and find things to do. It was important to me to see how many people are passionate about this issue, it made me feel less alone in both my concerns and my actions. It felt important to be part of The Big One, yeah, like I was part of a significant moment, a moment in history.

Such experiences are critical to sustained environmental collective action (Vestergren et al., 2019).

Within this broader movement, smaller identity-based subgroups often form—doctors, nurses, psychologists, educators, Christians, Muslims —each contributing specialised actions to the wider effort. Scientists are among these subgroups, finding a place within the movement, building connections with each other, and deciding how to apply their expertise and resources to collective goals.

Four steps to participation have been identified: being sufficiently sympathetic; being the target of a mobilisation attempt; being sufficiently motivated; and finally overcoming barriers (B. Klandermans & Oegema, 1987). Many scientists encounter significant barriers before taking their first steps into activism, whether that involves joining a chat group, an online meeting, or a public demonstration. These barriers can be intellectual—questions of legitimacy and identity—or practical, such as fears about career repercussions or not knowing what to do. A two-step model has been proposed for understanding scientists' progression to activism, distinguishing between barriers that deter willingness and those that deter action (Dablander, Sachisthal, Cologna, et al., 2024b), echoing prior models (B. Klandermans & Oegema, 1987). Building on these frameworks, this study examines how scientists who are at least somewhat willing become actively involved. This paper focuses on factors relevant to scientists' engagement in activism which emerged during fieldwork. While it highlights important processes and dynamics, it does not aim to be exhaustive of all factors relevant to pro-environmental activism. Scientists' professional identities introduce unique challenges to activism, requiring careful identity negotiation to maintain credibility while embracing disruptive action (Finnerty et al., 2024a, 2024b), offering novel psychological insights into collective action. The ethnographic findings are structured around a process-oriented framework, detailing how scientists transition into activism, negotiate their identities, and sustain engagement. The following sections address three key dimensions of this process:

1. Pathways into Activism
2. Managing the Scientist Identity: Negotiation and Performance

3. Sustaining Action: Motivation and High-Cost Actions

This structure emerged organically through the analysis of data, reflecting the temporal progression of how scientists experience and evolve within activism. These results draw on observations and reflections from four significant events:

1. Scientist Rebellion Action at Shell Headquarters (7th April 2022): A high-profile demonstration against fossil fuel expansion, with scientists in labcoats throwing ballons full of fake oil over the front of the building. One scientist was arrested. Occurred during the April 2022 Rebellion.
2. Scientist for XR Action at the Department of Business, Energy, and Industrial Strategy (BEIS) (13th April 2022): A targeted protest against oil and gas licensing, involving scientists gluing themselves to windows and displaying scientific papers. 8 scientists were arrested. Occurred during the April 2022 Rebellion.
3. 'March for Nature' (22nd April 2023): A large-scale publicly sanctioned march through Parliament Square, focused on biodiversity loss. Unlike high-risk direct actions, this event prioritised public awareness over disruption, with scientists playing a visible but non-confrontational role. It formed part of The Big One protests, which drew over 100,000 attendees, including representatives from major environmental NGOs such as Greenpeace and Friends of the Earth.
4. 'Ask a Scientist' Stand (21st – 24th April 2023): An interactive public engagement initiative organised by Scientists for XR, held at Parliament Square as part of the Big One demonstrations. Designed as a public engagement tool rather than a protest, it aimed to bridge the gap between scientific expertise and activism by inviting passersby to discuss climate and related sciences with researchers.

Note on Positionality and Perspective

This results section integrates both ethnographic and autoethnographic insights. As a participant, I use "*we*" to highlight moments of shared decision-making, collective action, and group experiences. At times, I adopt the first-person perspective "*I*" to offer reflexive insights on my own experiences, challenges, and transformations as a participant-researcher. Finally, I also describe general processes and patterns, not as a "*we*" or an "*I*", that emerged from my fieldwork. These observations are grounded in broader group dynamics and collective action theory, offering an analytical lens through which to interpret the events and experiences shared. This framing is designed to balance the richness of personal and collective experiences with the analytical depth of a broader ethnographic study, providing a comprehensive view of the ways in which scientists negotiate, perform, and transform their identities in activism.

6.3.1 Pathways into Activism

6.3.1.1 Overcoming Barriers to Activism. For many scientists, the decision to engage in activism is preceded by a period of uncertainty and self-reflection. Questions such as "Is activism right for me?", "Am I the right kind of scientist?", "What will others think?", or "What can I do?" reveal intellectual and practical barriers shaped by professional norms, identity, and assessments of risk. A primary deterrent to participation is the fear of professional or legal consequences. Many scientists worry that engaging in activism, particularly civil disobedience, could result in institutional backlash, reputational damage, or even arrest. Given these concerns, many scientists hesitate to engage in direct action. Low-risk actions provide an accessible entry point for those willing to engage but hesitant to take on high personal risk. The Big One, a large-scale Extinction Rebellion (XR) demonstration in April 2023, was explicitly nondisruptive and police-sanctioned, offering a safer and less contentious space for first-time participants who may “worry about the risk of arrest”. One scientist described how this influenced their decision to join The Big One as their first action:

> While I have followed XR actions in the past, The Big One offered an easy entry point to joining an action, for me at least [...], as the focus was very clearly on peaceful demonstration rather than civil disobedience, which felt less daunting for a newcomer.

By lowering the perceived risk, events like The Big One helped bridge the gap from sympathiser to actor (B. Klandermans & Oegema, 1987; Oegema & Klandermans, 1994). Scientists who initially engage in lower-risk, socially sanctioned actions may then develop a sense of legitimacy, belonging, self-efficacy, and empowerment, which increases confidence in taking further steps into activism (Drury & Reicher, 2009; van Zomeren et al., 2008b; Vestergren et al., 2019).

Beyond concerns about risk, many scientists struggle with the cultural tension between scientific and activist norms. One member highlighted how such cultural differences can lead to discomfort, limiting engagement:

> Activists frequently come to Scientists asking for the most hard-hitting fact or […] what’s the best slogan […] and it’s like […] the things that activists want from scientists, scientists are really reluctant to provide basically, which leads to a lot of frustration. [...] It’s like a cultural thing […] and that has to do with why Scientists have difficulty entering into activism to be honest […] because it’s just a different approach, isn’t it? It’s a different mindset.

Scientists are often trained to avoid emotive language, resist politicalisation, and maintain objectivity (Douglas, 2009). The fear of professional repercussions or being perceived as biased adds to this hesitation (Dablander, Sachisthal, Cologna, et al., 2024b; Finnerty et al., 2024b; Messling et al., 2025). Research on scientist-activists highlights the need for identity reconciliation—a process through which scientists find ways to integrate their professional values with activism, rather than seeing them as opposing forces (Finnerty et al., 2024a, 2024b). This requires a reframing of activism as an extension of scientific responsibility—a duty to act on knowledge rather than remain neutral. Scientists for Extinction Rebellion provides a critical space for this identity reconciliation, offering a structured way for scientists to engage with activism while maintaining scientific integrity. S4XR provides multiple avenues for scientists to engage with activism while maintaining their professional integrity. Members participate in direct protest actions, contribute to science communication efforts, and offer their expertise to inform movement strategies. Through these varied roles, S4XR enables scientists to align their activism with their disciplinary strengths, allowing for different levels of engagement. Additionally, the collective nature of the group facilitates informal peer learning, where members can seek guidance from those who have navigated similar tensions. This shared experience helps to reinforce scientific legitimacy within activism while also supporting those who might otherwise struggle to reconcile their professional and activist identities.

6.3.1.2 Finding a Place in the Movement. Once scientists overcome initial barriers to participation, the challenge shifts to finding a role that aligns with both their professional identity and the collective goals of the movement. Scientists for Extinction Rebellion (S4XR) plays a crucial role in providing an entry point for engagement, offering a structured space where scientists can contribute their expertise while negotiating their evolving activist identity. Originally established as a group dedicated to providing accurate scientific information to support XR's campaigns, S4XR gradually evolved into a faction engaged in public demonstrations. By ensuring the scientific integrity of XR's actions, S4XR allowed members to feel their contributions were essential to the movement's success. One of the founding members said this was a key motivation for the group, a space for scientists to find a place within the movement. One participant at The Big One reflected on this role "It is essential for scientists to be part of events organised by Extinction Rebellion. We validate the demands of XR by participating." By embedding themselves within XR actions, S4XR provided a bridge for scientists to align their professional skills with the movement's broader goals. Their presence served as a legitimising force, reinforcing the scientific credibility of the movement while also helping individual members develop confidence in their participation. The presence of an "approving social milieu" (B. Klandermans & van Stekelenburg, 2014) was instrumental in this process. Seeing other scientists engaged in the movement signalled to newcomers that activism was a legitimate extension of their scientific roles, rather than an aberration. One member noted how witnessing this collective presence facilitated participation from their friends:

> I have a few friends who made the commitment to join after seeing the whole group in action. Even though they knew about XR Scientists through talking to me, they seemed to feel more comfortable seeing a group of scientists working together.

As an example of scientists working together, the Ask a Scientist initiative (see Figure 6.1) at The Big One illustrates how identity-aligned spaces can validate and encourage scientists' participation by integrating their skills, expertise, and identity into activist spaces. Compared to more disruptive actions, this initiative resembled conventional science communication. Positioned prominently in the protest area by Westminster, the stand facilitated the public's engagement with scientists on topics including climate change, biodiversity, behaviour change, and energy storage, depending on the relative expertise of the scientist in question. Functioning as a more conventional form of science communication compared with protest, this interactive format helped ease scientists' transition into activism, validating scientists' contributions within the wider protest space, increasing perceptions of self and collective efficacy (Finnerty et al., 2024b; van Zomeren et al., 2008b; Vestergren et al., 2018). Additionally, by being visible, interested scientists were able to find S4XR and inquire about joining. Central to this initiative was the lab-coat as a symbol of scientist identity.

Figure 6.1 April, 2023. The Big One, London. Ask a Scientist Stand. Photo Credit: Scientists for Extinction Rebellion.

6.3.1.3 The Lab-coat as a Vehicle for Social Change. A defining feature of S4XR's public engagement is the strategic use of symbolic markers to signal and unify scientists' participation in activism. Central to this is the white lab-coat, a publicly recognised "indicator of a special status" (Joseph & Alex, 1972, p. 723). Research has shown that clothing functions as a key marker of social identity (Roach-Higgins & Eicher, 1992) and when intentionally selected, it allows individuals to convey specific messages about their role and status (R. A. Feinberg et al., 1992). Inspired by the March for Science (Reardon et al., 2017), S4XR's founders adopted the lab-coat to unite and empower scientists, while differentiating them from non-scientist activists. As a form of dress, it serves as a powerful identity signal, communicating both epistemic authority while demonstrating that scientists are actively engaging in civil resistance.

October 2019 marked the first instance of S4XR's participation in environmental demonstrations in London. Indexed by the lab-coat, scientists challenged traditional expectations of neutrality, reframing their identity as a vehicle for social change (Reicher, 2001). This strategy aligns with broader findings on dress as a multilayered symbol that helps negotiate multi-layered and hybrid identities (Pratt & Rafaeli, 1997). By aligning their expertise with activist goals, S4XR members reframed their role—not just as knowledge producers, but as ethically compelled actors asserting a duty to act on the science they represent (Finnerty et al., 2024a, 2025).

My first experience wearing a lab coat in an activist setting occurred during a protest at the Science Museum in London in August 2021. The demonstration aimed to expose Shell's sponsorship of a greenhouse gas exhibition (see Figure 6.2). Having arrived without a lab-coat, a fellow scientist generously offered me theirs. Despite the gesture, I hesitated. As a social scientist, I questioned whether the lab-coat—strongly associated with laboratory-based disciplines—represented my field. While I understood its function as a unifying symbol of epistemic authority, I also recognised its potential to invoke scientism[20], an overemphasis on science's authority. When I voiced this concern another scientist responded, "Yes, it's scientism, but it's scientism for good", arguing that its effectiveness in reinforcing the movement's message outweighed such concerns.

[20] Scientism is "an exaggerated trust in the efficacy of the methods of natural science applied to all areas of investigation" (Merriam-Webster Dictionary, 2024).

Figure 6.2 August, 2021. Shell Out of Our Museum action at the Science Museum, London. Photo Credit: Feng Ho.

Despite its strategic advantages, the lab-coat is not universally embraced. Research on clothing and identity suggests that for an item of dress to function effectively as a collective marker, individuals must deliberately adopt it as representative of their identity (R. A. Feinberg et al., 1992). However, when a uniform does not fully align with individuals' conception of the identity, it can become a point of contention (Joseph & Alex, 1972). While many recognised the strategic value of performing a scholarly identity in activism, they disagreed on how best to perform this identity. In this case, the lab-coat effectively signalled scientific authority, but its strong association with laboratory-based disciplines led some scientists, particularly social scientists, to question its suitability. While some within S4XR adopted it pragmatically, others felt it misrepresented the epistemological diversity of social sciences, making it an uneasy or even exclusionary symbol of academic participation in climate activism. Psychology, for example, straddles the line between 'hard' and 'soft' sciences (Uher, 2021), which might explain initial discomfort among psychologist members of S4XR in adopting the lab-coat. Additionally, its association with Milgram's obedience studies, and others, further complicated its reception among psychologists.

Sociologists and anthropologists within XR—but not S4XR—expressed that the lab-coat clashed with their disciplinary training and epistemological stance, discouraging them from joining. In response to these concerns, a few social scientists and I convened a public symposium to explore the role of social science in the climate crisis. Despite successfully connecting over a hundred social scientists across various disciplines, establishing a cohesive activist identity remained elusive. The absence of a universally accepted signifier for social sciences hindered efforts to carve out a distinct space for those who felt alienated by S4XR's hard science leanings. One humorous suggestion was to don tweed jackets, but no widely resonant symbol emerged, further emphasising the importance of dress for collective organising (R. A. Feinberg et al., 1992; Joseph & Alex, 1972; Roach-Higgins & Eicher, 1992), reflecting deeper tensions about what it meant to be a 'scientist-activist.' As a result, social scientists may find it more difficult to achieve visibility or to assert their legitimacy in movements that rely on symbolic markers to communicate authority and expertise. This may contribute to hesitation in engaging with groups like S4XR or the perception that their role is less defined compared to that of their natural science counterparts.

Despite these tensions, the lab-coat remained a powerful tool for those who chose to wear it. While few S4XR members needed lab coats for their routine work, the garment functioned as an emblem of scientific authority, much like XR Doctors' use of scrubs. It served multiple purposes: helping scientist-activists identify one another, signalling expertise to non-scientist activists, and visibly representing scientific involvement in the movement to the wider public. These benefits led some social scientists to overcome their initial reservations.

Over time, I came to see the lab-coat as an essential part of my evolving identity within the movement, helping to bridge the gap between professional norms and activist demands. The sense of community resulting from being a part of a group of scientist-activists was empowering. Though I had long been interested in environmental activism, I had struggled to find a group where my academic background felt relevant. Collaborating with fellow scientists gave my activism a depth and authenticity it had previously lacked. During the Science Museum protest, I saw firsthand how the lab-coat shaped public interactions. It served as a symbol of expertise, prompting members of the public to speak to me on their understanding of and feelings about the climate and ecological crisis. While it initially felt foreign to me, I soon recognised its value in establishing credibility and facilitating engagement.

While early engagements with S4XR helped members find their place within activism, they also raised ongoing questions about identity fit. This tension—between professional norms and activist expectations—necessitates active management of the scientist identity, both internally and externally. Differing perceptions of what it means to be a scientist further complicates these dynamics, as scientist-activists must navigate expectations of objectivity, credibility, neutrality, and advocacy. These tensions require ongoing negotiation, shaping what it means to be a ‘scientist’ in activism. For some, these tensions proved insurmountable, leading them to withdraw from activism altogether. Others chose to continue their engagement but distanced themselves from the scientist identity, choosing not to perform it in public-facing roles. This flux in membership reflects the ongoing negotiation of what it means to be a ‘scientist’ in activism, with membership in S4XR fluctuating as individuals struggled to reconcile these identities. The next section explores how scientists negotiate, perform, and evolve their identities over time in response to these challenges.

6.3.2 Managing the Scientist Identity: Negotiation and Performance.

Scientists who enter activist spaces navigate tensions between their professional norms—objectivity, neutrality, and credibility—and the emotional, disruptive, and morally charged nature of activism. These negotiations occur both internally, as participants reconcile their roles as scientists and activists, and externally, as they engage with the public, media, and other activists. Over time, the scientist identity may evolve, becoming moralised and hybridised, blending elements of scientific expertise with activist urgency.

6.3.2.1 Scientists as Privileged Activists. Initial participation of scientists in public demonstrations was marked by a perception of "unarrestability," where scientists, by virtue of their identity, appeared to enjoy a degree of immunity. The lab-coat seemed to impart a 'bullet-proofness', something reflected to me on multiple occasions. During S4XR's first public actions in October 2019, scientists sat in the road blocking traffic but were not arrested, even as non-scientist activists faced immediate consequence. One scientist reflected on this perceived privilege:

> I then joined the initial scientist for XR actions in October 2019 in London, and that was the first time I ever wore a lab-coat [...] and yeah, for two, we did like two days of actions then, including some roadblocks, temporary roadblocks that we [...] tried to get arrested basically and the police carried us out of the road but they didn't [...] arrest us yeah.

This early perception of immunity underscored powerfully how the scientist identity, indexed by the lab-coat, shapes interactions with authorities. By performing this identity, they disrupted typical activist stereotypes countering the tendency of police to treat all members of a crowd as inherently disruptive (Stott & Reicher, 1998). By referring to peer-reviewed studies –displaying scientific papers or using informative placards – care is taken to ground the activism in science. This juxtaposition counters stereotypes of activists being unemployed or uninformed, as noted by one member after The Big One:

> I think a group of scientists in their lab coats makes a great impression on people, they can't say we are unemployed or don't know what we are talking about[...] so I feel it's important to show up and make our presence known.

Unlike conventional activists, scientists carry the symbolic weight of trusted expertise (Cologna et al., 2025). Capstick et al. (2022) argue that because scientists are widely regarded as trusted authorities, their participation in activism has the potential to generate greater public impact than that of the average activist. This aligns with research on identity performance as a tool for influencing audiences (Klein et al., 2007). Of course, scientists were not entirely immune to arrest. As actions became more disruptive—such as gluing themselves to government buildings—police responses shifted. The first mass arrest of scientists in the UK at COP26 in November 2021 (Thompson, 2021), marked a turning point, highlighting both the durability and the eventual breakdown of perceived immunity.

Another way scientists experience differential treatment is in media representation. Actions by scientists can, on occasion, attract greater attention than those led by non-scientists. For example, an action by S4XR at the Department of Business, Energy, and Industrial Strategy on the 13th of April 2023 (see Figure 6.3), protesting the expansion of oil and gas licenses, generated more media coverage and subsequent social media engagement than a simultaneous action involving a greater number of XR activists at Shell headquarters. This disproportionate attention has extended beyond the initial event, with the action subsequently featured in multiple documentaries, public talks, and news articles (Cornwall Climate Care, 2024; V. Morozov & Jones, 2024; Scientists for Extinction Rebellion, 2025; The Guardian, 2022).

Of course, this difference in treatment creates expectations about what scientists can and may do in action, shaped both by scientists' conceptions of themselves and views of the wider public, speaking to the importance of the audience(s) for identity performance (Klein et al., 2007).

Figure 6.3. April 2022, Scientists for Extinction Rebellion protesting at Department for Business, Energy, and Industrial Strategy. Photo Credit: Andrea Domeniconi.

6.3.2.2 Performing as a Scientist: Audience and Expectations. Actions like the BEIS protest in April 2022 illustrate how scientists carefully curated their public image to balance their role as activists with the expectations of their professional identity. The scientist's role carries significant weight and responsibility. Being a scientist requires accuracy and restraint from making definitive statements with too great a degree of confidence. However, this commitment to careful communication can be a point of tension in activism, which often demands attention-grabbing, succinct messages.

In planning the action at BEIS, there was in-depth discussion about the image of the scientist, the key message, and originality of the action. The message needed to be clear, based on the science, and respond to the UK government's policy. The message 'New Oil and Gas = Death" was selected to directly challenge UK government policy while remaining rooted in scientific evidence. Participants debated a range of tactics, from conventional placards to visually striking actions, such as throwing black paint-filled balloons (as used by Scientist Rebellion at Shell headquarters) or pasting scientific papers onto buildings. As one participant remarked:

> Scientists are people who normally don't participate in these protests, who, dare I say, seem dignified. I thought it was fantastic, the paint throwing, which was great, but it might not fit with the image of a scientist, if you see what I mean?

Ultimately, the group opted to balance both aspects—the need for originality and attention-grabbing demonstrations with the importance of maintaining the dignified public image of a scientist—in designing the action. During the action a group of scientists, visibly representing their professional identity with lab-coats bearing the message 'New Oil and Gas = Death', complemented by placards conveying the same message, pasted scientific papers to the front window of BEIS (Gayle, 2022). Some also engaged in symbolic gestures of resistance including gluing of hands to the front windows and chalk spraying the windows. As a designated non-lab-coat wearing videographer, I observed this interplay between activism and professional identity—how scientists sought to retain epistemic authority while engaging in morally charged advocacy, reflecting ongoing negotiation of what constitutes “appropriate” behaviour for scientists in activist spaces.

A similar negotiation emerged during the March for Nature at the Big One, where we were strategically positioned at the front of an estimated 60,000-person march, carrying placards with stark statistics on biodiversity loss, serving as ambassadors for scientific evidence, effectively justifying the march itself. However, this visibility also heightened expectations. In the rush to assemble, I found myself carrying a placard citing a Woodland Trust statistic (see Figure 6.4), a topic outside my immediate expertise. When approached by a live-streamer for an impromptu interview, I was confronted with the challenge of speaking authoritatively on an area of science I was only broadly familiar with. This moment underscored a paradox: the lab-coat serves as a symbol of expertise, yet it also generates audience expectations that any scientist can speak for the entirety of environmental and climate science. While I clarified that the statistic had been compiled by colleagues and highlighted the broader significance of ancient woodlands, I was acutely aware of the limits of my expertise.

This experience highlighted the complexity of embodying the scientist identity during action. While each scientist’s expertise is limited to a specific field, the public may view them as a conduit for the all scientific knowledge. This perception can create challenging situations where scientists are expected to possess expertise on topics outside their domain. This may inadvertently cast doubt on a person’s credibility when it becomes clear that they are not an expert on that topic. This creates potential risks: if a scientist falters outside their specialism, it may inadvertently erode public trust rather than strengthen it. Yet, this experience also highlighted the importance of shared expertise. The statistics were collaboratively compiled, vetted, and shared, reflecting the way scientific knowledge is built through discussion, peer review, and synthesis of multiple perspectives. This moment highlighted the need for transparency about individual expertise while simultaneously leveraging the strength of the collective—an approach that could mitigate the expectation for scientists to be universal experts. Fossen (2025) offers a philosophical defence of the role of academics in climate activism, not through individual expertise, but by virtue of their position within the academic community. In a climate crisis where warnings from scientists are being ignored, activism becomes an ethical responsibility that transcends disciplinary boundaries and leverages the collective strength of academia.

Figure 6.4. April 2023, The Big One, March for Nature, Westminster. Photo Credit: Crispin Hughes

When we returned to Westminster, the issue of epistemic authority resurfaced. A photographer requested individual pictures of each scientist with their placard, specifying that participants should ideally be experts in the topics displayed. This request led to visible discomfort for approximately half of the group, prompting quiet placard swapping among members. The moment underscored the ongoing negotiation of expertise within public actions. While we had prepared the placards collectively, the expectation that each scientist embodies individual expertise highlighted the tension between the collaborative nature of activism and the public's perception of scientific authority. I chose a placard stating that there was a gap between the UK government's rhetoric on the importance of the environment and years of under funding actions to address the issues, something I felt confident in being able to state (see Figure 1.2). This choice reflected my own negotiation of credibility, balancing personal expertise with the collective message. The moment left me reflecting on how the scientist identity in public actions requires constant navigation, not only in how it is performed but also in how it is perceived by others. Science itself does not have fixed borders; rather, its boundaries are actively drawn and redrawn depending on context (Gieryn, 1983). Similarly, scientists in activist spaces must strategically manage how their expertise is framed, ensuring their authority is neither overstated nor undermined. However, while the public performance of scientific identity may involve some flexibility, S4XR simultaneously maintains strict internal boundaries, ensuring that its membership remains exclusively composed of scientists. These internal boundaries serve to protect the group's epistemic authority, reinforcing its distinct role within the broader movement.

6.3.2.3 Who Counts as a Scientist? Negotiating Membership and Authority.

Epistemic authority—the credibility and trust associated with scientific expertise—must be actively maintained within S4XR to uphold the group's unique identity as scientist-activists. One way this authority is preserved is by strictly limiting membership to individuals with a scientific background. During the Big One, S4XR received a handful of requests from non-scientists who expressed interest in joining. These requests were politely declined, reflecting the group's commitment to maintaining its distinct contribution as a space for scientists within the broader movement. This exclusivity underscores the delicate balance S4XR must navigate between inclusivity and credibility. While the group values collaboration with non-scientist activists, its impact relies on its ability to present itself as a collective of scientists who bring their expertise into activism. Admitting non-credentialed members risks diluting this identity and could undermine the epistemic authority that makes the group uniquely compelling to both the public and other activists. This boundary-setting happens not just during public events like the Big One but more generally as the group engages with new members and broader audiences. By defining who belongs and who does not, S4XR strengthens its collective identity as a group of scientists engaging in activism—not simply activists who happen to be scientists. Maintaining strong group boundaries allows the collective to distinguish itself from other activist networks while preserving the legitimacy that comes with scientific affiliation.

Nevertheless, despite these efforts, the scientist identity is frequently challenged when invoked in public actions. These challenges come from both external actors (the media and public) and internal group members. The public and media often scrutinise or dismiss the scientific identity of activist-scientists, while members themselves sometimes grapple with whether they "qualify" as scientists within this context. For example, the Daily Mail depicted a photo of our group during the march, yet overlooked our scientific credentials by describing us simply as "Activists hold signs and wear lab coats" (Ross & May, 2023). Fellow scientists noted that this was not an isolated incident, with similar publications deliberately downplaying or ignoring participants' professional affiliations.

Echoing this was the question “Are you a real scientist?” posed by many throughout the weekend at the Ask a Scientist stand. Interpretations of what constituted a "real" scientist varied widely. Upon learning that some participants were not climatologists, certain members of the public dismissed us as illegitimate advocates for climate action. Others questioned our formal credentials, prompting clarifications about participants’ academic qualifications. In one exchange, a questioner’s skepticism was alleviated when I outlined my credentials—a social science doctoral candidate with a Bachelor's and two Master's degrees—alongside those of a colleague, a practicing cancer biologist with a doctorate. The crux, in this case, was not the branch of science we belonged to but the validation of our identities as qualified scientists, emphasising the collaborative and interdisciplinary nature of the group. Activists too challenged us to see if we were “real scientists”. In one exchange, an older protestor pointed at my lab-coat questioning my legitimacy as a scientist given my specialisation in behavioural science and social psychology. She assumed it wasn’t “real science,” compared to the “real scientist”, a microbiologist, standing beside me. This further highlighted for me the difficulty for social scientists to claim a “scientist” identity in activism.

These external challenges were mirrored by internal doubts among some members. Conversations with retired scientists and a physics PhD student revealed hesitations about their qualifications to join S4XR. Both retired scientists questioned whether their lack of active employment undermined their legitimacy, while the PhD student wondered if they could claim the scientist identity before completing their doctorate. However, these concerns were often resolved through dialogue and peer affirmation, demonstrating the role of in-group validation in reinforcing identity (Tajfel & Turner, 1979). For example, a retired XR scientist reassured a retired agricultural scientist that their scientific training and perspective still shaped their worldview, affirming that scientific identity extends beyond active employment. Similarly, S4XR actively showcased the diverse backgrounds of its members—spanning disciplines from physics to environmental psychology to cancer biology—to illustrate that all scientists, regardless of their field, had a role in climate advocacy.

These cases illustrate the paradox of epistemic authority in public action. Fully qualified scientists may question their own legitimacy due to their disciplinary focus or career stage, while external actors challenge their authority regardless. This dual tension necessitates ongoing efforts to affirm scientific identity internally while communicating it effectively to external audiences. Within S4XR, this is navigated through an emphasis on shared scientific values rather than a narrow focus on disciplinary expertise alone. Yet, this raises a thornier question as to whether non-subject specialist scientists have the necessary epistemic authority to advocate on climate and environmental issues as scientists.

6.3.2.4 Reconstructing the Scientist Identity through Performance. These ongoing tensions highlight how the performance and perception of the scientist identity are not static but evolve through participation in activism, reflecting how social identities change through their performance in collective action (Drury & Reicher, 2000; Klein et al., 2007; Reicher, 2001). Engaging in public action challenges scientists to reconcile traditional notions of objectivity with the demands of advocacy (Finnerty et al., 2024a), leading to significant transformations in how they view themselves and their role in society. These shifts ultimately lead to the emergence of a hybrid *scientist-activist* identity.

Participation in groups like Scientists for Extinction Rebellion (S4XR) and Scientist Rebellion shifts the scientist identity beyond neutrality and detachment, embedding it within a moral framework. As Drury and Reicher argue (Drury & Reicher, 1999, 2000) collective action provides a context for the creation of new social identities. Through repeat participation, scientists move from being neutral conveyors of evidence to active agents of change or scientist-activists (Finnerty et al., 2024b), aligning their expertise with the moral and strategic goals of the movement. This transformation is reinforced by moral conviction and the politicisation of identity, processes commonly observed in sustained activism (Leal et al., 2024).

These shifts manifest in activist performances that blend scientific authority with moral urgency. Actions such as pasting scientific papers at the Department for Business, Energy & Industrial Strategy (BEIS) or holding placards at the March for Nature reposition scientific evidence as a direct challenge to inaction. The message “New Oil and Gas = Death” epitomised this shift, transforming scientific knowledge from a neutral statement into an imperative for change. Civil disobedience, normally perceived as outside the boundaries of standard science communication, becomes reframed as an ethical obligation. One scientist, glued to a BEIS window, articulated this sense of duty:

> I’m feeling proud, feeling like I’ve fulfilled a duty, a duty to myself, but also a duty to the science [they gestured to a paper pasted to the window beside them], and a duty to all my loved ones, my nephews, and my nieces. […] As a scientist I believe we have a duty not only to uphold the integrity of our work but to protect the public, to protect the natural world that we study. It is no longer enough for scientists just to do publications. We also have to do public action. That’s why we are here today. That is why we are taking part in this civil disobedience.
>
> Scientist arrested during BEIS, 2022

Here, duty is framed in multiple ways—towards oneself, towards the scientific evidence, and towards future generations. This illustrates how activism reconstructs the scientist identity by aligning it with moral obligations that extend beyond conventional professional boundaries. The act of gluing oneself to a building or blocking a road is justified as defending both scientific integrity and the futures of those they care about.

Another example of this transformation in identity, occurred during a 'die-in' at the edge of The Mall towards the end of the March for Nature. Around us, participants lay on the ground in silence, symbolising the victims of environmental collapse. We, the scientists, remained standing, our placards held high serving as silent testimonies and our call to "listen to the science." Observing a fellow scientist in tears, I was struck by the weight of the moment—this was not just about presenting science but about embodying its urgency. Their visible emotion and ecological grief (Cunsolo & Ellis, 2018) disrupted the expectation of scientific detachment, highlighting that scientists, too, feel the profound weight of the climate crisis (Schipper et al., 2024). Standing amidst the silent crowd, our presence was both a testament to the severity of the crisis and a challenge to the idea that science can—or should—remain emotionally detached from its consequences.

Emotions—particularly anger, frustration, and moral outrage—play a crucial role in this transformation. The moralisation of the scientist identity is deeply affective, reinforcing the urgency of activism (Agostini & van Zomeren, 2021b). While the shift towards a scientist-activist identity provides a framework for justifying participation, it is often the emotions tied to this transformation—frustration, anger, and a sense of injustice—that propel individuals towards more radical actions. One scientist later arrested at BEIS captured this growing frustration "I'm angry, I'm really angry that we have to do all this, that we have to get to this point, that I have to […] push for change in this way. It's not fair. It's not right." As frustration intensifies, so too does the willingness to engage in high-risk activism. The felt injustice of government inaction despite mounting scientific evidence transforms anger into moral conviction, reinforcing commitment to civil disobedience. This fusion of moral urgency, emotional intensity, and professional expertise enables scientists to justify high-cost activism while maintaining the authority of their scientific role.

Yet, escalation is not inevitable. Scientists weigh the risks of activism within a social context, shaped by their relationships with fellow activists, perceptions of efficacy, and shared moral emotions. The following section examines how solidarity, trust, and emotional reinforcement sustain engagement over time, influencing individuals' personal risk thresholds.

6.3.3 Sustaining Commitment and Escalating Risk in Scientist-Activism

As we sheltered discreetly in an alley around the corner from the government department of Business, Energy, and Industrial Strategy, my heart pounded. Lab-coats with the freshly printed "New Oil and Gas = Death" messages were handed out, hidden beneath long coats to conceal our intentions until the critical moment. Moving in small groups to avoid rousing attention, we positioned ourselves across from the building. Sitting on a bench, I double-checked my camera settings as the atmosphere around me grew charged with anticipation. Suddenly, a loud cry and flare smoke signalled the start. XR activists staged a distraction at the BEIS entrance a little to the left, securing S4XR members an opportune moment. No time to think, I darted across the road, weaving through traffic to capture the unfolding action on camera. Scientists pasted scientific papers to the building's windows while others glued their hands beside them. A vanguard formed, holding placards aloft bearing the stark message, "New Oil and Gas = Death." The air crackled with urgency while those behind the vanguard hastily applied glue to their hands before affixing their hands to the glass. By the end of the action a couple of hours later, nine scientists were arrested.

This episode provides a window into the processes that sustain engagement and support high-cost actions. How did these scientists reach this point? What sustains long-term engagement in high-risk activism? Scientists engaging in civil disobedience do not begin with a willingness to take such risks. Instead, participation emerges through a gradual process of commitment, group bonding, and moral conviction—a process rooted in the social and psychological mechanisms that underpin collective action.

6.3.3.1 Frustration, Efficacy, and the Turn to Civil Disobedience. The limitations of conventional routes of science communication often serve as a catalyst for scientists engaging in civil disobedience. Despite years of publishing research, advising policymakers, and engaging in public communication, many scientists perceive these strategies as ineffective in bringing about meaningful systemic change. This growing frustration—coupled with a belief in the necessity of more confrontational tactics—pushes some towards high-risk activism. One scientist, glued to the front window of the Department for Business, Energy, and Industrial Strategy (BEIS), articulated this sentiment:

> No regrets. This has to be done. We've tried everything else. We are trying everything else still [...]. All the time-honoured ways of doing research, writing papers, trying to engage with policymakers, communicating to the public, communicating with the media etc., etc., etc […] but it's not enough because whenever it suits the government, or those with vested interests, they disregard all of it, and so this is the last resort me and twenty or so scientists feel we need to take.

These reflections highlight two key psychological mechanisms underpinning scientists' decisions to escalate their activism: perceived inefficacy of conventional methods and growing moral urgency. A crucial factor in sustaining and legitimising scientist-led civil disobedience is collective efficacy—the shared belief that collective action can produce meaningful change (van Zomeren et al., 2008b). While individual scientists may initially feel powerless, engagement in collective action fosters a sense of agency. The belief that civil disobedience can shift public discourse or disrupt harmful policies sustains participation. This sense of efficacy is reinforced by shifting group norms within scientist communities. Traditional norms of scientific engagement—objective detachment, policy advising, and cautious public communication—are increasingly being challenged by a counter-norm: that scientists have a duty not just to inform but to act (Finnerty et al., 2024a, 2024b). One scientist captured this shift:

> As scientists, we have tried to warn the world as reasonably and as rationally as possible, gathering the evidence over decades. I spent years of my life researching this, years more in the Arctic to find out the effects climate change is having. […] But what is the point of doing it if it just gets ignored? As a scientist, I believe we have a duty not only to uphold the integrity of our work but to protect the public, to protect the natural world that we study. It is no longer enough for scientists just to do publications. We also have to do public action. That's why we are here today. That is why we are taking part in this civil disobedience. We really urge you, all of you, to join us. Because at the moment we are on a pathway to catastrophe.

The increasing moralisation of the scientist identity transforms civil disobedience into an ethical form of science communication—a moral imperative. The speaker's appeal to "you", other scientists, underscores a shift from knowledge production to direct action. However, frustration and a belief in the necessity of action alone do not sustain participation in high-cost activism. For many scientists, engagement in civil disobedience is deeply intertwined with the social and emotional bonds they develop within activist networks. Solidarity, trust, and a shared moral identity strengthen commitment, making it easier to take risks—not only for the cause but also for one another.

6.3.3.2 Solidarity, Trust, and Decision-Making in Scientists for XR. The decision to participate in high-risk activism was not taken lightly. In the days leading up to the BEIS action, extensive discussions took place about roles, risks, and personal thresholds. Each participant was encouraged to contribute in ways that aligned with their skills and comfort levels—whether by pasting research papers onto government buildings, gluing themselves to the windows, or, in my case, documenting the protest through filming. This self-selection process ensured that participation felt empowering rather than coercive, an approach that aligns with research on group support fostering collective efficacy and empowerment in activism (Drury & Reicher, 2009).

A couple of days before BEIS, while we sat in a circle on the grass in Hyde Park, one member expressed concerns about being arrested due to career risks. Another reassured them, saying, “You are among friends.” This exchange encapsulated a fundamental principle within S4XR: participation was self-determined. There was no expectation that anyone should push beyond their personal threshold of risk. Instead, the emphasis was on contributing authentically and sustainably. This ethos extended into the protest itself. One scientist, glued to the window of BEIS, stated, “Above everything else, I want to make sure everyone is OK, that everyone feels safe and valued and has a voice.” This care-oriented approach functioned as a safeguard against burnout—a common issue in activist communities (Cox, 2010). While commitment to the cause was high, there was an awareness that sustained engagement required emotional resilience, which could only be cultivated through trust, flexibility, and shared responsibility. Scientists frequently reminded one another that participation at any level was valued, reinforcing a sense of solidarity. This support and unity can influence the extent to which someone feels empowered to act (Vestergren et al., 2019). One scientist, reflecting a week after their arrest at BEIS, captured this dynamic:

> It's all community-based, right? I can take a lot more on and I can take a lot more personal cost if I'm with others who will support me. But when I'm on my own, I have to take less personal cost. It's like I can deal with more slaps to the face if I'm with people who […] support me through it. If I'm on my own, then I can take fewer slaps.

Over time, these close-knit relationships reinforced a sense of collective identity. In my own experience, I had felt this, having been welcomed warmly and trusted to help ensure the action went smoothly. Another member, also glued on, emphasised the positive role of these personal relationships for engendering a sense of community and energy:

> Participating in activism, we're not doing it for the fun of it. [...] It can be very emotionally draining, it can get a huge backlash from people you care about, people you don't even know. But actually, it gives me a lot, it gives me a sense of community, it's an opportunity to talk with people who understand things [...] and who care about the future. [...] It can be a really energising environment in some ways. Maybe not [...] when you're glued to a government department, but in the midst of protest [...] we end up having some great ideas, forming new connections [...] You know I'm so grateful […] It really helps you develop and grow and work with people who then work together and act in a much more effective way.

This sense of belonging and emotional connection, and the assurance of mutual aid, was integral to the success of this action and subsequent support for each other after it. Nonscientific members of the welfare team provided further support, ensuring that everyone—especially those taking the highest risks—was physically and emotionally cared for. XR Doctors in their scrubs provided support by engaging with passing members of the public. In the days after the action, many of the scientists joined others in holding a rally outside Charing Cross Station in support of Emma Smart who was held in poor conditions and refused bail (Gayle, 2022c, 2022b). Protesters highlighted the inhumane treatment of climate activists within the legal system, framing her case as a broader attack on scientific dissent.

6.3.3.3 Personal Reflection: The Shifting Threshold of Risk. Reflecting on my experience of BEIS later that evening, I wrote this:

> The more time passes, the more I develop relationships with this group, and the more I understand the severity of this issue, the more I feel it viscerally, the more action I want to take. I feel energised and emotionally charged by today's action [...] I was there because I care about this issue and these people. I didn't fully appreciate it before, that when you're there in the midst of action, with people you identify with and care for, who are risking themselves, you feel a strong compulsion to act too.

The experience was unlike anything I had encountered before. Within that space, everything felt heightened—urgent, emotionally charged—a convergence of personal commitment and collective action. Leal and colleagues (2024) found that repeat participation in collective action promotes attitude moralisation via moral emotions, prompting further action. Additionally, research on within-group processes in small groups who engage in intense actions, finds that the combination of solidarity, shared identity, and personal bonds increase the likelihood of prosocial action and risk-taking (Swann et al., 2012, 2014). My growing connection to the group, coupled with an intensifying awareness of the climate crisis, created a visceral pull towards further activism.

In the immediate aftermath of the BEIS action, I felt a strong compulsion to push my personal boundaries further. Following the arrests, some of us gathered on a grassy area opposite Westminster School. Responses to the day's events varied. Some were invigorated, seemingly charged by the experience, while another appeared shaken—visibly upset, expressing a sense of emptiness. Earlier, just after the arrests, they had wept, frustrated by the perceived necessity of such drastic measures. Two scientists reflected that they had pushed their boundaries further than ever before, suggesting they might be willing to do so again in the future.

These contrasting reactions highlight the intrinsic complexities of personal risk thresholds, where emotional discomfort and the personal cost of activism are weighed against the perceived importance of the cause and the support of the group. XR's 4th value speaks to this idea of boundary pushing "We openly challenge ourselves and this toxic system: Leaving our comfort zones to take action for change". However, comfort zones are highly individual and fluctuate over time. As time passed, my initial urge to escalate waned. This shifting emotional arousal illustrates how an individual's willingness to take risks evolves in response to both internal and external factors.

Examining my fieldnotes across time, it became evident that there is a waxing and waning to the affective dimension underpinning one's commitment and willingness to risk one's autonomy. Away from the action, as daily life resumed, the intense well of feeling, of moral conviction, and the sense of efficacy associated with protest faded. Distinct psychological pathways into activism—one driven by emotion and group identity, another by problem-focused, strategic reasoning, have been identified (van Zomeren et al., 2012). Reflecting on my experience, I noticed a personal shift from the former to the latter: what began as an emotionally charged compulsion to act gradually gave way to a more calculated assessment of risks and rewards.

While emotional shifts and social bonds shape the evolving threshold of risk, several additional psychological mechanisms further illuminate this process. One key factor is hedonic adaptation. At first, sitting down on roads adjoining Trafalgar Square felt bold. By the end, it felt routine. The following day, I joined a bridge block at Vauxhall Bridge, where activists sat on picnic blankets, playing music and chatting, while others faced a greater risk of arrest at either end of the bridge. Again, it initially felt daring, but as time passed, I barely registered the police presence. A police officer approached me and calmly asked why I was blocking the bridge. I told him it was because of the climate crisis. He acknowledged this, said he "just wanted me to be aware" that it was illegal, and warned that a Section 14 order would soon be issued. This polite, procedural exchange reinforced my growing sense of ease within these spaces. During the BEIS action, one of the glued-on scientists told me their heart had raced more the first time they sat in a road than when physically affixed to government property. This aligns with research on hedonic adaptation—the tendency for emotional reactions to diminish with repeated exposure (Frederick & Loewenstein, 1999). In activism, this suggests that initial apprehension about risk can fade over time, normalising transgressive action and altering risk thresholds. Self-efficacy also shapes this evolution. As activists gain experience through collective action and supported by their peers, they develop confidence in their ability to navigate protests and their consequences, which can increase willingness to sustain action and to engage in higher-risk actions (Vestergren et al., 2018).

Yet even though I flirted with arrest, I did not follow through by committing fully to actions like those at BEIS. This internal tension—the desire to escalate versus the hesitation to do so—reflected the broader choices faced by many scientist-activists. These evolving perceptions of risk and efficacy reflect the broader process of activist engagement outlined earlier. The initial barriers to participation—uncertainty, professional concerns, and personal hesitation—give way to increasing confidence and a normalisation of scientist-activism and, in some cases, civil disobedience. However, this progression is neither inevitable nor uniform. While some scientists escalate their activism, others negotiate their involvement within professional constraints and strategic considerations. This ongoing tension between identity, risk, and commitment underscores the complexities of sustaining scientist-activism over time.

6.3.4 The Wider Political Context.

The political climate globally has become increasingly hostile toward climate activists (Berglund et al., 2024). Over the past few years, government rhetoric has painted activists, including climate groups like Extinction Rebellion (XR), as extremists, and this narrative is reflected in escalating legal measures aimed at suppressing protest. Reports from Amnesty International (Amnesty International, 2023), and the Office of the High Commissioner for Human Rights highlight the "deeply troubling" nature of this shift, particularly in the UK (Laville, 2024; OHCHR, 2023). This context is crucial in shaping the risk-reward calculus for activists, me included. Climate change, while scientifically indisputable, is embattled by political action and denial. The rise of environmental social movements has corresponded with the rise of political conservatism, populism, and misinformation (Mahony & Hulme, 2016; Swyngedouw, 2019) —a concerted effort by some to preserve the status quo (Brulle & Norgaard, 2019; IPCC, 2022). Laws have been introduced that criminalise peaceful protest activities such as blocking roads, resulting in activists facing significant legal risks, from fines to imprisonment (Berglund et al., 2024).

As a non-British citizen and an early-career academic, I find myself having to navigate these risks with extra caution. The increasing penalties for acts of protest, such as the case of two Just Stop Oil activists sentenced to three years in prison for blocking the Queen Elizabeth II Bridge (Just Stop Oil, 2023a, 2023b), serve as stark reminders of the high stakes involved. This underscores the strategic necessity of diverse modes of activism, where movements balance high-risk, disruptive tactics with lower-risk, inclusive participation opportunities.

Of course, the political context itself plays a pivotal role in framing actions as political. In the United States, for instance, the politicisation of science and mass firings of scientists from science agencies (Nowogrodzki et al., 2025; Witze, 2025) has shaped how scientists are perceived. Simply resisting being fired can be seen as an act of resistance (Travis et al., 2025), given the highly charged political environment. Others are rallying together to 'Stand Up for Science' across the USA and Europe (Nowogrodzki et al., 2025), echoing the March for Science protests, highlighting how political resistance and scientific advocacy are intertwined (Reardon et al., 2017).

As the political context surrounding both science and protest shifts, and as debates about the 'right methods' of activism intensify (Young & Thomas-Walters, 2024), these decisions become increasingly difficult. The evolving challenges of navigating these contested spaces underscore the complex role of scientist-activists, who must balance professional integrity with the imperatives of action in an ever-changing political environment.

6.4 Conclusion

This paper set out to answer a critical question: how do scientists become activists, and how do they sustain their engagement over time? The psychological mechanisms that motivate and sustain activism—empowerment, a sense of efficacy, solidarity, strong moral conviction, and a politicised sense of injustice—are not unique to scientists but shape all engaged in collective action. Building on previous research which finds that scientist engagement in activism depends on the extent to which activism is seen as identity-congruent, as well as concerns about credibility and professional repercussions (Dablander, Sachisthal, Cologna, et al., 2024b; Finnerty et al., 2024a, 2024b), this ethnographic paper emphasises the importance of providing identity aligned spaces as a crucial entry point.

The transition from scientist to scientist-activist is often marked by an inflection point: a moment when scientists recognise that activism can fit within their identity, that their expertise is valued in activist spaces, and that they are not alone in navigating these tensions. Finding solidarity with like-minded others provides reassurance and legitimacy, helping to overcome initial hesitations about engagement. However, while scientific symbols—such as lab coats—help to signal expertise, they also shape the boundaries of participation. These symbols can reinforce a sense of cohesion among scientist-activists but may also limit engagement to those who identify with or pragmatically accept these markers of scientific legitimacy. This dynamic raises questions about whose expertise is recognised within these spaces and how scientist-activist communities balance inclusivity with strategic identity performance.

Sustaining activism over time requires ongoing identity work. Scientists must carefully manage their professional standing, preserving their epistemic authority by enforcing strict membership boundaries or limiting public communication to their areas of expertise. At the same time, activism reshapes their identity, giving rise to a hybrid scientist-activist identity—one that blends scientific expertise with a growing sense of moral urgency. As activism becomes embedded in their sense of self, moral obligations increasingly shape their choices, with civil disobedience emerging as its most visible and contested expression. In these moments, scientists invoke their scientific authority to justify action, while simultaneously reframing their role—moving from knowledge producers to moral agents compelled to act. This hybrid identity is performed and reinforced through the strategic use of scientific symbols—lab-coats, data visualisations, and scientific rhetoric—which signal both expertise and ethical responsibility. Civil disobedience represents the clearest expression of this moralised identity, but it also invites contestation, challenging traditional notions of scientific detachment.

Yet, activism is not a linear trajectory. Participation can intensify, pause, or shift in response to external pressures, personal capacity, or strategic considerations. This study, therefore, not only underscores the fluidity of scientist identity but also highlights the ways in which it is actively maintained, reinforced, and contested within activist spaces.

Chapter 7: Conclusion

This thesis set out to understand the psychological underpinnings of environmental activism amidst the escalating climate and ecological crisis. It sought to describe the motivations that compel individuals to engage in activism, ranging from high-stakes actions to more routine, low-cost behaviours. Employing a diverse set of methods – surveys, interviews, and ethnographic fieldwork – this thesis across 5 studies and 5 papers, offers a comprehensive view of the psychological drivers of pro-environmental activism. The rise of scientist-activism in particular, has provided a contemporary context for this research, increasing its ecological validity. The multi-part format of the thesis has allowed for an in-depth examination of specific aspects of environmental activism, with each paper standing alone yet collectively forming a cohesive whole.

7. 1 Summary and Integration of Findings

Chapter 2, Paper 1, 'Self and Morality: Expansive Perspectives and Environmental Activism' investigated the role of expansive moral and self-concepts in driving pro-environmental activism. It examined how individuals with broader moral circles and more inclusive self-concepts are inclined to identify as environmental activists. The study found that while these expansive traits correlate with activist identity and self-reported environmental activism, they do not necessarily predict actual pro-environmental action, highlighting the inherent complexity of predicting behaviour. As this research was correlational it could not determine whether expansion of self and moral concepts preceded, or proceeded from, engagement in pro-environmental behaviours. As elaborated in the bridging page between Chapters 2 and 3, it is possible that an individual's self-concept and moral circles expand and deepen through engaging in environmental activism and identifying as an activist rather than the other way around, meriting further research. Though these constructs displayed some promise (i.e., for the self-reported measures), and these other avenues for future research were identified, their failure to predict the behavioural measure was a significant factor in moving away from the expansiveness concept. However, a focus was maintained on how identity and moral psychological processes impact environmental activism throughout the remaining work.

Chapter 3, Paper 2, 'Scientists' Identities Shape Engagement with Environmental Activism' pivoted to scientist-activism in response to the trends identified in fieldwork (See Chapter 1, and Chapter 6) and emerging literature trends which highlighted the significance of scientist-activism in environmental movements. The study sought to understand how the 'scientist identity' influences engagement in environmental activism. It revealed that the content of scientist identity—particularly perceptions of the science-activism relationship—was a stronger explanatory variable for activism engagement than merely identifying as a 'scientist'. Specifically, scientists who viewed environmental stewardship as an intrinsic duty of their profession and maintained that activism did not erode their objectivity and impartiality were notably more active in environmental causes. This paper underscored the significance of inter-identity fit in this applied context, demonstrating that alignment between professional and activist identities could substantially motivate scientists' participation in activism. The open responses from scientists further underscore the importance of identity construction, detailing how different scientist identity constructions can either delegitimise or legitimise action, depending on how values of objectivity, impartiality, and professional duty are invoked. This emphasises the importance of understanding the unique ways in which scientists construct their identities given the role they play in whether and how scientists act.

Noting that the dilemmatic nature of scientists' engagement with environmental issues remained underexplored, Chapter 4, Paper 3, 'Between two worlds: the scientist's dilemma in climate activism' explored how scientists manage the ideological dilemma of engaging in advocacy and activism given that, traditionally, the scientific community promotes impartiality and objectivity while discouraging advocacy. This paper examined the nuanced ways in which environmentally concerned scientists navigate this tension, detailing the linguistic repertoires they employ, and the subject positions they adopt, to manage this dilemma. It was observed that scientists employ two strategies to reconcile their professional identities with their activism: by either redefining what it means to be a scientist or by reframing the work that scientists do. The subject positions adopted broadly serve to legitimise action, such as arguing that activism as a scientist is objective and rational, or that being a scientist conveys a moral duty to advocate for scientific information. This work demonstrated how scientists can manage the inter-identity fit and provide an understanding of how scientists are able to engage in environmental advocacy and activism while preserving their identities as scientists. This extended the work of Paper 2 by providing a deeper understanding of how scientists reconcile their professional identities with activism, offering insights into how identity construction and negotiation can facilitate environmental action while maintaining scientific integrity. Additionally, this chapter explored how while ideological dilemmas may initially shape scientists' decision to engage in activism, sustained commitment and high-cost actions involve additional motivating factors. Moral obligations—whether to family, future generations, or broader societal concerns—play a significant role. Scientists draw strength from their bonds with other activists, finding camaraderie and shared purpose in their connections. These personal and social factors intersect with ideological beliefs, underscoring the multifaceted nature of scientists' motivations for environmental advocacy.

Chapter 5, Paper 4, 'Climate futures: Scientists' discourses on collapse versus transformation,' examined how environmentally concerned scientists construct the future in the context of climate change. Recognising the importance of scientists in shaping both public discourse and policy responses, this study applied a critical discursive psychology analysis to scientists' talk about the future. It found that the way scientists frame the future—whether as predetermined, delayed, or open to transformation—impacts the urgency and scope of their proposed responses. Scientists constructed the future along a spectrum, from 'Fixed Futures,' in which collapse was presented as inevitable, to 'Transformable Futures,' where human agency was seen as central to determining climate outcomes. In between these, a 'Delayed Futures' framing positioned collapse as probable but potentially mitigatable through intervention. This study demonstrated that scientists' temporal framings shape their "argumentative flexibility"—the range of arguments available to them when discussing climate solutions. When the future was framed as fixed, discussions tended towards doomist discourse, where action was often justified more by moral conviction than efficacy. In contrast, the 'Delayed Futures' and 'Transformable Futures' framings allowed for arguments grounded in collective action, policy intervention, and technological innovation. These findings highlight the importance of temporal framings in climate discourse, as the way scientists talk about the future influences what actions are seen as viable, necessary, or achievable. Given that scientists are trusted public figures and are increasingly engaging in activism—through movements like Scientists for Extinction Rebellion and Scientist Rebellion—understanding how they construct and articulate possible futures is essential.

Chapter 6, Paper 5, ‘Scientists as Activists: An Ethnography of the 'Critical Moments' in Scientists' Transition to Activism’, presented an ethnographic study of UK-based scientists involved with Scientists for Extinction Rebellion. The study employed participant-observation and autoethnography to explore the fusion of scientific and activist identities, the dynamics of intergroup and intragroup processes, and the negotiation of personal thresholds for action. The paper contributes to the thesis by situating previous findings on scientists’ engagement with environmental activism (from Papers 2, 3, and 4) within real-world contexts. One finding concerned how Scientists for Extinction Rebellion transformed the lab-coat from a symbol of scientific authority to a tool for protest, enabling scientists to form a collective scientist-activist identity for coordinating action. The adornment of lab coats with Extinction Rebellion’s imagery, such as the hourglass symbol, further contributed to the formation of a hybrid scientist-activist identity. However, this is a complex symbol, as for some, the lab-coat represented a barrier (for many social scientists) or a source of imposter syndrome (those who did not feel themselves to be the ‘right kind’ of scientists). Another significant finding discussed is how inductive group processes, fostering a sense of “family” or “psychological kin” among members, in this context facilitated and encouraged high-cost actions where scientists were arrested for their protests. My personal narrative offers a first-person perspective on these processes, for example by illustrating how strong group bonds and shared experiences can shift individual thresholds, compelling members to take more action. This paper underscores the importance of longitudinal, ecologically valid approaches to understanding identity work in activism, revealing how engagement is shaped by ongoing negotiation of identity.

Integrating these findings, the central theme is one of motivation. What motivates some individuals to act while others do not? As demonstrated in Chapter 2, simply having a more inclusive sense of self or moral circles may not be enough when presented with an opportunity to act. The thesis reveals that while personal values and ethical considerations are significant, they are part of a broader array of factors that drive environmental action. For scientists, professional identity and the interplay with moral obligations, perceptions of the future, and inter and intra group dynamics within activist networks are crucial in shaping their engagement with environmental activism. This complex intersection of multiple factors underscores the need to attend to both the specific nuances of individual contexts where actions occur and the broader patterns that can inform general understandings of activism. Given this complexity, this thesis employed multiple methodological approaches to fully explore the psychological, social, and performative dimensions of activist identity. The following section reflects on the epistemological and pragmatic reasons for adopting this diverse methodological framework.

7.2 Reflections on Methodological and Epistemological Choices

A key challenge in studying identity within environmental activism is its multifaceted nature. It can be understood as an internal measurable psychological state that shapes behaviour, or as something socially constructed through discourse and interaction. This thesis engaged with distinct epistemological and ontological approaches to identity by employing both cognitivist and discursive approaches, reflecting the complexity of how individuals experience, negotiate, and perform activist and other related identities. This section outlines the epistemological and pragmatic considerations that guided these methodological choices.

As discussed on page 10 regarding the epistemological stance of the research, this thesis adopted a critical realist perspective while acknowledging a form of weak social constructionism. This position enabled an approach that did not reduce identity to either an internal psychological construct or a purely discursive phenomenon. Instead, identity was understood as something that could be both measured and analysed quantitatively, while also being negotiated, performed, and contested in social interaction. By integrating these perspectives, this thesis ensured a more comprehensive understanding of how identity functioned within environmental activism.

7.2.1 How Identity Was Examined Across the Thesis: Methodological Diversity

Each empirical paper in this thesis engaged with identity differently, drawing on distinct epistemological traditions to explore different aspects of activist identity. Paper 1 (Self and Morality: Expansive Perspectives and Environmental Activism) conceptualised identity as an individual psychological construct, measured through quantitative psychometric scales. Here, identity was treated as an internalised aspect of the self, with statistical analyses used to explore correlations between identity strength, moral expansiveness, and activism.

Paper 2 (Scientists' Identities Shape Engagement with Environmental Activism) continued this cognitivist and psychological approach, but introduced social identity theory, emphasising group identification and identity content concerning how scientists viewed the relationship between science and activism.

Paper 3 (Between two worlds: the scientist's dilemma in climate activism) adopted a discursive approach, analysing how scientists rhetorically positioned their professional and activist identities within broader ideological debates about the role of science in society. Unlike the earlier papers, which assumed that identity could be measured as an individual or collective trait, this study treated identity as a dynamic process, co-constructed through discourse and shaped by competing ideologies about science, neutrality, and advocacy. Scientists employed different linguistic repertoires to position themselves in ways that either reinforced or contested dominant norms about scientific objectivity and activism. This highlighted identity not only as a socially performed and context-dependent phenomenon but also as a site of ideological struggle, where rhetorical strategies served to legitimise or delegitimise engagement in activism.

Paper 4 (Climate futures: Scientists' discourses on collapse versus transformation) extended this by considering how identity was shaped by future imaginaries, analysing how different identity positions emerged in relation to crisis narratives. Here, identity was not only seen as discursively constructed, but also temporally situated—shaped by broader future oriented narratives about collapse, transformation, and responsibility.

Paper 5 (Beyond Research: Scientists on the Streets) took an ethnographic approach, engaging directly with activist communities. Identity was explored as something embodied and performed, emphasising symbolism (e.g., lab coats) and the social and emotional processes that sustained activist commitment. This approach highlighted how identity was something that was expressed through collective action, embodied performance, and high-risk activism.

7.2.2 Justification for Methodological Diversity

7.2.2.1 Epistemological Justification. At first glance, this methodological diversity might appear inconsistent, moving between cognitivist, discursive, and ethnographic approaches. However, these varied approaches were deliberate, shaped by both theoretical and pragmatic concerns. The diversity of approaches aligned with the critical realist epistemology outlined in the introduction. This stance acknowledged that psychological constructs like identity had a real, measurable existence, but also that identity was co-constructed through social practices, language, and collective action. This thesis took the position that both aspects were important, reflecting the complexity of identity itself and supporting the exploration of identity from multiple, complementary angles.

7.2.2.2 The Pragmatic Concerns of Research Impact. This diversity was shaped by pragmatic concerns related to research impact. The quantitative cognitivist studies were designed to engage with psychology, behavioural science, and interdisciplinary environmental journals, where statistical modelling and quantitative approaches to identity are valued. The discursive and ethnographic studies were tailored to social movement, environmental humanities, and qualitative psychology journals, where narrative, discourse, and context are central.

Another practical factor was producing relevant research for the communities studied, which necessitated diverse approaches. The quantitative studies were designed to provide evidence-based insights into the psychological and social identity factors that influence activism. By measuring variables such as scientist identity strength, activist identity, and perceptions of science-activism compatibility, these studies identified patterns in who engages in activism and why. These findings are useful for scientists and environmental organisations in understanding what encourages or discourages participation in activism, particularly in professional settings where activism may be contested. The qualitative studies, in contrast, were designed to capture the lived experiences and identity negotiations of activists, focussing on how activists construct, perform, and justify their identities in specific contexts. This was particularly relevant for activists navigating tensions between their professional roles and their activist commitments, as well as for movement organisers seeking to understand intragroup dynamics, solidarity, and emotional sustainability in high-cost activism.

Taken together, this thesis demonstrates the value of methodological pluralism in studying scientist activism, allowing for a nuanced understanding of how scientists engage with activism.

7.3 Implications

7.3.1 Theoretical Implications

Building on the reflections in the previous section, the central theoretical contribution of this thesis is the importance of attending to the interplay of multiple identities, the concept of inter-identity fit, and the processes of moral concern within environmental activism. This thesis explored how individuals, particularly scientists, navigate their various identities—professional, personal, and as activists—and how these identities align or conflict with each other and with their moral obligations to the environment. People may hold multiple identities (Klandermans, 2014; Reicher et al., 2010). While environmental personal and social identities are the primary drivers of environmental action (Mackay et al., 2021a; Schmitt et al., 2019; Vesely et al., 2021) this research further demonstrated the significance of inter-identity dynamics in shaping engagement with activism. The presence of professional identity groups within the environmental movement, such as XR Doctors, XR Psychologists, and XR Educators, as well as faith-based groups like XR Muslims or Christian Climate Action, highlights the role of central identities that are key to individuals' self-concept, which then seek expression in activism.

Papers 2 and 3 demonstrate how inter-identity fit is a key factor, particularly where the identities might be perceived as at conflict (Finnerty et al., 2024a, 2024b; Turner-Zwinkels, Postmes, et al., 2015). The thesis demonstrates that scientists engage in complex negotiations of their professional identities to reconcile potentially conflicting aspects with their commitment to environmental action (Finnerty et al., 2024a). This negotiation can lead to the formation of hybrid identities (Levy et al., 2017) that encapsulate both their scientific and activist identities (Paper 5).

Other theoretical contributions of this thesis include examining the utility of expansive self and moral concepts for understanding environmental engagement, extending the moral expansiveness literature (Crimston et al., 2016), and attending to the future. While both self and moral expansiveness were positively associated with the strength of environmental activist identity and self-reported activism, they did not predict actual engagement in a concrete action, such as signing the Climate and Ecology Bill. This finding underscores the complexity of the relationship between personal values and tangible environmental actions, highlighting the necessity of including direct behavioural measures in research to capture a more accurate picture of environmental engagement (van der Linden, 2019). It also points to the potential gap between reported attitudes and behaviours, suggesting that future research should delve deeper into the factors that facilitate the translation of environmental concern into action. Recognising the importance of the future for present action (Power et al., 2023), this thesis detailed how scientists' perspectives on the future shape their engagement with environmental issues. This contribution points to the significance of future imaginaries in informing scientists' present-day decisions and actions. It underscores that scientists' envisioned futures are not passive forecasts but active constructs that influence their commitment to and participation in environmental advocacy.

A further theoretical contribution of this thesis lies in its methodological pluralism, which underscores the importance of studying identity through multiple epistemological lenses. By integrating cognitivist, discursive, and ethnographic approaches, this thesis illustrates how identity is both an internalised psychological construct and a dynamic, socially negotiated process. This has implications for future research, suggesting that rigid adherence to a single epistemological perspective may limit the ability to capture the full complexity of identity within activism.

Collectively, these insights contribute to a more holistic theoretical understanding of environmental activism's drivers. However, as a complex phenomenon there are myriad factors at play. Yet, attending to all the possible factors that may be at play was beyond the scope of this research (see (Vestergren et al., 2024) for a perspective on this). The fieldwork conducted provides a sense check on what is relevant when people are actively engaged in environmental activism. By immersing myself in action contexts, observing a range from lower-risk to higher-risk activities, and monitoring this over time, I gained insights into the priorities of activists in these lived contexts. This approach provided a check against theoretical assumptions, revealing the actual motivators and concerns of individuals deeply involved in the movement. It underscores the importance of ecological validity in research, ensuring that the findings are grounded in the realities of activist engagement and commitment. The theoretical implications of this fieldwork lie in its ability to contextualise and validate the complex interplay of identities, motivations, and actions that drive environmental activism. By attending to the lived experiences of activists, this thesis contributes to a nuanced understanding of the psychological and social processes underpinning environmental activism, offering a framework for future research to explore these dynamics further.

7.3.2 Practical Implications

The practical implications of this research are twofold, encompassing strategies for encouraging environmental action and refining approaches to studying such activism. This thesis suggests that interventions aimed at promoting environmental activism should be tailored to resonate with the central identities of individuals and groups. Understanding inter-identity fit is crucial, as it can inform how environmental groups structure their activities to accommodate the diverse identities of their members. By creating spaces within environmental movements that allow for the expression and performance of these identities—whether professional, faith-based, or otherwise—activists, as well as sympathisers (B. Klandermans & van Stekelenburg, 2014), may feel a stronger connection and commitment to the cause. Additionally, understanding how people envision the future and linking these visions to present actions could serve as a powerful motivator for sustained engagement. Future visions play a pivotal role in shaping present actions, suggesting that activists' forward-looking perspectives should be integrated into campaign narratives to inspire and sustain engagement. The research provides further evidence for the importance of intragroup processes, solidarity, and support in maintaining commitment within environmental movements, particularly when aligned with a broader movement identity. It reinforces the strategic value of affinity group structures (Extinction Rebellion, 2024b) and similar approaches that bolster community bonds and collective action.

In terms of research, this thesis underscores the value of employing a multi-methodological and longitudinal approach to capture the complexity of environmental activism (Vestergren et al., 2024). The combination of surveys, interviews, and fieldwork provides a comprehensive picture, bridging the gap between self-reported attitudes and actual behaviours observed in real-world contexts. Fieldwork, as an ecologically valid method, offers a sense check on theoretical assumptions, revealing the motivators and concerns of activists as they engage in protest and advocacy. Future research should continue to utilise such ecologically valid methods to explore the dynamic interplay of identities, motivations, and actions that drive environmental activism.

7.4 Limitations and Future Directions

Rather than rehashing the limitations discussed in each paper, this discussion focuses on the overarching limitations of the research focus and analysis. While this thesis has provided a comprehensive examination of individual and group-level factors influencing environmental activism, particularly within the scientific community, it has not extensively explored the broader cultural and institutional contexts that shape activism. The psychological approach adopted has yielded significant insights into activists' motivations and actions but may not fully capture the complex interplay between cultural norms, institutional practices, and societal structures. Culture, in the context of this research, can be defined as the collective manifestation of mental and public representations that inform and guide behaviour within a society (Sperber, 1985; Sperber & Hirschfeld, 2007). It includes the norms, values, beliefs, and practices that are communicated and sustained through various forms, such as rituals, laws, and stories. These cultural elements are dynamic, shaped by their modes of expression and the social environments they inhabit. Moreover, culture and history are not just created by people; they are forces that, to a certain extent, create persons by shaping identities and social realities (Bloch, 2005, 2012). This reciprocal relationship between culture and the individual suggests that cultural and historical contexts are integral to the formation of personal and collective identities, an aspect that requires further exploration in the context of environmental activism. Future research must consider how academic cultures influence scientists' engagement with activism and public communication.

Returning to my interviews with scientists, an unexplored theme in this thesis is the discrepancy between the stated values and actual practices within university cultures, as illustrated by this speaker:

> Ecologist and Activist
>
> Universities value public communication of science, or at least they say they do. […] I think universities, what they say doesn't match what they do. So, you look at the, you know, the mission statements of […] probably any university, they will have something in there about contributing to the public good […] through our knowledge and our teaching. And yet […] when I was applying for promotion at University of X […] a couple of times I applied for permanent positions that I didn't get. There were three things, three areas […] that I had to tick. So, it was […] teaching and course development, […] research and fundraising and it was […] admin and how many committees I'm on and how much of my own free time I volunteer to keep the university afloat. […] There was nothing about public communication of science and yet when you hear them talk, it's something they value. When it comes to the actual aspects of your job that count for promotion it wasn't there, so I think there's this mismatch between what they say they value and what they actually value, and I think that's a problem.

This gap between rhetoric and reality points to a broader cultural issue within academia, where the public good is championed in mission statements but is not necessarily prioritised in the metrics for academic success. This mismatch raises questions about the true culture of universities and suggests that future research could benefit from examining how these cultural factors influence scientists' engagement with environmental activism and public communication. Gardner and colleagues emphasise the central role universities and academics can play by moving beyond publications to engagement in stronger forms of advocacy and activism (2021). Yet, others point out that despite thousands of Higher Education Institutions having issued Climate Emergency declarations, academics, in general, operate as if these declarations are immaterial, thereby reproducing a ‘business-as-usual’ cultural hegemony (Thierry et al., 2023). This wider culture may make conversations about the environmental crisis and how to respond more challenging, as illustrated by the following quote:

> Ecologist and Activist
>
> I very rarely talked about it because of emotional things basically. […] I have a reluctance to put pressure on people […] I just hate making people uncomfortable […]. So, for that reason I very, very rarely, if ever, start conversations of the type of ‘Yeah so what are you doing or why aren't you doing more?’ […] And I think from their point of view […] there's a sort of shame element or an embarrassment element, you know. ‘I don't want to talk to you about this because it will just highlight what I'm not doing and make me feel bad about myself’. […] It's just another form of burying your head in the sand.

This quote evokes the emotional barriers that prevent open dialogue about environmental responsibility within academic settings, reinforcing a culture of avoidance. Addressing this requires not only individual action but also structural shifts within Higher Education Institutions.

Addressing these limitations, future research could expand the scope to encompass all academic disciplines, rather than just natural and social scientists, and consider the culture of Higher Education Institutions themselves. This research could involve understanding how individual researchers across disciplines perceive their role in this global challenge, how academic institutions envision their contributions, and the implications of these perceptions for the landscape of higher education. By addressing these areas, future research could assist Higher Education Institutions in redefining their roles during this critical time. The exploration of academic roles in environmental crises would benefit from a multi-methodological approach, combining quantitative surveys to capture a broad range of opinions with qualitative interviews to gather nuanced perspectives from both individual academics and institutional leaders. Additionally, interactive workshops could foster dialogue on challenges and best practices, while case studies of institutions could provide context-specific insights. Recognising the limitation of having primarily sampled WEIRD (Henrich et al., 2010) individuals in this thesis, including academics and institutions from the Global South would ensure a diverse and inclusive understanding of environmental challenges, with collaborations through networks like Climate University[21] making this possible. The outcomes of such research would not only clarify academia's role in addressing the climate crisis but also could identify effective strategies for engagement.

7.5 Conclusion

The climate and ecological crisis is one of the defining challenges of our times. We must be ambitious in meeting this head on if we are to secure a liveable future. By exploring the psychological underpinnings of what motivates and sustains environmental activism, this thesis contributes to the literature on collective action. By examining the interplay of multiple identities, moral obligations, and group dynamics, this thesis provides a nuanced understanding of what drives scientists and the wider public to take up environmental action. The findings underscore the importance of aligning activism with central identities, the need for interventions that resonate with these identities, and the value of considering future visions in shaping present actions. Moreover, the research highlights the significance of intragroup processes and the support structures that sustain commitment within the movement. Beyond its theoretical contributions, this thesis also raises critical questions about the institutional landscape in

[21] Climate University are a global network committed to addressing environmental challenges e.g., University of Dar es Salaam (Tanzania), Tata Institute of Social Sciences (India), and University of the South Pacific (Fiji).

which activism takes place. The gap between stated academic values and institutional incentives remains a major barrier to meaningful engagement. Universities and research institutions must critically reflect on how their policies and cultures either facilitate or suppress environmental action. Gardner et al. (2021) argue that academia has the potential to move beyond publications towards stronger forms of advocacy and activism—realising this potential will require institutional change.

Ultimately, it is my hope that this thesis not only advances academic discourse but also serves as a catalyst for change, offering insights that inform both future research and practical efforts to foster a more engaged and effective response to the environmental challenges we face.

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Appendices

Appendix A: Supplemental Material for "Self and morality: Expansive perspectives and environmental activism" (Paper 1; Chapter 2)

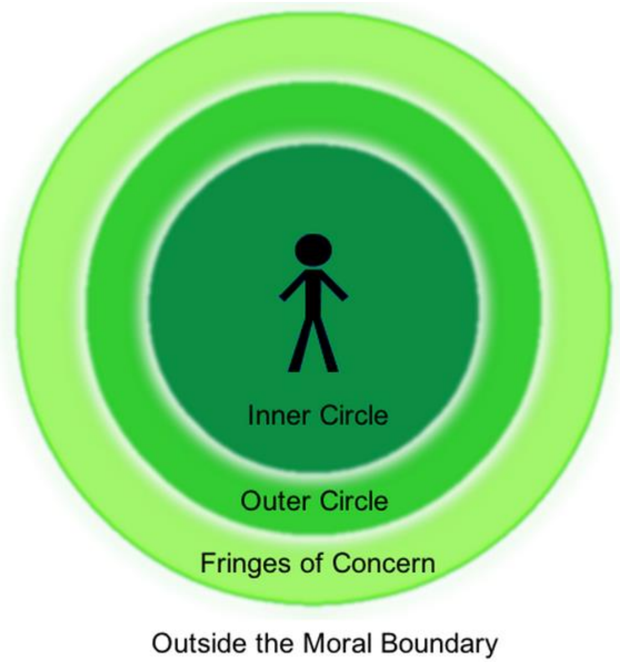
A.1 Measures Study 1

<u>Moral Expansiveness Scale</u> (Crimston et al., 2016)

People sometimes talk about ***'circles of moral concern'***. These circles are simple ways to make sense of the *levels of moral consideration we have for different entities* (e.g., people, animals, and the environment).

Where we place these entities within our moral circles is important and has direct consequences for how we treat them. For example, you might have close family or friends that are central to your moral world, this means you would be willing to make personal sacrifices for them. However, if we do not include an entity within our moral circles, this means we do not believe they are deserving of moral care and consideration, and wouldn't want to make sacrifices for them.

On the following page you are given the opportunity to organise a range of entities and place them within your own moral circles that reflect your individual views and feelings.



Please read the four moral boundary descriptions below before completing the moral circle task.

- ***Inner Circle of Moral Concern:*** These entities deserve the **highest level of moral concern and standing.** You have a moral obligation to ensure their welfare and feel a sense of personal responsibility for their treatment.

- ***Outer Circle of Moral Concern:*** These entities deserve **moderate moral concern and standing.** You are concerned about their moral treatment; however, your sense of obligation and personal responsibility is greatly reduced.

- ***Fringes of Moral Concern:*** These entities deserve **minimal moral concern and standing**, but you are not morally obligated or personally responsible for their moral treatment.

- ***Outside the Moral Boundary:*** These entities deserve **no moral concern or standing.** Feeling concern or personal responsibility for their moral treatment is extreme or nonsensical.

Having carefully read these descriptions, please consider the **level of moral concern you have for each of the entities below and select the appropriate moral circle placement.** Please note, there are no right or wrong answers – we just want to know your opinion.

- Rose bush
- Elected leader of your country (position, not specific individual)
- Close friend
- Mentally challenged individual
- Supporter of opposing political party
- Soldier of your country
- Fish
- Charity worker

- Terrorist
- Refugee
- Foreign citizen
- Chicken
- Partner/spouse
- Somebody with different religious beliefs
- Murderer
- Apple tree
- Co-worker
- Old-growth forest
- Bee
- Chimpanzee
- Homosexual
- Coral reef
- Redwood tree
- National park
- Somebody from your neighborhood
- Citizen of your country
- Cow
- Child molester
- Dolphin
- Family member

Responses are coded as 3 (*inner circle of moral concern*), 2 (*outer circle of moral concern*), 1 (*fringes of moral concern*) or 0 (*outside the moral boundary*). Responses to each entity are added together to create a total moral expansiveness score between 0 (*least morally expansive*) to 90 (*most morally expansive*).

<u>Self-Expansiveness Scale</u> (Finnerty et al., 2022)

Lots of things are important parts of the way we see ourselves. These can include our family, the place where we live, and the kinds of objects that we treasure. Some are more important than others, while others have no impact on how we see ourselves at all. It is useful to think about our sense of self in terms of '**circles of the self**'. These circles can be used to evaluate the importance of these entities for you.

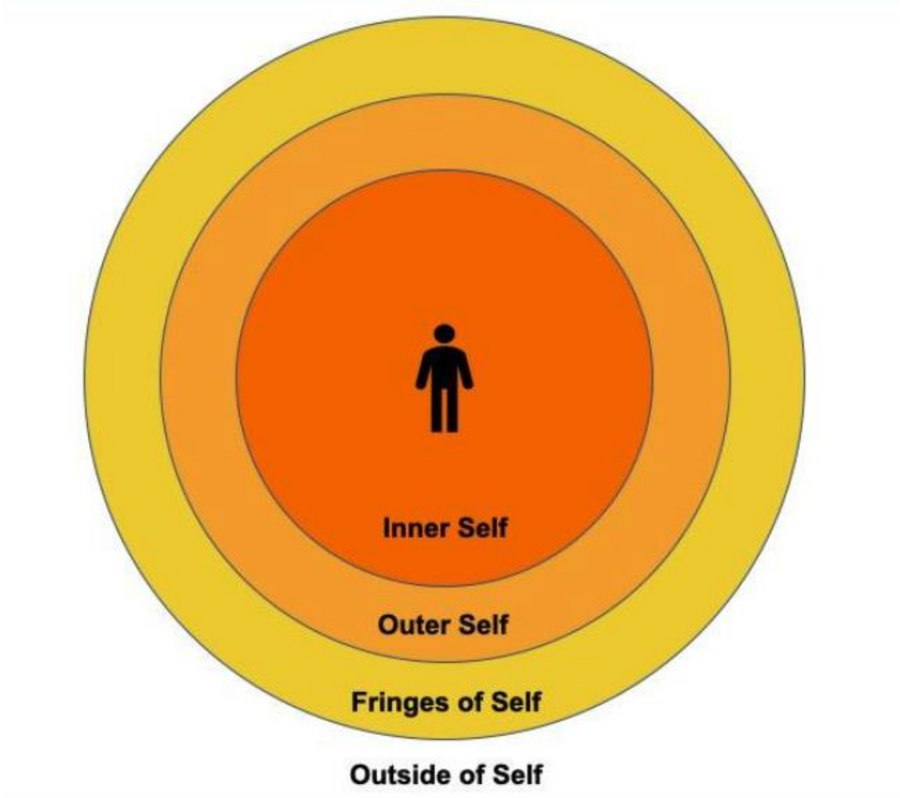
In this task we will ask you to consider a range of different entities and objects. You will rate how important these are using these '**circles of the self**'. The closer you place something to the centre the more important it is for how you see yourself.

<u>Identity and Sense of Self</u>

Below you will find a diagram detailing '**circles of the self**'. These circles are simple ways to make sense of the relative importance each entity has for your sense of self. Some examples of entities may include other people, animals, tools, and places.

Where you place these entities within our 'circles of the self' is important as it highlights which entities are most important to your sense of self. If you do not include an entity within these circles, by placing them '**Outside of Self**', this means that they have **no impact on your sense of self.**

On the following pages you are given an opportunity to organise a range of entities and place them within your own '**circles of the self**'. There are no right or wrong answers, you are only asked to complete the task in a way that reflects your own individual views and feelings.



Please read the four descriptions of circles of the self below carefully before completing the sense of self task.

- ***Inner Self:*** These entities are **central** to your **sense of self**. They from essential parts of your identity. You could not imagine or describe who you are without them.

- ***Outer Self:*** These entities are **important** to your **sense of self**. They form significant parts of who you are.

- ***Fringes of Self:*** These entities play a **minimal role** in your sense of self. They form part of who you are but to a lesser degree than entities in the inner and outer circles.

- ***Outside of Self:*** These entities have **no impact** on who you are.

Having carefully read these descriptions, please consider **the level of importance each of the entities below have for how you see your self.** Drop each one into the appropriate circle box on the right.

Please note, there are no right or wrong answers - we just want to know your opinion.

Apple tree
Artificially intelligent robot
Bee
Citizen of your country (British citizen in studies one and two)
Flag of your country (British flag)
Soldier of your country (British soldier)
Elected leader of your country (position, not specific individual) – British Prime Minister
Cash
Charity/aid worker
Chicken
Child molester
Chimpanzee
Close friend
Coral reef
Cow
Co-worker
Dolphin
Family member
Fish
Foreign citizen
LGBTQ+ individual
Hardback/softback book
Mentally challenged individual
Murderer
National park (Lake District)
Laptop/desktop computer
Oak tree (or tree relevant to country in question e.g., redwood tree)
Old-growth forest
Partner/spouse
Pen and paper
Planet Earth
Refugee
Religious text (could include the Bible, Quran, the Vedas, or other religious text)
Rose bush
Smartphone
Somebody from your neighborhood
Somebody with different religious beliefs
Supporter of opposite political party
Supporter of your political party
Terrorist

Responses are coded as 3 (*inner circle of self*), 2 (*outer circle of self*), 1 (*fringes of self*) or 0 (*outside the self*). Responses to each entity are added together to create a total self expansiveness score between 0 (*least self expansive*) to 90 (*most self expansive* – if using 30 items from MES) or 123 (*most self expansive* – if using additional 11 items).

Transition text between scales

Depending on which they scale they completed first participants would be presented with one of the following statements to transition them from the prior framing.

Transition between scales: SES to MES

Now we will ask you to complete another evaluation task. As before you will be asked to consider a range of people, objects and things that you might encounter in everyday life. We want you to consider their importance to you **in terms of the moral concern you have for them.**

First you will read a description of the task. Then you will be tasked with organising a range of entities according to the **level of moral concern** you have for them. Where you place them in terms of moral concern is **important and has direct consequences for how you treat them.** Moral concern for an entity means that an entity is **deserving of moral care and consideration.**

Transition between scales: MES to SES

Now we will ask you to complete another evaluation task. As before you will be asked to consider a range of people, objects and things that you might encounter in everyday life. We want you to consider their importance for **how you see yourself**, how they affect **your identity.**

First you will read a description of the task. Then you will be tasked with organising a range of entities according to their **importance for how you see yourself.**

Demographic questions

What is your nationality?

What is your current country of residence?

How old are you?

How would you describe your gender?

Male

Female

Prefer to self-describe as ___________ (non-binary, gender-fluid, agender, please specify)

Prefer not to say

Which of the following best describes your sexual orientation?

Heterosexual

Homosexual

Bisexual

Asexual

Other ____________

Prefer not to say

What is the highest level of education you have completed?

What is your ethnic group?

Asian or Asian British

Black, African, Black British or Caribbean

White

Another ethnic group

Prefer not to say

Occupational status

Student

Employed full time

Employed part time

Unemployed

Employed but now working from home due to Covid-19

Unemployed due to Covid-19

Please indicate the number of people living in your household (including yourself) that you consider to be members of your family?

Current relationship status

Single

With partner/spouse

Polyamorous

Other __________

Please indicate your political beliefs from left/liberal to right/conservative on issues of the economy, e.g., social welfare, government spending, tax cuts:

1 – left/liberal, 4 – neutral, 7 – right/conservative

Please indicate your political beliefs from left/liberal to right/conservative on social issues, e.g., immigration, homosexual marriage, abortion:

1 – left/liberal, 4 – neutral, 7 – right/conservative

A.2 Measures Study 2

Moral Expansiveness Scale and Self Expansiveness Scale identical to their form in Study 1.

Activism Orientation Scale

How often do you engage in the following activities related to **environmental activism**?

0 = Never do this; 1 = Do this rarely; 2 = Do this sometimes; 3 = Do this often

1. Display a poster or bumper sticker with an environmental message?
2. Invite a friend to attend a meeting of an environmental organization or event?
3. Purchase a poster, t-shirt, etc. that endorses an environmental point of view?
4. Serve as an officer in an environmental organization?
5. Engage in an environmental activity in which you knew you would be arrested?
6. Attend an informational meeting of an environmental group?
7. Organize an environmental event (e.g., talk, support group, march)?
8. Give a lecture or talk about an environmental issue?
9. Go out of your way to collect information on an environmental issue?
10. Campaign door-to-door for an environmental group?
11. Present facts to contest another person's environmental statement?
12. Donate money to an environmental group?
13. Engage in a physical confrontation at an environmental demonstration?
14. Send a letter or e-mail expressing an environmental opinion to the editor of a periodical or television show?
15. Engage in an environmental activity in which you feared that some of your possessions would be damaged?
16. Engage in an illegal act as part of an environmental protest?
17. Confront jokes, statements, or innuendoes that ridicule or depreciate environmental activism?
18. Boycott a product for environmental reasons?
19. Distribute information representing a particular environmental group's cause?
20. Engage in an environmental activity in which you suspect there would be a confrontation with the police or possible arrest?
21. Send a letter or e-mail about an environmental issue to a public official?
22. Attend a talk on a particular group's environmental concerns?
23. Attend an environmental 's regular planning meeting?

24. Sign a petition for an environmental cause?
25. Encourage a friend to join an environmental organization?
26. Try to change a friend's or acquaintance's mind about an environmental issue?
27. Block access to a building or public area with your body as part of an environmental demonstration?
28. Donate money to an environmental political organization?
29. Try to change a relative's mind about an environmental issue?
30. Wear a t-shirt or button with an environmental message?
31. Keep track of the views of politicians regarding environmental issues important to you?
32. Participate in discussion groups designed to discuss issues or solutions of a particular environmental group?
33. Campaign by phone for an environmental group?
34. Engage in an environmental group activity in which you feared for your personal safety?

We adapted this scale from:

Corning, A. F., & Myers, D. J. (2002). Individual Orientation Toward Engagement in Social Action. *Political Psychology*, *23*(4), 703–729. https://doi.org/10.1111/0162-895X.00304

Identification as an environmental activist

Self-reported identification with environmental activists as a form of politicised environmental identity was measured using 8 items adapted from Cameron (2004). Higher scores indicate stronger identification. Options were scored from 1 (Strongly Disagree) – 7 (Strongly Agree) with a possible range of 8 – 56.

1. I have a lot in common with environmental activists.
2. I feel strong ties to environmental activists.
3. I find it difficult to form a bond with environmental activists (reverse scored).
4. I don't feel a sense of being "connected" with environmental activists (reverse scored).
5. I often think about the idea that I am an environmental activist.
6. Overall, being an environmental activist has very little to do with how I feel about myself (reverse scored).
7. In general, being an environmental activist is an important part of my self-image.
8. The idea that I am an environmental activist rarely enters my mind (reverse scored).

https://www.tandfonline.com/doi/full/10.1080/13576500444000047?casa_token=jnrZT2gaIOEAAAAA%3AZVyvUDsNl1fprTQZA86o8LstJK5zpyInHrVIJztKi6CmijD_5uprowAEwGiqq_2Me8BJoyGCWWP_

Climate and Ecology Bill (formerly the Climate and Ecological Emergency Bill)

We selected the UK based supporters' campaign for the Climate and Ecology Bill Climate and Ecology Bill - Parliamentary Bills - UK Parliament (formerly named the Climate and Ecological Emergency Bill) as a real-world measure of pro-environmental behaviour. The bill had its first reading in the House of Commons on the 21st of June 2021. Study two was conducted in September 2021.Participants were presented with the following text:

Parliament declared a Climate Emergency back in 2019 – but actions haven't matched their words. An emergency requires strong, decisive action to reverse the climate and ecological crisis.

Enter the Climate & Ecological Emergency Bill.

Why do we need the Climate and Ecological Emergency Bill?

Drafted by scientists, legal experts, ecological economists and environmentalists, the CEE Bill is designed specifically to reverse the climate and ecological breakdown we face.

The Bill asks the UK to take responsibility for its fair share of greenhouse gas emissions, to actively restore biodiverse habitats in the UK and to stop damage to the environment through the production, transportation and disposal of the goods we consume.

Tabled by Caroline Lucas of the Green Party, the Bill now has support of over 100 MPs across 8 political parties, from England, Scotland, Wales and Northern Ireland.

Participants were then asked:

Would you like to join the Climate and Ecological Emergency Bill campaign?

We remind you that your responses and personal data are anonymised in this study. The information collected by the CEE campaign is not connected with this study. It is your choice whether you would like to sign this bill or not. Your response does not affect your participation in this study.

Participants who said no proceeded to the next part of the study (identification with environmental activists). Participants who said yes were then presented with the following text:

Link to Climate and Ecological Emergency Bill Campaign Website

Please click link below to take you to the CEE Bill supporter page in a separate tab. Once you have signed up return here and click the button below to advance to the next part of the study:

<u>Join the CEE campaign</u>

Alternatively, if you would no longer like to sign up, please click the button below to take you to the next part of the study.

Signing up to the CEE bill was assessed using two binary measures. First participants were asked if they would like to sign the bill. If they said no it was coded ‘0’ and they were directed to the next part of the study. If they said yes, their response was coded ‘1’. Using Qualtric’s survey flow features participants who said yes were then presented with a link to the supporter’s page where they could sign up. They were instructed to click on the link if they wished to sign up to the campaign. We amended the html and javascript to record whether participants clicked on the link or not. If they clicked on the link it was coded as a ‘1’. If they opted to skip to the next part of the survey, then it was coded as a ‘0’. As we were interested in whether people signed up or not, not whether they were willing or not to do so, only those who clicked on the link were coded as 1 for analysis purposes.

A.3 Supplementary Analysis Study One

Scale validation of 30-item expansiveness scales. The 30-item MES had excellent internal consistency at time one ($\alpha = .91$), with a mean of 45.66 (*SD* = 13.08, range: 12 - 86), and at time two ($\alpha = .92$; *M* = 44.71, *SD* = 12.83, range: 5 - 81). The MES demonstrated moderate test-retest reliability, $r(214) = .63$, $p < .001$. Crimston et al. (2018) found a similar test-retest result, $r = .61$, $p <.001$, for the short form of the MES. Average MES scores were remarkably similar to those reported by Crimson et al. (2016, 2018) and Kirkland et al. (2022). The 30-item SES had excellent internal consistency at time one ($\alpha = .93$), with a mean of 27.17 (*SD* = 14.04, range: 6 - 77), and at time two ($\alpha = .94$; *M* = 27.95, *SD* = 14.37, range: 5 - 70). SES scores demonstrated very good (Fleiss, 2011), borderline excellent (Cicchetti, 1994), test-retest reliability, $r(214) = .75$, $p < .001$.

Relationship with participant demographics. The 30 item MES and SES displayed distinct relationships with demographic variables and political conservatism. A small positive correlation between age and SES score was found at both times: $r_{T1}(214) = .20$, $p < .001$; $r_{T2}(214) = .18$, $p < .001$. At time one, there were no mean difference in self-expansiveness for males (*M* = 26.32, *SD* = 15.27) and females (*M* = 27.50, *SD* = 13.45), $t(128.85) = 0.55$, $p = .58$, 95% CI [- 3.03, 5.39], nor at time two ($M_{Male} = 26.28$, *SD* = 14.50; $M_{Female} = 28.85$, *SD* = 14.10), $t(140.2) = 1.23$, $p = .22$, 95% CI [- 1.55, 6.70]. The SES was unrelated to political orientation at both time points: conservatism (economic), $r_{T1}(214) = -.08$, $p = .23$; conservatism (social), $r_{T1}(214) = .05$, $p = .43$; conservatism (economic), $r_{T2}(214) = -.07$, $p = .33$; conservatism (social), $r_{T2}(214) = .04$, $p = .60$.

The MES was unrelated to age: $r_{T1}(214) = .01$, $p = .89$; $r_{T2}(214) = .004$, $p = .57$. At time one, there were no mean difference in moral expansiveness for males (*M* =

43.72, SD = 13.51) and females (M = 46.61, SD = 13.01), t(139.13) = 1.49, p = .58, 95% CI [-0.94, 6.72], nor at time two (M_{Male} = 42.71, SD = 12.32; M_{Female} = 45.76, SD = 13.15), t(152.31) = 1.66, p = .10, 95% CI [-0.57, 6.66]. The MES was negatively related to political orientation at both time points: conservatism (economic), r_{T1}(214) = - .22, p < .001; conservatism (social), r_{T1}(214) = - .22, p = <.001; conservatism (economic), r_{T2}(214) = - .20, p = .003; conservatism (social), r_{T2}(214) = -.18, p = .009.

Scale validation, and relationships, with all 41 entities included. The 41-item SES had excellent internal consistency at time one (α = 0.94), with a mean of 39.19 (SD = 18.28, range: 6 - 102), and time two (α = 0.95), with a mean of 39.87(SD = 39.87, range: 5 - 96). SES scores demonstrated excellent (Cicchetti, 1994), test-retest reliability, r(214) = .77, p < .001. The 41-item MES had excellent internal consistency at time one (α = 0.92), with a mean of 57.27 (SD =16.29, range: 17 - 106), and time two (α = 0.93), with a mean of 56.31(SD=16.60, range: 5 - 101). The 41 item MES demonstrated moderate test-retest reliability, r(214) = .65, p < .001. The 41 item SES and MES shared meaningful variance at time one, r(214)= .56, p < .001, and time two, r(214) = .60, p < .001).

A small positive correlation between age and SES score was found at both time points: r_{T1}= .14, p = .04; r_{T2} = .15, p = .03. At time one, there were no mean difference in self-expansiveness for males (M = 37.28, SD = 20.00) and females (M = 39.98, SD = 17.42), t(127.62) = 0.97, p = .33, 95% CI [- 2.80, 8.21], nor at time two (M_{Male} = 36.90, SD = 14.50; M_{Female} = 41.46, SD = 18.35), t(136.81) = 1.65, p = .10, 95% CI [- 0.91, 10.03]. The SES was unrelated to political orientation at both time points: conservatism (economic), r_{T1} = -.07 p = .28; conservatism (social), r_{T1} = .08, p = .24; conservatism (economic), r_{T2} = - .06, p = .37; conservatism (social), r_{T2} = .06, p = .34.

The MES was unrelated to age at both times: $r_{T1} = -.01$, $p = .89$; $r_{T2} = -.04$, $p = 0.57$. At time one, there were no mean difference in moral expansiveness for males ($M = 54.11$, $SD = 17.09$) and females ($M = 58.73$, $SD = 15.85$), $t(134.59) = 1.91$, $p = .06$, 95% CI [-0.17, 9.41], nor at time two ($M_{Male} = 52.97$, $SD = 16.44$; $M_{Female} = 57.93$, $SD = 16.51$), $t(144.33) = 2.07$, $p = 0.04$, 95% CI [0.23 9.68]. The MES was negatively related to political orientation at both time points: conservatism (economic), $r_{T1} = -.19$, $p = .006$; conservatism (social), $r_{T1} = -0.16$, $p = .02$; conservatism (economic), $r_{T2} = -.16$, $p = .02$, though not conservatism (social), $r_{T2} = -.11$, $p = .12$.

Principal components analysis on moral expansiveness entities. Our decision to employ a principal components analysis (PCA) was guided by three factors. First, we observed that some entity categories diverged from the original research. Crimston et al. (2016) observed clear differences in the moral position of higher vs. lower sentience animals, whereas we found minimal differences in scoring between these two animal groups. Second, no component or factor analysis was reported by Crimston et al. (2016, 2018) for how the entity categories were decided. The original categories appear to have been chosen *a priori*. Rottman and colleagues (2021), later conducted a factor analysis for the MES, although the items used were quite different from the original formulation. Third, PCA is useful for reducing complex datasets into fewer components (Abdi & Williams, 2010; Shlens, 2014). As we were interested in the relationship between self-relevance and moral concern, and that the MES is a validated instrument, we used the MES entities for our analysis. We chose time one for the analysis, being the first-time participants encountered the items.

We report findings from the ‘psych’ package (Revelle, 2021) and used ‘oblimin’ rotation. Bartlett’s test (chi square 6318.263, p < .001) confirmed the data was sufficient for analysis. Sampling adequacy (MSA) was checked using the Kaiser-Meyer-Olkin criterion test (KMO) confirming that the items were more than sufficient (.90) for analysis. However, the value of the determinant was not greater than 0.00001 which may be due to a) there being too many items and/or b) high correlations between some of the items. Normally, before conducting the analysis any highly correlated items would be removed. However, as we were interested in identifying any unique groupings all items were included.

Four components were identified. A PCA with parallel analysis (Vivek et al., 2017) simulated 100 random datasets, indicating the fourth component should possess an eigen value of 1.67 or above. The fourth component in our analysis had a value of 2.55[ii]. All animals, plants, environmental targets, and *planet Earth* (13 entities) loaded together (α = .95; loadings ranged from .59 to .87). Fourteen of the human entities, which included ingroups, outgroups, revered individuals, and stigmatised individuals loaded together (α = .92; loadings ranged from .58 to .80). Five of the object/technological items (excluding *artificially intelligent robot*) and *British flag* loaded together (α = .83; loadings ranged from .59 to .80). Villain entities loaded together (α = .93; loadings ranged from .86 to .94). *Family member*, *close friend*, *partner*, *artificially intelligent robot,* and *religious text* did not load with the four components. As the original research grouped the first three entities together, and due to their *prima facie* similarity, we grouped them together (α = .36[iii]). The other entities were excluded from subsequent analysis.

A similar PCA analysis for Study 2 data corroborated these entity categories, providing additional support (see analysis_pca.Rmd OSF | Self and Moral Expansiveness, Identity & Environmental Activism). We computed five composite variables based on the self-relevance and moral worth averaged across the items that loaded to each component (see Table 2.1). T-tests revealed distinct differences in ratings of self-expansion vs. moral concern. Correlations between the dimensions (Table 2.1) revealed that nature targets benefited most from identification with the entity (i.e., had the largest correlations), while human targets benefited least.

Principal components analysis on 41 item MES at Time 1 and 2, Study 1

Table S1
Factor loadings (above 0.5) for the Moral Expansiveness Scale items, study one, both times

	Time 1				Time 2			
Entity	**Factor 1: nature**	**Factor 2: humans**	**Factor 3: objects**	**Factor 4: villains**	**Factor 1: nature**	**Factor 2: humans**	**Factor 3: objects**	**Factor 4: villains**
Dolphin	0.87				0.88			
Bee	0.87				0.82			
Fish	0.86				0.89			
Chicken	0.83				0.86			
Cow	0.82				0.85			
Chimpanzee	0.81				0.83			
Oak	0.81				0.82			
Apple tree	0.81				0.82			
Coral reef	0.80				0.72			
Old growth forest	0.78				0.77			
Rose bush	0.72				0.71			
National Park (Lake District)	0.67				0.64			
Planet Earth	0.59				N/A			
Person from a different religious background		0.80				0.79		
British citizen		0.77				0.69		
Aid worker		0.76				0.72		
Neighbour		0.75				0.73		
Person from a similar religious background		0.69				0.63		
Foreign citizen		0.68				0.67		

Person from the same political party	0.68			0.69		
Person from the opposite political party	0.68			0.74		
Co worker	0.65			0.66		
Mentally challenged individual	0.63			0.68		
refugee	0.61			0.75		
British prime minister (position, not specific individual)	0.61			0.59		
Lgbtq+ individual	0.60			0.66		
British soldier	0.58			0.61		
Phone		0.80			0.80	
Computer (desktop or laptop computer)		0.79			0.82	
Cash		0.76			0.79	
Pen and paper		0.71			0.78	
British flag		0.63			0.68	
Book (hardback / softback)		0.59			0.70	
Murderer			0.94			0.84
Child molester			0.91			0.83
Terrorist			0.86			0.81
Artificially intelligent robot		N/A			0.59	

Means, Standard Deviations, and Correlations between the MES and Individual Entity Groups, Study 1, Time 1

Table S2

Means, standard deviations, and correlations with confidence intervals between the MES and Individual Entity Groups, Study 1, Time 1

Overall MES and entity groups	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. MES	45.66	13.08	___	___	___	___	___	___	___	___	___	___
2. Family/Friends	8.71	0.83	.15*	___	___	___	___	___	___	___	___	___
3. In-group	5.46	1.82	.61**	.29**	___	___	___	___	___	___	___	___
4. Stigmatised	5.10	2.13	.73**	0.09	.56**	___	___	___	___	___	___	___
5. Animals (high sentience)	4.69	2.31	.79**	0.02	.24**	.42**	___	___	___	___	___	___
6. Environment	4.53	2.24	.76**	-0.10	.25**	.36**	.71**	___	___	___	___	___
7. Animals (low sentience)	4.47	2.34	.77**	-0.03	.19**	.39**	.90**	.74**	___	___	___	___
8. Revered	4.19	1.92	.71**	.24**	.68**	.57**	.34**	.32**	.25**	___	___	___
9. Out-group	3.88	1.94	.72**	0.13	.62**	.76**	.36**	.32**	.33**	.68**	___	___
10. Plants	3.56	2.48	.72**	-0.02	.24**	.27**	.70**	.79**	.71**	.32**	.25**	___
11. Villains	1.07	1.99	.21**	0.02	0.05	.21**	-0.06	-0.05	-0.05	.23**	.18**	-0.11

Note. MES = Moral Expansiveness Scale. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$.

Means, Standard Deviations, and Correlations between the MES and Individual Entity Groups, Study 1, Time 2

Table S3

Means, standard deviations, and correlations with confidence intervals between the MES and Individual Entity Groups, Study 1, Time 2

Overall MES and entity groups	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. MES	44.71	12.83	___	___	___	___	___	___	___	___	___	___
2. Family/Friends	8.65	0.92	.31**	___	___	___	___	___	___	___	___	___
3. In-group	5.37	1.80	.64**	.36**	___	___	___	___	___	___	___	___
4. Stigmatised	4.81	1.99	.68**	.26**	.58**	___	___	___	___	___	___	___
5. Animals (high sentience)	4.49	2.20	.80**	.19**	.28**	.37**	___	___	___	___	___	___
6. Animals (low sentience)	4.48	2.25	.80**	.14*	.28**	.33**	.90**	___	___	___	___	___
7. Environment	4.44	2.14	.74**	.20**	.23**	.31**	.70**	.72**	___	___	___	___
8. Revered	4.11	1.86	.73**	.25**	.67**	.61**	.36**	.35**	.36**	___	___	___
9. Out-group	3.84	2.08	.71**	0.12	.60**	.71**	.37**	.34**	.30**	.69**	___	___
10. Plants	3.62	2.31	.74**	.16*	.28**	.21**	.76**	.80**	.75**	.35**	.24**	___
11. Villains	0.91	1.74	.18**	-.22**	0.05	0.10	-0.05	-0.02	-0.03	.20**	.23**	-0.04

Note. MES = Moral Expansiveness Scale. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$.

Means, Standard Deviations, and Correlations between the SES and Individual Entity Groups, Study 1, Time 1

Table S4

Means, Standard Deviations, and Correlations Between the SES and Individual Entity Groups, Study 1, Time 1

Overall SES and entity groups	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. SES	27.17	14.04	___	___	___	___	___	___	___	___	___	___
2. Family/Friends	7.87	1.53	.44**	___	___	___	___	___	___	___	___	___
3. In-group	4.16	2.03	.64**	.45**	___	___	___	___	___	___	___	___
4. Environment	2.47	2.34	.80**	.30**	.31**	___	___	___	___	___	___	___
5. Animals (low sentience)	2.33	2.31	.81**	.14*	.35**	.66**	___	___	___	___	___	___
6. Plants	2.32	2.49	.84**	.25**	.37**	.82**	.78**	___	___	___	___	___
7. Stigmatised	2.12	2.16	.73**	.20**	.42**	.46**	.47**	.46**	___	___	___	___
8. Animals (high sentience)	2.00	2.20	.83**	.22**	.33**	.71**	.88**	.78**	.50**	___	___	___
9. Revered	1.98	1.86	.77**	.34**	.63**	.48**	.46**	.50**	.62**	.50**	___	___
10. Out-group	1.62	1.57	.70**	.32**	.50**	.46**	.38**	.41**	.67**	.39**	.65**	___
11. Villains	0.31	1.08	.29**	0.05	.20**	0.06	.19**	0.08	.25**	.14*	.27**	.23**

Note. SES = Self Expansiveness Scale. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$.

Means, Standard Deviations, and Correlations between the SES and Individual Entity Groups, Study 1, Time 2

Table S5

Means, Standard Deviations, and Correlations Between the SES and Individual Entity Groups, Study 1, Time 2

Overall SES and entity groups	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. SES	27.95	14.37	___	___	___	___	___	___	___	___	___	___
2. Family/Friends	8.06	1.35	.45**	___	___	___	___	___	___	___	___	___
3. In-group	4.08	2.01	.58**	.43**	___	___	___	___	___	___	___	___
4. Environment	2.62	2.39	.82**	.25**	.27**	___	___	___	___	___	___	___
5. Animals (low sentience)	2.43	2.44	.85**	.22**	.30**	.79**	___	___	___	___	___	___
6. Plants	2.31	2.52	.85**	.29**	.34**	.87**	.85**	___	___	___	___	___
7. Animals (high sentience)	2.27	2.39	.85**	.24**	.29**	.80**	.92**	.84**	___	___	___	___
8. Revered	2.17	1.9	.79**	.41**	.58**	.49**	.55**	.53**	.54**	___	___	___
9. Stigmatised	2.07	2.01	.65**	.21**	.35**	.36**	.39**	.36**	.39**	.57**	___	___
10. Out-group	1.66	1.77	.72**	.31**	.49**	.41**	.43**	.40**	.43**	.68**	.70**	___
11. Villains	0.28	0.95	.30**	0.12	.21**	0.09	0.12	0.08	0.07	.29**	.33**	.41**

Note. SES = Self Expansiveness Scale. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$.

A.4 Supplementary Analysis Study Two

Skewness in activism engagement scores. Activism scores were positively skewed, a trend likely mirrored in the general population (= 8.52), as this value exceeds the threshold indicative of population skewness ((Cramer, 1997). Theoretically, it is reasonable to observe skewness in activism scores. The inherent costs of activism – such as time commitment, effort, financial investment, and potential personal bodily risk, e.g., protestors blocking doors – would discourage a majority from extensive engagement (Klandermans & Oegema, 1987). Given this, we decided that removing outliers or data transformation could distort meaningful variability. Therefore, to maintain the integrity of our findings while accommodating the skewness, we opted to report results from both a standard parametric multiple regression and a bootstrapped regression to ensure robustness in our analysis.

Demographic relationships with key variables. Males[22] had higher SES scores (M = 29.28, SD = 15.00) than females (M = 26.70, SD = 12.90) but this was not a significant difference, $t(165.67) = -1.53$, p = .13, 95% CI [-6.05, .79]. Females had higher MES scores (M = 48.90, SD = 12.40) than males (M = 45.40, SD = 13.90) but this was not a significant difference, t(170.05) = 2.13, p =.034, 95% CI [0.26, 6.69]. Females (M = 27.7, SD = 8.54) and males (M = 25.8, SD = 7.25) did not differ in their identification as environmental activists, t(219.08) = 2.07, p = .04, 95% CI [0.10, 3.75]. Females had higher activism frequency scores (M = 17.33, SD = 12.40) than males (M = 15.10, SD = 13.90) but this was not a significant difference, t(169.99) = 1.39, p = .17, 95% CI [-.94, 5.46].

[22] 3 participants opted not to report their gender; 3 described themselves as non-binary; 1 described themselves as gender-fluid; 1 described themselves as heterosexual. These were too few for statistical analysis, so a t test was used.

Table S6
Hierarchical logistic regression results using signing up to the CEE bill as the criterion

Predictor	*B (SE)*	*B* 95% CI [LL, UL]	*Z*	*Odds ratio*	*Odds ratio 95% CI [LL, UL]*	Fit	χ2
Intercept	-0.30 (0.49)	[-1.26, 0.68]	-0.61	0.74	[0.28, 1.97]		
Age	0.00 (0.01)	[-0.02, 0.03]	0.31	1	[0.98, 1.03]		
Political conservatism (social issues)	-0.18 (0.15)	[-0.47, 0.11]	-1.21	0.84	[0.63, 1.11]		
Political conservatism (economy)	-0.23 (0.14)	[-0.52, 0.04]	-1.61	0.79	[0.58, 1.04]		
						Pseudo $R^{2\dagger}$ = .045, .046, .071	
							15.52***
Intercept	-1.09 (0.72)	[-2.52, 0.34]	-1.5	0.34	[0.08, 1.40]		
Age	-0.00 (0.01)	[-0.03, 0.03]	-0.04	1	[0.97, 1.03]		
Political conservatism (social issues)	-0.15 (0.15)	[-0.45, 0.13]	-1.05	0.86	[0.64, 1.14]		
Political conservatism (economy)	-0.21 (0.14)	[-0.50, 0.07]	-1.44	0.81	[0.61, 1.07]		
MES	0.02 (0.01)	[-0.01, 0.04]	1.48	1.02	[1.00, 1.04]		
						Pseudo $R^{2\dagger}$ = .051, .053, .081	
							2.21
(Intercept)	-2.67 (0.73)	[-2.54, 0.32]	-1.52	0.33	[0.08, 1.38]		
Age	0.00 (0.01)	[-0.03, 0.03]	0.11	1	[0.97, 1.03]		
Political conservatism (social issues)	-0.15 (0.15)	[-0.44, 0.14]	-0.10	0.86	[0.64, 1.15]		

Political conservatism (economy)	-0.21 (0.14)	[-0.50, 0.07]	-1.43	0.81	[0.61, 1.07]
MES	0.02 (0.01)	[-0.00, 0.05]	1.77	1.02	[1.00, 1.05]
SES	-0.01 (0.01)	[-0.03, 0.01]	-1.01	0.99	[0.97, 1.01]

Pseudo $R^{2\dagger}$ = .054, .056, .086

1.03

Note. A significant *b*-weight indicates the beta-weight and semi-partial correlation are also significant. *b* represents unstandardised regression weights. se represents the standard error. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. *†*A range of pseudo r-squared values were calculate using 3 methods. All are reported in the following order (Hosmer and Lemeshow, Cox and Snell, Nagelkerke).
* *indicates p < .028.* ** *indicates p < .01.* *** *indicates p < .001.* Only values of p < .009 are considered significant.

Appendix B: Supplemental Material for "How Scientist Identity Shapes Engagement with Environmental Activism: Findings from a Multinational Survey" (Paper 2; Chapter 3)

B.1 Measures

<u>Identification with scientists</u>

Self-reported identification with scientists was measured using 8 items adapted from Cameron (2004). Higher scores indicate stronger identification. Options were scored from 1 (Strongly Disagree) – 7 (Strongly Agree) with a possible range of 8 – 56.

1. I have a lot in common with scientists.
2. I feel strong ties to scientists.
3. I find it difficult to form a bond with scientists (reverse scored).
4. I don't feel a sense of being "connected" with scientists (reverse scored).
5. I often think about the idea that I am a scientist.
6. Overall, being a scientist has very little to do with how I feel about myself (reverse scored).
7. In general, being a scientist is an important part of my self-image.
8. The idea that I am a scientist rarely enters my mind (reverse scored).

<u>Identification with environmental activists</u>

Self-reported identification with environmental activists as a form of politicised environmental identity was measured using 8 items adapted from Cameron (2004). Higher scores indicate stronger identification. Options were scored from 1 (Strongly Disagree) – 7 (Strongly Agree) with a possible range of 8 – 56.

1. I have a lot in common with environmental activists.
2. I feel strong ties to environmental activists.
3. I find it difficult to form a bond with environmental activists (reverse scored).
4. I don't feel a sense of being "connected" with environmental activists (reverse scored).
5. I often think about the idea that I am an environmental activist.
6. Overall, being an environmental activist has very little to do with how I feel about myself (reverse scored).
7. In general, being an environmental activist is an important part of my self-image.

8. The idea that I am an environmental activist rarely enters my mind (reverse scored).

We adapted these scales from:

Cameron, J. E. (2004). A Three-Factor Model of Social Identity. *Self and Identity*, *3*(3), 239–262. https://doi.org/10.1080/13576500444000047

Compatibility of Science and Activism

Items have been created by the research team to assess how scientists view the relative compatibility of science and activism. Higher scores indicate a belief that science and activism are compatible.

Format

We would now like to ask you some questions about the compatibility of science and activism. Please consider how true for you each statement below is on a 1 (strongly disagree) - 5 (strongly agree) scale.

1. If I engaged in environmental activism, this would compromise my ability to be objective (reverse scored).
2. It is the responsibility of a scientist to remain completely impartial, and engagement in environmental activism is a great risk to this impartiality (reverse scored).
3. Being a scientist requires taking a stand for the environment.
4. You can be both a scientist and an environmental activist.
5. If I engaged in environmental activism, others would see me as "biased".
6. Engaging in environmental activism does not jeopardise my reputation as a scientist (reverse scored.

Proximity of climate change

We included two questions assessing belief of proximity of climate change. Both are scored on a 1 (strongly disagree) - 5 (strongly agree) Likert scale.

Format

Please consider how true for you each statement below is on a 1 (strongly disagree) - 5 (strongly agree) scale.

1. Do you believe you will be negatively affected by climate change in your lifetime?
2. Do you believe those close to you, such as your friends and family, will be negatively affected by climate change?

Additional Engagement Factors

We included a range of other potential engagement factors. These items were created primarily from conversations with environmental activists collected during ethnographic fieldwork by the primary researcher (Finnerty et al., Manuscript in preparation), and literature (Gardner et al., 2021).

Format

Have you experienced any of these barriers to participating in any form of environmental activism? Please indicate below on a scale of 1 (no impact) to 5 (very significant impact) how much each barrier has affected your participation in environmental activism.

1. Work commitments.
2. Financial limitations.
3. Transport access
4. Unsure about effectiveness of activism.
5. Family commitments.
6. Concerns about visa/residency.
7. Fears/worries about what other people might think of you.
8. Lack of interest in activism.
9. Unsure about what actions you can take.
10. Lack of energy.
11. Concern about Covid-19.
12. Don't know any family, friends, or colleagues engaged in climate action.

Activism-engagement

How often do you engage in the following activities related to **environmental activism**?

0 = Never do this; 1 = Do this rarely; 2 = Do this sometimes; 3 = Do this often

Conventional/lower risk activist behaviours

1. Try to change another person's mind about an environmental issue?
2. Present facts to contest another person's environmental statement?
3. Boycott a product for environmental reasons?
4. Sign a petition for an environmental cause?
5. Go out of your way to collect information on an environmental issue?
6. Confront jokes, statements, or innuendoes that ridicule or deprecate environmental activism?
7. Donate money to an environmental group or political organization?
8. Join an environmental demonstration/protest?
9. Distribute information representing a particular environmental group's cause?
10. Attend an environmental group's informational or planning meeting?
11. Encourage a friend to join an environmental group/organization?
12. Purchase a poster, t-shirt, etc. that endorses an environmental point of view?
13. Send a letter or e-mail about an environmental issue to a public official or the editor of a periodical or television show?
14. Wear a piece of clothing e.g., a t-shirt, or button with an environmental message?
15.

Higher risk/more public activist behaviours

1. Engage in an environmental activity in which you believed you would be possibly arrested?
2. Block access to a building or public area with your body as part of an environmental demonstration?
3. Engage in an environmental group activity in which you feared for your personal safety?

4. Campaign door-to-door for an environmental group?
5. Engage in an environmental activity in which you suspect there would be a confrontation with the police or possible arrest?
6. Organize an environmental event (e.g., talk, support group, march)?

We adapted[23] this scale from:

Corning, A. F., & Myers, D. J. (2002). Individual Orientation Toward Engagement in Social Action. *Political Psychology*, *23*(4), 703–729. https://doi.org/10.1111/0162-895X.003047 O

Activist group membership

Participants were asked whether they were part of any activist groups. If they said yes, they were presented with examples of groups and asked to choose any that they are part of. They were also asked if they have participated in any actions with any of the groups.

[23] A factor analysis was conducted on activism data from a prior study to reduce the number of items from 34 to 20 to reduce survey completion time while still preserving the validity of the measure (see "misc_study_2_aos_data" folder for data and analysis). Klar and Kasser (2009) found that activist behaviours could be grouped together in two categories: conventional activism and high-risk activism.

Solutions to climate change

To assess whether participants endorse technological solutions for climate change rather than human behaviour change or political systems change we created 4 statements which participants can indicate agreement for.

Format

We would now like to ask you some questions about solutions to climate change.

Please consider how true for you each statement below is on a 1 (strongly disagree) - 5 (strongly agree) scale.

1. To what extent do you agree with the following statement: Inventing new technologies is the only way to successfully tackle climate change.
2. To what extent do you agree with the following statement: Changing political systems is the only way to successfully tackle climate change.
3. To what extent do you agree with the following statement: Changing human behaviour is the only way to successfully tackle climate change.
4. To what extent do you agree with the following statement: New technologies on their own will not solve climate change.

Demographic questions

- Please choose your academic field below. If you work in two or more fields please select all that apply.
    - Anthropology
    - Biology
    - Chemistry
    - Computer Science
    - Earth Science
    - Economics
    - Engineering and Technology
    - Geography
    - Linguistics

    - Logic
    - Mathematics
    - Medical and Health Sciences
    - Physics
    - Psychology
    - Sociology
    - Other (open text response)
- Please write your specific discipline below (open text response)
- What is the highest level of education you have completed?
- How do you describe yourself?
    - Male
    - Female
    - Prefer to self-describe as ___________ (non-binary, gender-fluid, agender, please specify)
    - Prefer not to say
- How old are you?
- What ethnic or racial background do you primarily identify with? (Open text response)
- In which country do you currently reside?
- Which country are you originally from?
- Please indicate your political beliefs from left/liberal to right/conservative on issues of the economy, e.g., social welfare, government spending, tax cuts:
    - 1 – left/liberal, 4 – neutral, 7 – right/conservative
- Please indicate your political beliefs from left/liberal to right/conservative on social issues, e.g., immigration, homosexual marriage, abortion:
    - 1 – left/liberal, 4 – neutral, 7 – right/conservative

B.2 Supplementary Analyses

Note. Thematic analysis of the open responses, along with the tables of themes, are not available here due to space constraints. However, they can be found on the OSF repository for the project at the following link: https://osf.io/wvb7m/?view_only=5e4ed30bfed749448e2c41af3b3a66ea

Correlation tables

Activism-engagement correlations with key predictors and control variables

Means, standard deviation and Pearson correlations for activism frequency and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Activism frequency	1.45	0.56	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	0.19***	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	0.23***	0.77***	___	___	___	___	___
4. Age	40.06	11.73	0.24***	-0.13*	0.07	___	___	___	___
5. Scientist-Activist Compatibilism	4.2	0.7	0.42***	0.24***	0.28***	-0.07	___	___	___
6. Lack of interest in activism	1.86	1.08	-0.38***	-0.07	-0.09***	0.06	-0.37	___	___
7. Scientist Identity	5.26	1	0.08	0.04	0	0.08	0.02	-0.06	___
8. Activist Identity	4.73	1.27	0.7***	0.16***	0.24***	0.2***	0.46***	-0.39***	0.15**

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates *p* < .03. ** indicates *p* < .01. *** indicates p < .001

Means, standard deviation and Spearman correlations for activism frequency and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Activism frequency	1.45	0.56	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	0.18***	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	0.24***	0.77***	___	___	___	___	___
4. Age	40.06	11.73	0.25***	-0.09*	0.09	___	___	___	___
5. Scientist-Activist Compatibilism	4.2	0.70	0.4***	0.24***	0.29***	-0.03	___	___	___

6. Lack of interest in activism	1.86	1.08	-0.41***	-0.07	-0.1***	0.01	-0.29	___	___
7. Scientist Identity	5.26	1	0.09	0.06	0.04	0.11	0.06	-0.07	___
8. Activist Identity	4.73	1.27	0.69***	0.15***	0.26***	0.23***	0.43***	-0.35***	0.16**

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

Activism-engagement correlations with additional factors affecting engagement items

Means, standard deviation and Pearson correlations for activism frequency and barrier variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Activism frequency	1.45	0.56	___	___	___	___	___	___	___	___	___	___	___	___
2. Work commitments	3.23	1.32	0.12	___	___	___	___	___	___	___	___	___	___	___
3. Financial commitments	2.20	1.24	0.08	0.24***	___	___	___	___	___	___	___	___	___	___
4. Transport access	1.98	1.09	0.10	0.2***	0.48***	___	___	___	___	___	___	___	___	___
5. Unsure about effectiveness of action	2.67	1.20	-0.2***	-0.03	-0.03	-0.05	___	___	___	___	___	___	___	___
6. Family commitments	2.53	1.41	0.17**	0.36***	0.15**	0.12	-0.01	___	___	___	___	___	___	___
7. Visa residency concerns	1.64	1.28	0.05	0.12	0.18***	0.21***	-0.05	0.06	___	___	___	___	___	___
8. Worried about others might think about you	1.96	1.04	-0.06	0.15**	0.03	0.01	0.18***	0.12	0.02	___	___	___	___	___
9. Lack of interest	1.86	1.08	-0.38***	-0.13*	-0.08	-0.08	0.41***	-0.07	0	0.21***	___	___	___	___
10. Unsure about which actions to take	2.60	1.20	-0.15**	0.16**	0.24***	0.24***	0.3***	0.07	0.1	0.23***	0.19***	___	___	___
11. Lack of energy	2.88	1.23	0.04	0.3***	0.23***	0.23***	0.12	0.07	0.01	0.11	0.01	0.19***	___	___
12. Covid-19	2.48	1.30	0.16**	0.27***	0.29***	0.31***	-0.06	0.16**	0.11	0.08	-0.11	0.14*	0.23***	___

13. Don't know any friends or family involved	2.05	1.19	-0.15**	-0.02	0.22***	0.19***	0.16**	0.02	0.02	0.16***	0.18***	0.36***	0.23***	0

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

‘Inventing new technologies is the only way to successfully tackle climate change’ correlations with key predictor and control variables

Means, standard deviation and Pearson correlations for new technologies as sole solution to climate change and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Inventing new technologies is the sole solution to climate change	2.04	1.06	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	-0.1	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	-0.09	0.77***	___	___	___	___	___
4. Age	40.06	11.73	0.02	-0.13*	0.07	___	___	___	___
5. Scientist-activist compatibility	4.2	0.70	-0.33***	0.24***	0.28***	-0.07	___	___	___
6. Scientist identity	5.26	1	0.09	0.04	0	0.08	0.02	___	___
7. Activist identity	4.73	1.27	-0.22***	0.16***	0.24***	0.2***	0.46***	0.15**	___

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

Means, standard deviation and Spearman correlations for new technologies as sole solution to climate change and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Inventing new technologies is the sole solution to climate change	2.04	1.06	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	-0.13*	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	-0.11	0.77***	___	___	___	___	___
4. Age	40.06	11.73	0.03	-0.08	0.09	___	___	___	___
5. Scientist-activist compatibility	4.2	0.70	-0.30***	0.24***	0.29***	-0.03	___	___	___
6. Scientist identity	5.26	1	0.08	0.06	0.04	0.11	0.06	___	___
7. Activist identity	4.73	1.27	-0.17**	0.15**	0.26***	0.23***	0.43***	0.16*	___

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

‘Changing political systems is the only way to successfully tackle climate change’ correlations with key predictor and control variables

Means, standard deviation and Pearson correlations for political system change as sole solution to climate change and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Political system change is the sole solution to climate change	3.84	1.14	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	0.07	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	0.03	0.77***	___	___	___	___	___
4. Age	40.06	11.73	-0.1	-0.13*	0.07	___	___	___	___
5. Scientist-activist compatibility	4.2	0.70	0.17***	0.24***	0.28***	-0.07	___	___	___
6. Scientist identity	5.26	1	-0.09	0.04	0	0.08	0.02	___	___
7. Activist identity	4.73	1.27	0.15**	0.16**	0.24***	0.2***	0.46***	0.15**	___

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

Means, standard deviation and Spearman correlations for political system change as sole solution to climate change and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Political system change is the sole solution to climate change	3.84	1.14	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	0.04	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	0.04	0.77***	___	___	___	___	___
4. Age	40.06	11.73	-0.1	-0.08	0.09	___	___	___	___
5. Scientist-activist compatibility	4.2	0.70	0.2***	0.24***	0.29***	-0.03	___	___	___
6. Scientist identity	5.26	1	-0.07	0.06	0.04	0.11	0.06	___	___
7. Activist identity	4.73	1.27	0.14**	0.15**	0.26***	0.23***	0.43***	0.16*	___

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

'Changing human behaviour is the only way to successfully tackle climate change' correlations with key predictor and control variables

Means, standard deviation and Pearson correlations for human behaviour change as sole solution to climate change and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Human behaviour change is the sole solution to climate change	3.67	1.16	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	0	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	-0.02	0.77***	___	___	___	___	___
4. Age	40.06	11.73	0.02	-0.13*	0.07	___	___	___	___
5. Scientist-activist compatibility	4.2	0.70	0.1	0.24***	0.28***	-0.07	___	___	___
6. Scientist identity	5.26	1	-0.05	0.04	0	0.08	0.02	___	___
7. Activist identity	4.73	1.27	0.05	0.16**	0.24***	0.2***	0.46***	0.15**	___

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates $p < .03$. ** indicates $p < .01$. *** indicates p < .001

Means, standard deviation and Spearman correlations for human behaviour change as sole solution to climate change and core variables

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Human behaviour change is the sole solution to climate change	3.67	1.16	___	___	___	___	___	___	___
2. Impact on self	4.66	0.54	0.05	___	___	___	___	___	___
3. Impact on close others	4.73	0.51	0.02	0.77***	___	___	___	___	___
4. Age	40.06	11.73	0.03	-0.08	0.09	___	___	___	___
5. Scientist-activist compatibility	4.2	0.70	0.05	0.24***	0.29***	-0.03	___	___	___
6. Scientist identity	5.26	1	-0.05	0.06	0.04	0.11	0.06	___	___
7. Activist identity	4.73	1.27	0.04	0.15**	0.26***	0.23***	0.43***	0.16*	___

Note. M and *SD* are used to represent mean and standard deviation, respectively. * indicates p < .03. ** indicates $p < .01$. *** indicates p < .001

Principal components analysis

Compatibility beliefs about science and activism

Bartlett's test (chi square 534.37, $p < .001$), sampling adequacy (MSA) tests (Kaiser-Meyer-Olkin criterion test .77), and the value of the determinant (> .00001) confirmed the data were sufficient for analysis. We ran a PCA with parallel analysis (Vivek et al., 2017) which simulated 100 random datasets. It found that the second component should have an eigen value of 1.10 or above. The second component in our analysis had an eigen value of 1.08 which is acceptable. The objectivity and impartiality statements were then reverse scored as they express contrasting views to the duty and compatibility statements. The four belief statements corresponding to objectivity, impartiality, duty, and compatibility loaded together ($\alpha = .76$; loadings ranged from .70 to .84) and correlated with activism-engagement $r(327) = .42$, $p < .001$. The two reputation statements "If I engaged in environmental activism, others would see me as "biased"", "Engaging in environmental activism does not jeopardise my reputation as a scientist" (reverse-scored), had acceptable reliability ($\alpha = .66$; loadings ranged from .79 to .85). Higher scores indicate that activism does affect a scientist's reputation and credibility ($M = 2.79$, $SD = 0.92$), but did not correlate with activism engagement $r(327) = -.09$, $p = .09$.

Factor loadings (above 0.4) for the Scientist-Activist Compatibilism Items

Statement	**Factor 1: scientific values**	**Factor 2: reputation**
It is the responsibility of a scientist to remain completely impartial, and engagement in environmental activism is a great risk to this impartiality. (reverse-scored)	0.84	
If I engaged in environmental activism, this would compromise my ability to be objective (reverse-scored)	0.75	
Being a scientist requires taking a stand for the environment.	0.73	
You can be both a scientist and an environmental activist.	0.70	
If I engaged in environmental activism, others would see me as "biased" (reverse-scored)		0.85
Engaging in environmental activism does not jeopardise my reputation as a scientist		0.79

Additional Factors Affecting Engagement

The additional factors affecting engagement did not fit together into a single scale or subscales. Sampling adequacy (MSA) was mediocre (Kaiser-Meyer-Olkin criterion test .77), and the value of the determinant (> .00001) confirmed the data were sufficient for analysis albeit with some caution.

Factor loadings (above 0.4) for additional factors affecting engagement

Item	Factor 1	Factor 2	Factor 3
Transport access	0.79		
Financial commitments	0.75		
Don't know any family, friends, or colleagues engaged in climate action	0.48	0.46	
Visa/residency concerns	0.41		
Lack of energy			
Unsure about effectiveness of activism		0.74	
Lack of interest in activism		0.71	
Unsure about what actions to take	0.42	0.56	
Fears/worries about what others might think of you		0.53	0.41
Work commitments			0.79
Family commitments			0.76

However, internal consistency of subscales were not adequate for use for 1 ($\alpha = .56$), 2($\alpha = .61$), or 3 ($\alpha = .56$). Due to this the items were analysed individually rather than together.

Support for solutions cumulative link regressions

Comparison of cumulative link models with support for 'inventing new technologies is the sole way to successfully solve climate change' as the criterion

Predictor	*b*	*b* 95% CI [LL, UL]	*Std. Error*	*z*	*Odds ratio*	*Odds ratio 95% CI [LL, UL]*	*Log Likelihood*	χ2	AIC	R 2
Impact on close others	0.22	[-0.2, 0.44]	0.317	0.70	1.25	[0.67, 2.35]				
Impact on self	-0.28	[-0.47, 0.17]	0.298	-0.92	0.76	[0.42, 1.36]				
Age	0	[-0.23, 0.18]	0.009	-0.24	1	[0.98, 1.02]				
Scientist-activist compatibility	-0.22***	[-0.85, -0.42]	0.039	-5.78	0.80	[0.74, 0.86]				
							-418.80	38.51***	853.60	0.04
Impact on close others	0.24	[-0.38, 0.88]	0.32	0.75	1.27	[0.68, 2.41]				
Impact on self	-0.27	[-0.86, 0.32]	0.298	-0.90	0.76	[0.42, 1.37]				
Age	0	[-0.02, 0.02]	0.009	-0.01	1	[0.98, 1.02]				
Scientist-activist compatibility	-0.21***	[-0.29, -0.12]	0.043	-4.81	0.81	[0.75, 0.88]				
Activist identity	-0.01	[-0.03, 0.01]	0.012	-0.87	0.99	0.97, 1.01]				
							-418.42	39.27***	854.84	0.04
Scientist-activist compatibility	-0.23***	[-0.3, -0.15]	0.037	-6.06	0.80	[0.74, 0.86]				
							-419.23	36.76***	848.46	0.04

LL is the log-likelihood. AIC and BIC are the Akaike Information Criterion and Bayesian Information Criterion, respectively, which weigh model fit against model complexity, in related though somewhat different ways. The χ 2 values pertain to the likelihood ratio test comparing the given model with the null model; all three are significant at α = .0001. The R 2 values reported are McFadden's pseudo- R 2 values, which for any model M are defined as 1 minus (log-likelihood of M/log-likelihood of null model)LL and UL indicate the lower and upper limits of a confidence interval, respectively.
* indicates p < .03. ** indicates p < .01. *** indicates p < .001.

Comparison of cumulative link models with support for 'Changing political systems is the only way to successfully tackle climate change' as the criterion

Predictor	*b*	*b* 95% CI [LL, UL]	*Std. Error*	*z*	*Odds ratio*	*Odds ratio 95% CI [LL, UL]*	*Log Likelihood*	χ2	AIC	R2
Impact on close others	-0.23	[-0.89, 0.43]	0.317	-0.685	0.80	[0.41, 1.53]				
Impact on self	0.19	[-0.44, 0.8]	0.298	0.59	1.20	[0.65, 2.22]				
Age	-0.01	[-0.03, 0.01]	0.009	-1.238	0.99	[0.97, 1.01]				
Scientist-activist compatibility	0.13***	[0.05, 0.21]	0.039	3.202	1.14	[1.05, 1.23]				
							-448.31	13.88**	912.61	0.02
Impact on close others	-0.27	[-0.94, 0.39]	0.336	-0.806	0.76	[0.39, 1.48]				
Impact on self	0.18	[-0.44, 0.8]	0.316	0.574	1.20	[0.64, 2.22]				
Age	-0.02	[-0.03, 0]	0.009	-1.628	0.98	[0.97, 1.00]				
Scientist-activist compatibility	0.09***	[0.01, 0.18]	0.044	2.118	1.10	[0.99, 1.04]				
Activist identity	0.02	[0, 0.04]	0.012	1.813	1.02	0.97, 1.01]				
							-446.66	17.18**	911.32	0.02
Scientist-activist compatibility	0.13***	[0.05, 0.2]	0.038	3.29	1.13	[1.05, 1.22]				
							-449.69	11.12***	909.37	0.01

LL is the log-likelihood. AIC and BIC are the Akaike Information Criterion and Bayesian Information Criterion, respectively, which weigh model fit against model complexity, in related though somewhat different ways. The χ 2 values pertain to the likelihood ratio test comparing the given model with the null model; all three are significant at α = .0001. The R 2 values reported are McFadden's pseudo- R 2 values, which for any model M are defined as 1 minus (log-likelihood of M/log-likelihood of null model)LL and UL indicate the lower and upper limits of a confidence interval, respectively.
* indicates p < .03. ** indicates p < .01. *** indicates p < .001.

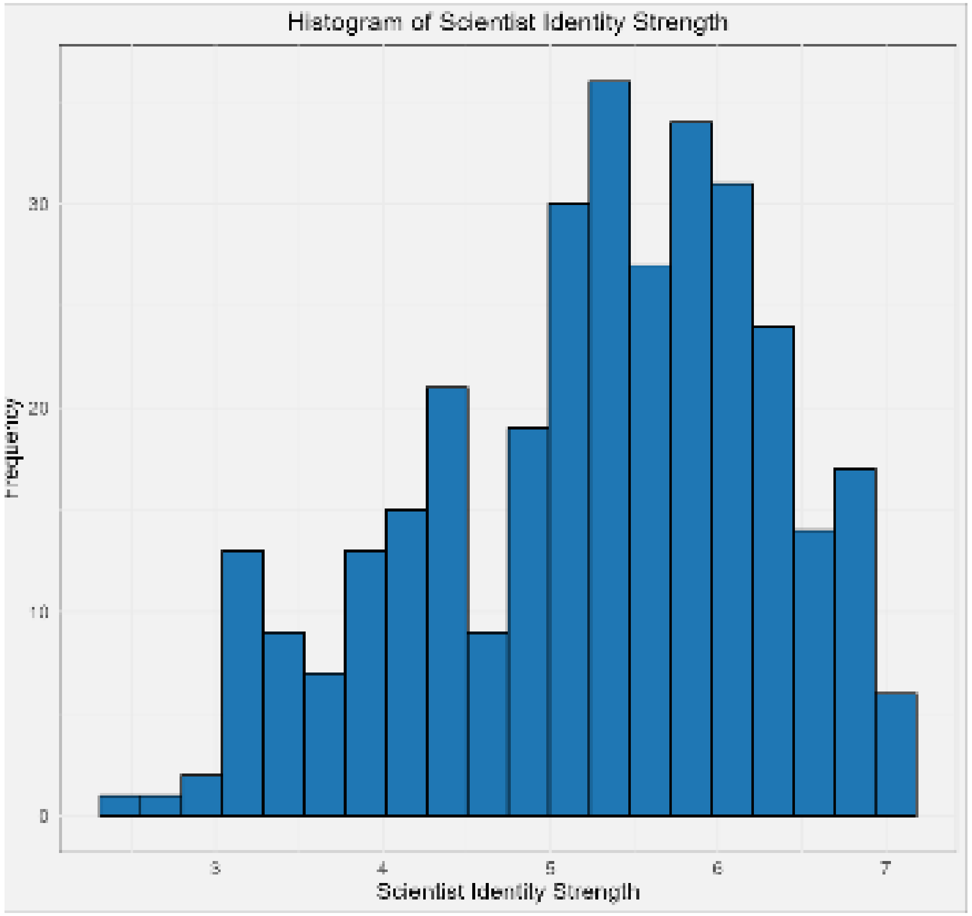
Comparison of cumulative link models with support for 'Changing human behaviour is the only way to successfully tackle climate change' as the criterion

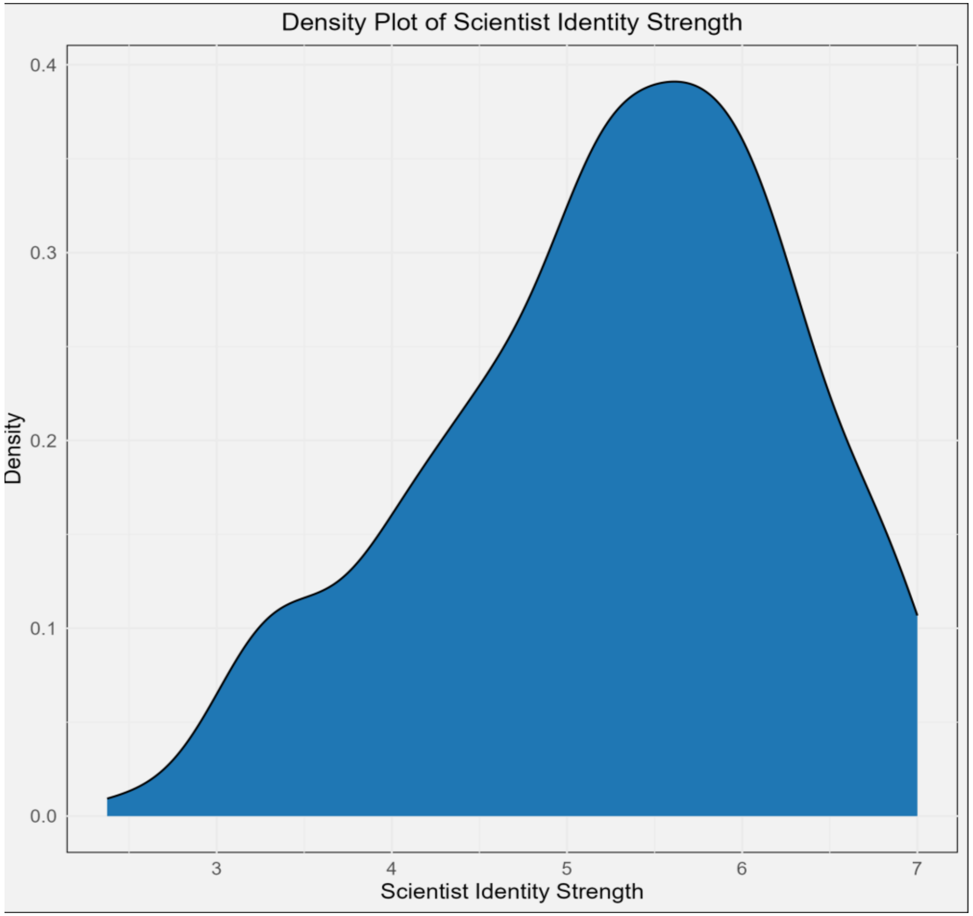
Predictor	*b*	*b* 95% CI [LL, UL]	*Std. Error*	*z*	*Odds ratio*	*Odds ratio 95% CI [LL, UL]*	*Log Likelihood*	χ2	AIC	R 2
Impact on close others	-0.34	[-0.99, 0.31]	0.329	-1.045	0.71	[0.37, 1.36]				
Impact on self	0.29	[-0.32, 0.9]	0.31	0.949	1.34	[0.73, 2.47]				
Age	0.01	[-0.01, 0.03]	0.009	1.013	1.01	[0.99, 1.03]				
Scientist-activist compatibility	0.07	[0, 0.14]	0.037	1.833	1.07	[1, 1.15]				
							-465.96	4.56	947.92	0.00
Impact on close others	-0.34	[-0.99, 0.31]	0.336	-1.034	0.71	[0.37, 1.36]				
Impact on self	0.3	[-0.31, 0.91]	0.316	0.954	1.34	[0.73, 2.47]				
Age	0.01	[-0.01, 0.03]	0.009	1.025	1.01	[0.99, 1.03]				
Scientist-activist compatibility	0.07	[-0.01, 0.15]	0.044	1.697	1.07	[0.99, 1.16]				
Activist identity	0	[-0.02, 0.02]	0.012	-0.173	1	[0.98, 1.02]				
							-465.94	4.59	949.89	0.00
Scientist-activist compatibility	0.06	[-0.01, 0.13]	0.035	1.708	1.06	[0.99, 1.14]				
							-466.79	2.90	943.58	0.00

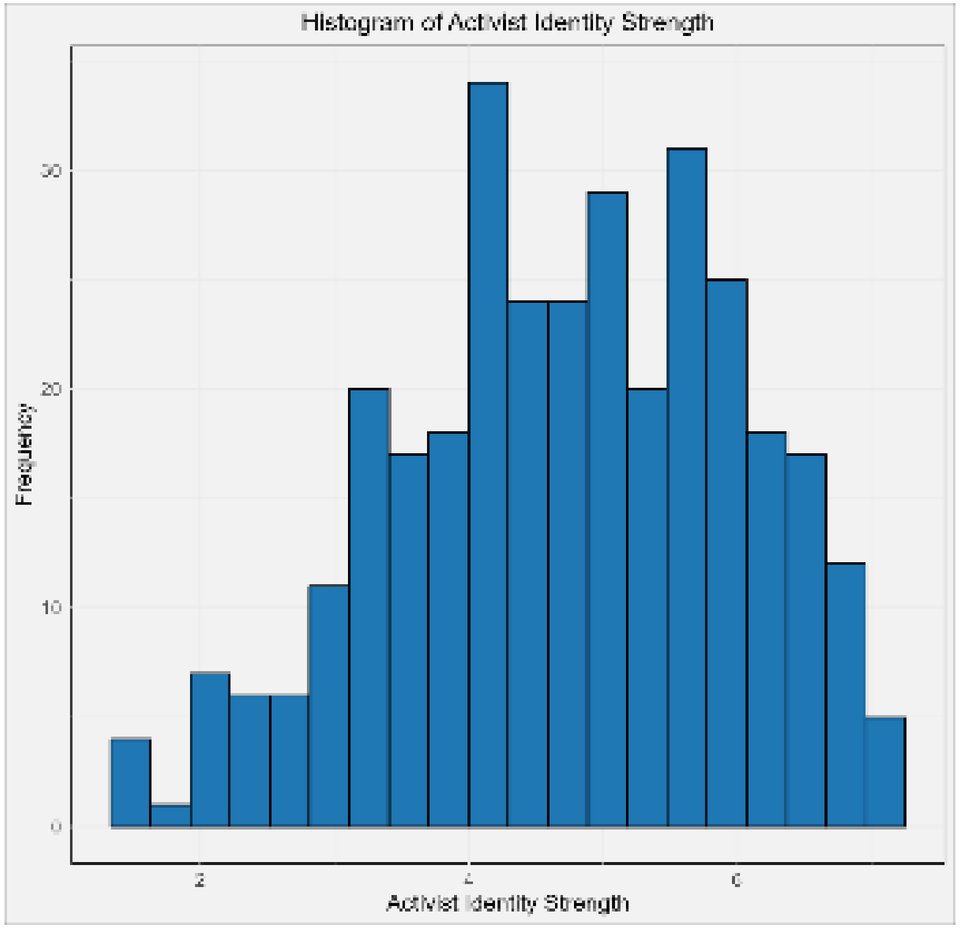
LL is the log-likelihood. AIC and BIC are the Akaike Information Criterion and Bayesian Information Criterion, respectively, which weigh model fit against model complexity, in related though somewhat different ways. The χ 2 values pertain to the likelihood ratio test comparing the given model with the null model; all three are significant at α = .0001. The R 2 values reported are McFadden's pseudo- R 2 values, which for any model M are defined as 1 minus (log-likelihood of M/log-likelihood of null model)LL and UL indicate the lower and upper limits of a confidence interval,

respectively.
* indicates $p < .03$. ** indicates $p < .01$. *** indicates $p < .001$.

Key Variable Distributions






Histogram of Activist Identity Strength
Frequency
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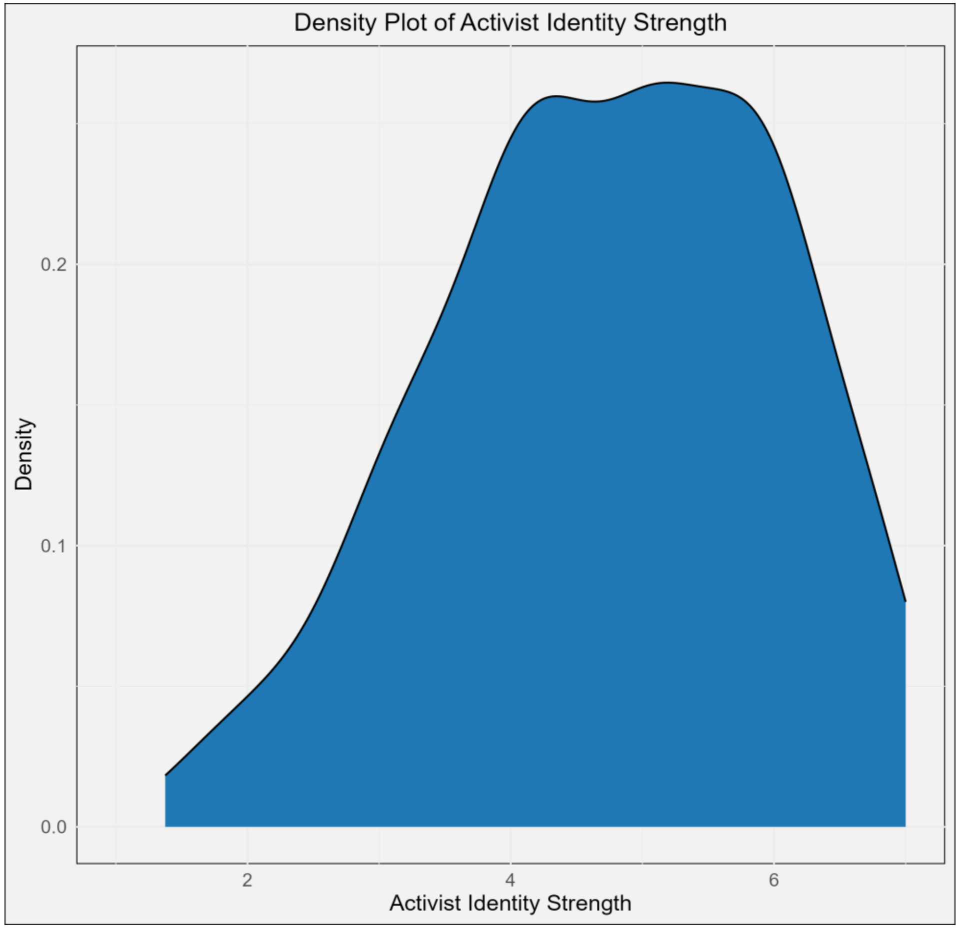
20
10
0
2
4
6
Activist Identity Strength


Density Plot of Activist Identity Strength
Density
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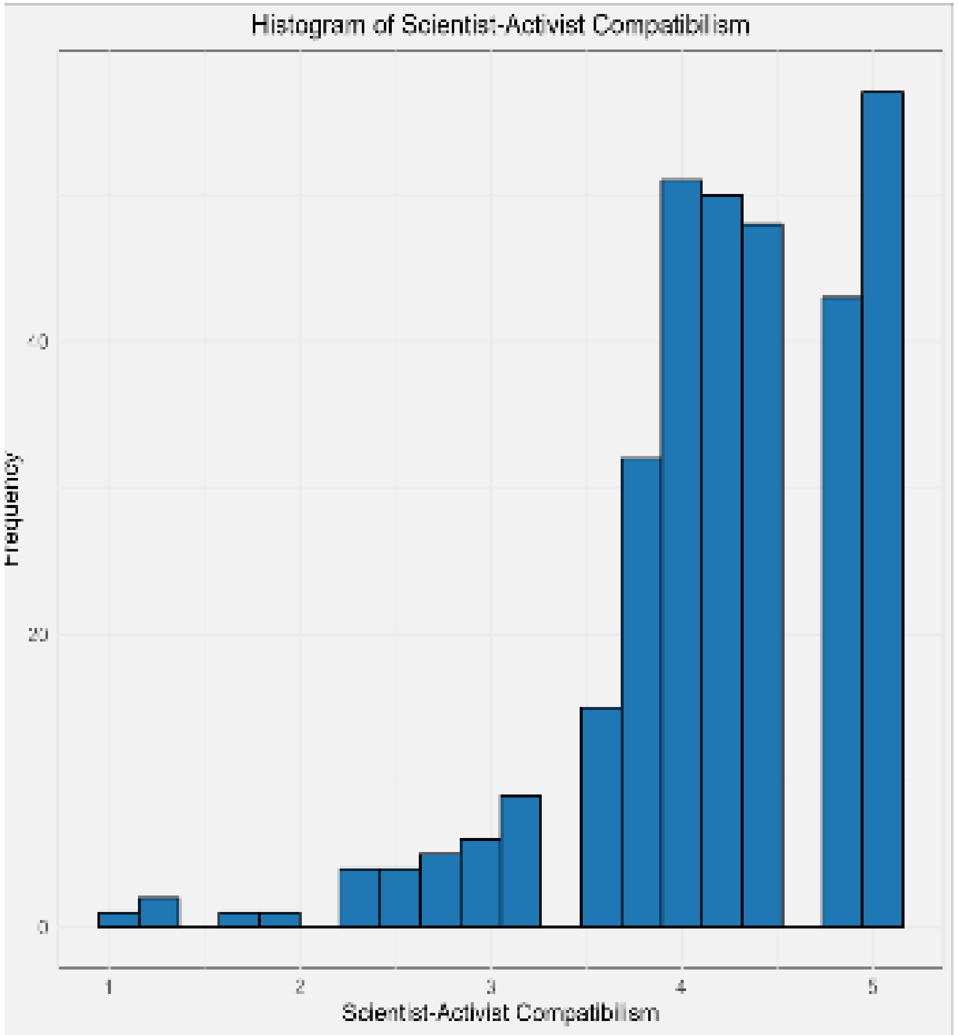
0.1
0.0
2
4
6
Activist Identity Strength


Histogram of Scientist-Activist Compatibilism
Frequency
0
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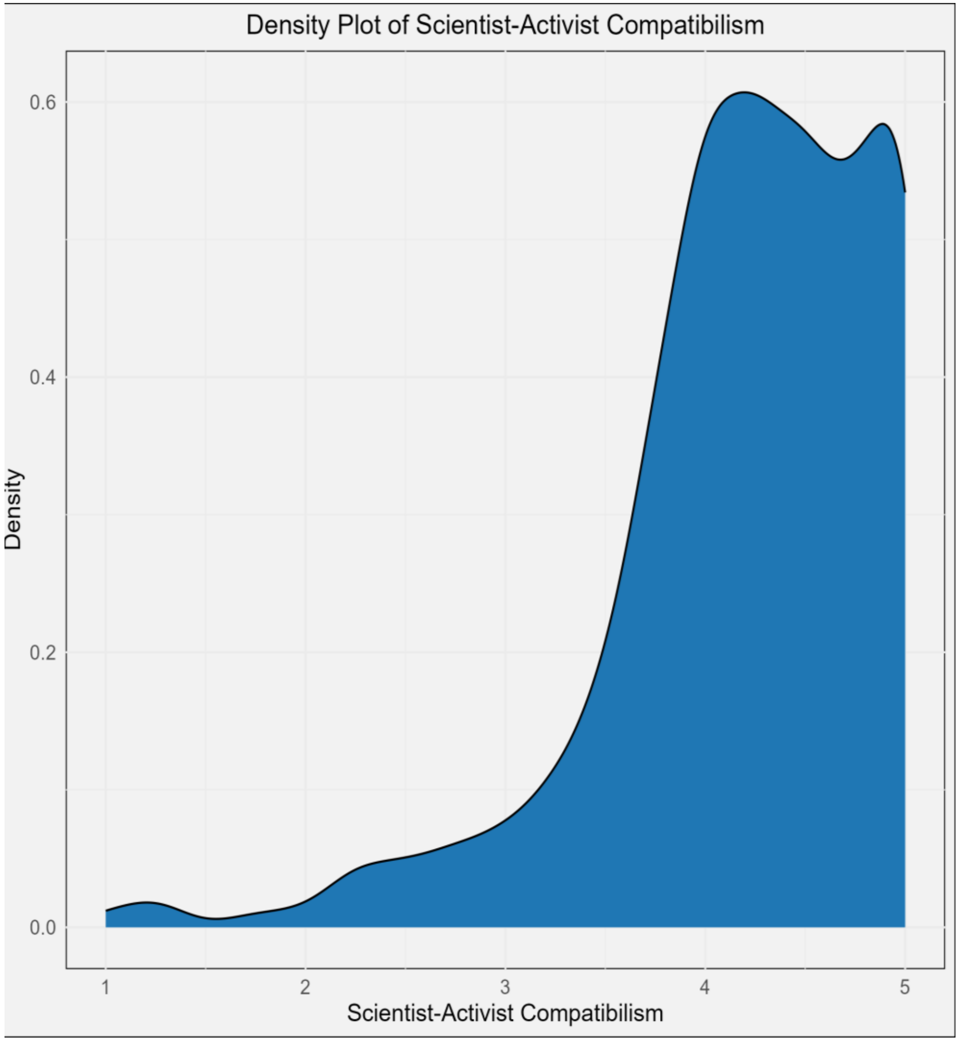
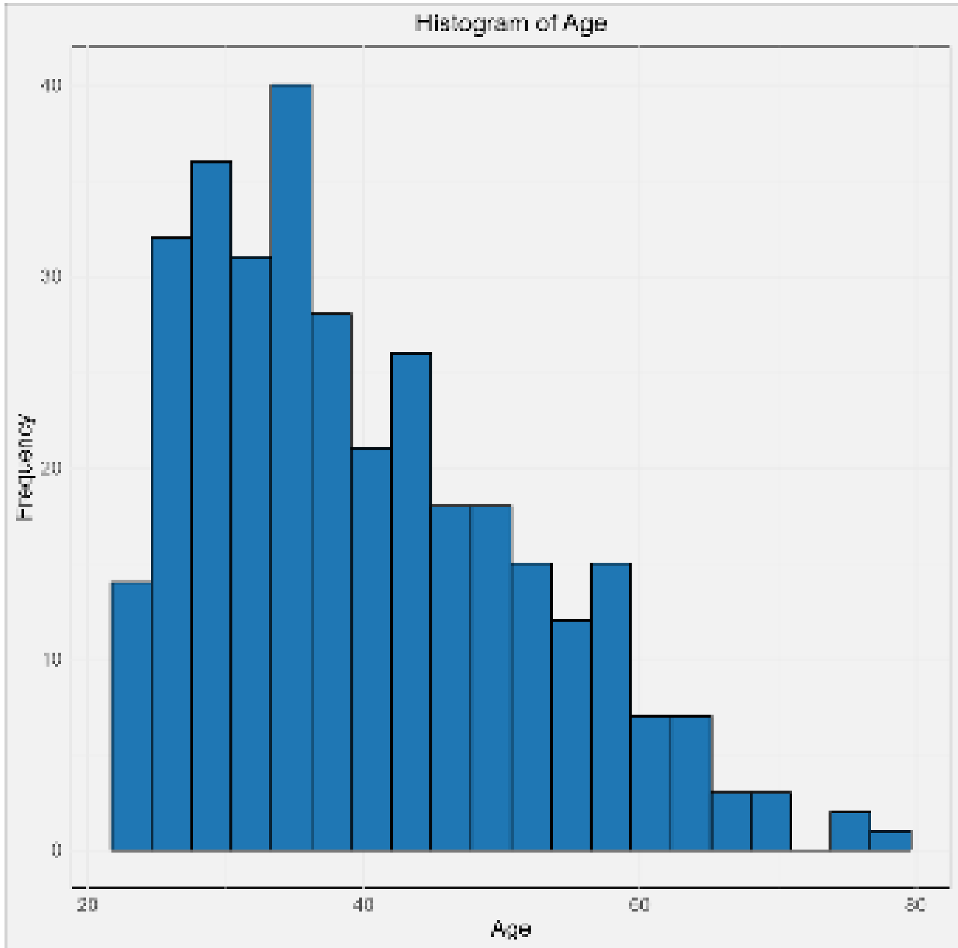
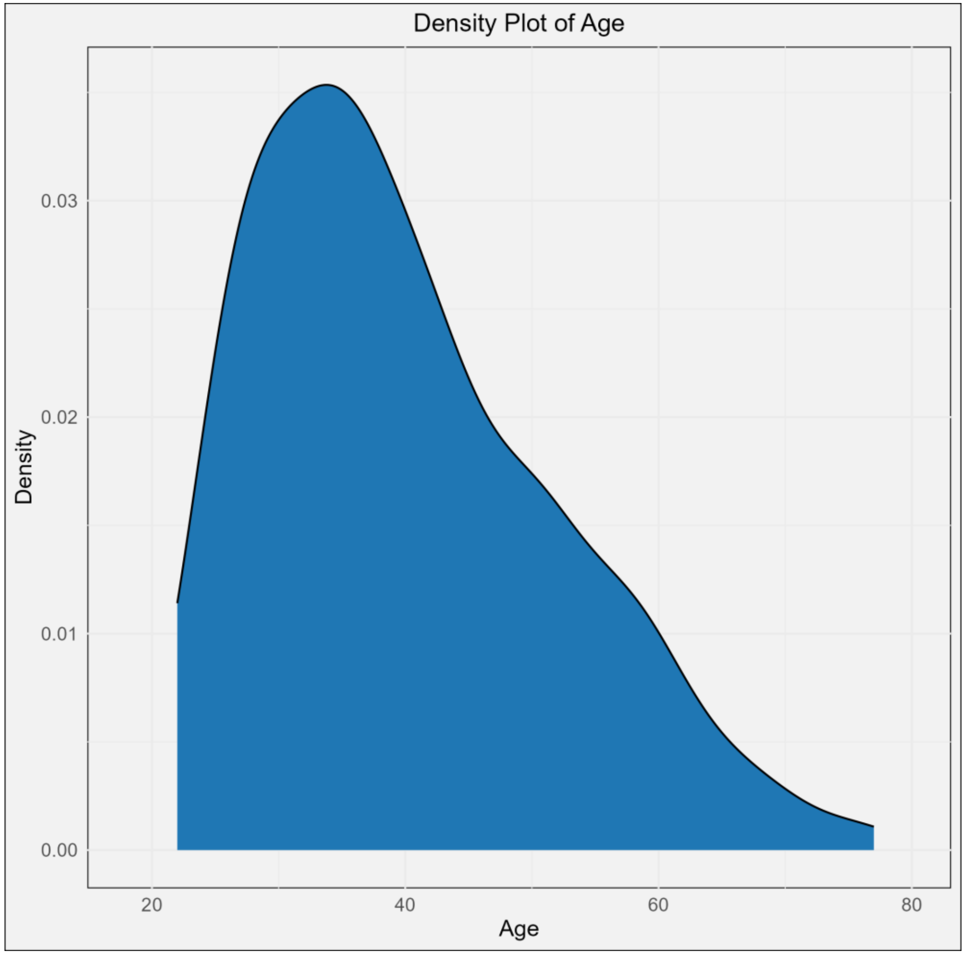
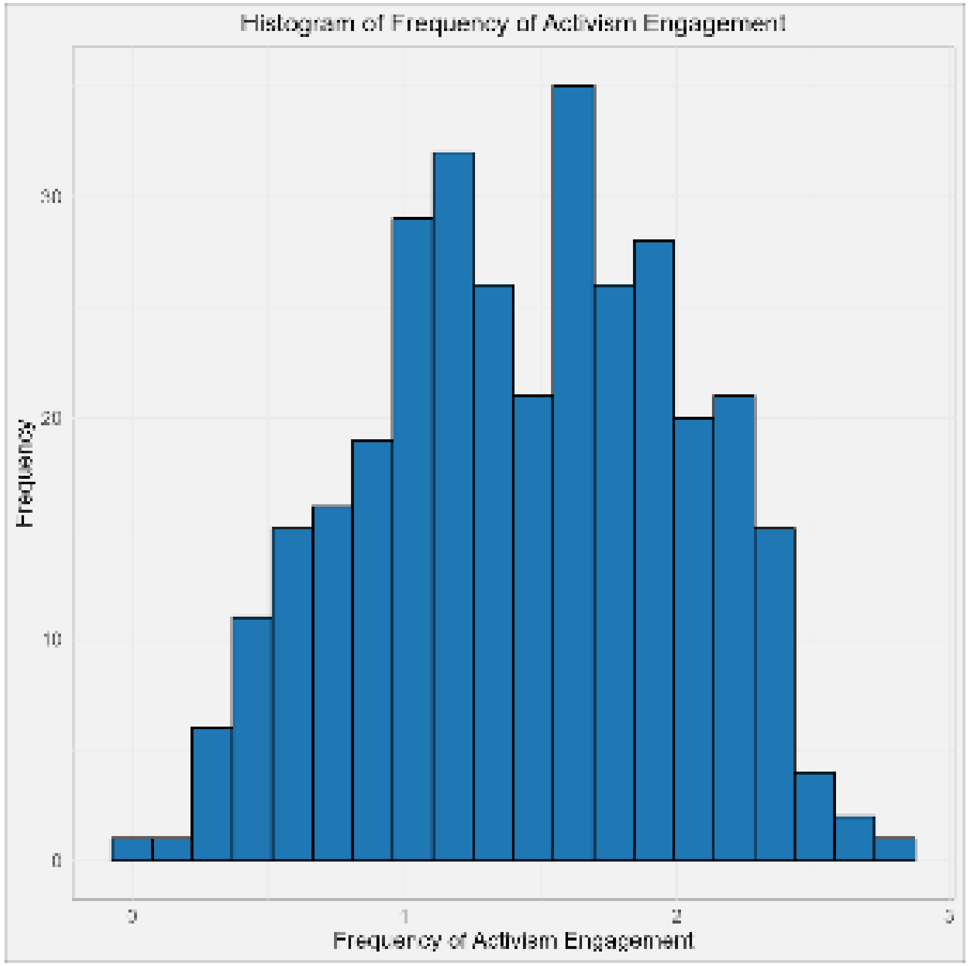
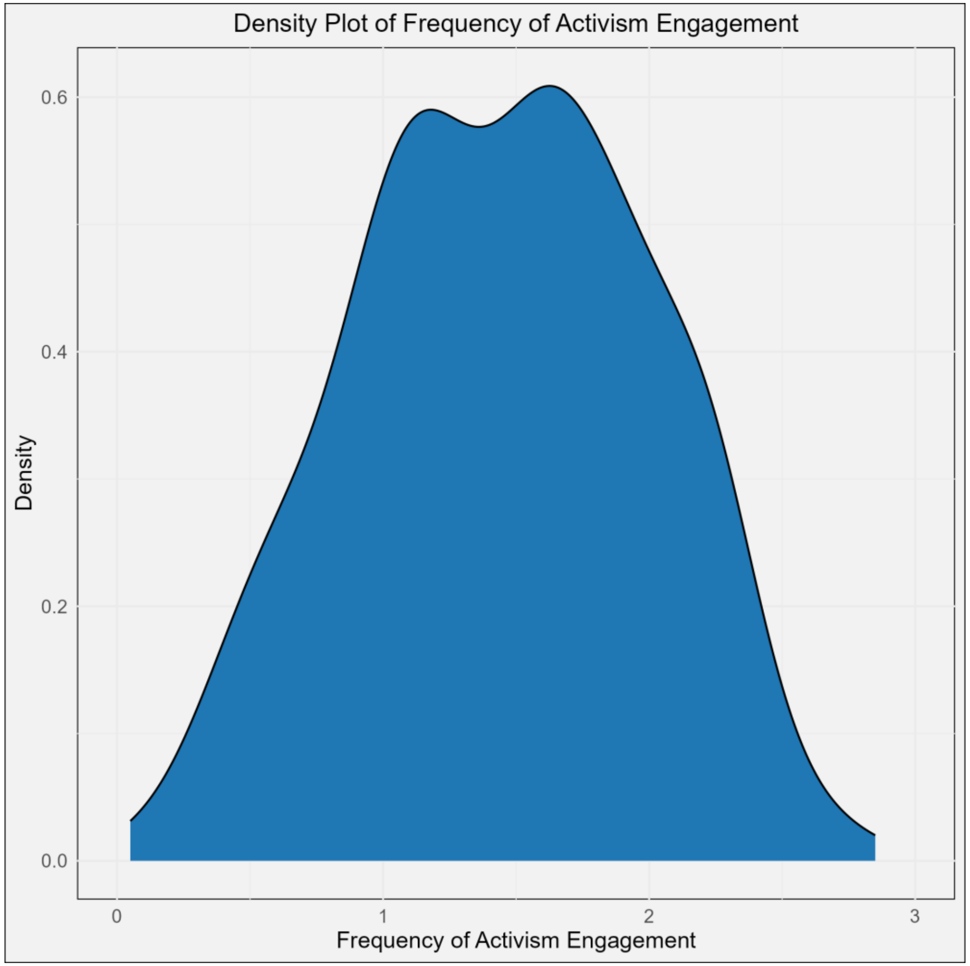
1
2
3
4
5
Scientist-Activist Compatibilism


Density Plot of Scientist-Activist Compatibilism
Density
0.0
0.2
0.4
0.6
1
2
3
4
5
Scientist-Activist Compatibilism


Histogram of Age
Frequency
40
30
20
10
0
20
40
60
80
Age


Density Plot of Age
Density
0.03
0.02
0.01
0.00
20
40
60
80
Age


Histogram of Frequency of Activism Engagement
Frequency
30
20
10
0
1
2
Frequency of Activism Engagement


Density Plot of Frequency of Activism Engagement
Density
0.6
0.4
0.2
0.0
0
1
2
3
Frequency of Activism Engagement

Bootstrapped Regression Output

- Intercept: Original [-12.64, 1.43] vs. Bootstrapped [-12.59, 0.65].
- Age: Original [0.06, 0.21] vs. Bootstrapped [0.07, 0.20]
- Science Activism Compatibilism: Original [0.12, 0.82] vs. Bootstrapped [0.11, 0.80]
- Interest: Original [-2.13, -0.37] vs. Bootstrapped [-2.14, -0.14]
- Identity Strength - Activist: Original [0.52, 0.72] vs. Bootstrapped [0.52, 0.73]

Bootstrapping involved resampling the data with replacement and recalculating the model 10,000 times. The bootstrapped confidence intervals thus obtained were compared with those from the original regression analysis. The close alignment between the original and bootstrapped confidence intervals underscores the robustness of the regression model and supports the validity of the findings.

Interaction between Scientist Identity Strength and Scientist Identity Content

A linear regression analysis was conducted to examine the relationship between scientist identity strength, beliefs regarding the compatibility of science and activism (scientist-activist compatibilism), and activism engagement. The interaction between scientist identity strength and scientist-activist compatibilism was included to assess potential moderating effects. The analysis was performed on a sample of 329 participants, with the data appropriately scaled. The regression model revealed the following outcomes:

1. The model explained a significant proportion of the variance in activism engagement ($R^2 = 0.182$, $F(3, 325) = 24.14$, $p < 0.001$). The adjusted R^2 value, 0.175, indicated a modest fit of the model to the data.
2. The coefficient for scientist identity strength was not statistically significant ($B = 0.068$, $SE = 0.050$, $t(325) = 1.364$, $p = 0.174$), suggesting that scientist identity strength alone was not significantly associated with activism engagement.
3. In contrast, beliefs in science-activism compatibilism showed a significant positive relationship with activism engagement ($B = 0.408$, $SE = 0.051$, $t(325) = 8.061$, $p < 0.001$), indicating that stronger beliefs in the compatibility of science and activism were associated with higher levels of activism engagement.
4. However, the interaction term between scientist identity strength and science-activism compatibilism did not reach statistical significance ($B = 0.059$, $SE = 0.049$, $t(325) = 1.206$, $p = 0.229$), suggesting that the moderating effect of scientist-activist compatibilism on the relationship between scientist identity strength and activism engagement was not supported in this analysis.

Comparison between Natural and Social Sciences

Participants were grouped in to natural or social sciences. Ninety (27.4%) participants listed two academic disciplines, and 28 (8.5%) listed three. Taking their first choice as their primary area we determined who worked largely within the natural (48.5%) and social (51.5%) sciences. We subset the data this way because we stated we would do so in the pre-registration to check if there are any relationships that are the product of these broad differences.

Broadly, there were few differences between natural and social scientists in the sample. Roughly equal numbers of natural and social scientists were members of activist groups (53.5% and 52.1% respectively). Critically, there was no significant difference in activism engagement between natural (*M* = 1.47, *SD* = 0.57) and social scientists (*M* = 1.42, *SD* = 0.55), t(322.1) = 0.77[-1.48, 3.38]., p = .44. Four differences were found. Natural scientists (*M* = 5.52, *SD* = 0.99) significantly identified more strongly as scientists than social scientists (*M* = 5.01, *SD* = 1.03), t(324.87) = 4.71[2.35, 5.72]., p < .001. Natural scientists (*M* = 42.2, *SD* = 12.1) were older on average than social scientists (*M* = 37.97, *SD* = 11.02), t(318.41) = 3.31[1.71, 6.75]., p < .001. Natural scientists (*M* = 2.78, *SD* = 1.11) were more uncertain about which actions to take than social scientists (*M* = 2.44, *SD* = 1.25), t(324.9) = 2.57[0.08, 0.59], p = 0.01. Finally, natural scientists (*M* = 3.35, *SD* = 1.05) expressed that activism did not jeopardize their reputation as a scientist, but to a lesser extent than social scientists (*M* = 3.63, *SD* = 1.06), t(325.01) = - 2.47[-0.52, -0.06]., p < .001. In summary, analysis revealed minimal differences between natural and social scientists within the sample.

Academic Field. An exploratory analysis was conducted to examine the influence of academic field on activism scores, prompted by a reviewer's inquiry. The analysis, which included instances where there were 5 or more responses for each field, resulted in a sample size of 302, a decrease from the original 329 responses.

The analysis revealed a statistically significant effect, F(14, 287) = 2.24, p = 0.007. Post hoc analysis using Tukey's HSD test identified a significant difference between psychology and anthropology ($p = 0.009$). Psychology exhibited a mean activism score of 1.21, significantly lower than anthropology's mean score of 1.78 ($p < 0.01$) and only marginally higher than economics, which had the lowest mean score of 1.20. However, no other significant differences were found among the academic fields (all p-values > 0.05), suggesting that the variations observed in psychology and anthropology may not reflect broader differences across all fields.

It is worth noting that a much larger sample size would be required to draw definitive conclusions about the influence of academic field on activism levels. Additionally, existing research suggests that it may not be the academic field per se, but rather whether the research is climate-related or not, that makes a difference in activism levels within specific academic disciplines (Dablander, Sachisthal, & Haslbeck, 2024).