

# ‘Safe Spaces’ and Community Building for Climate Scientists, Exploring Emotions Through a Case Study

Neal R. Haddaway<sup>1,2</sup>, Joe Duggan<sup>3,4</sup>

[1] Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany. [2] Africa Centre for Evidence, University of Johannesburg, Johannesburg, South Africa. [3] Fenner School of Environment & Society, Australian National University, Canberra, Australia. [4] Department of Pacific Affairs, Australian National University, Canberra, Australia.

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**Corresponding Author:** Joe Duggan, Fenner School of Environment & Society, ANU College of Science, Frank Fenner Building 141, The Australian National University, Acton, ACT 2601, Australia. E-mail: [joe.duggan@anu.edu.au](mailto:joe.duggan@anu.edu.au)

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## Abstract

Environmental scientists are acutely aware of the increasing dangers posed by the climate crisis, and this professional awareness is linked to raised levels of climate anxiety. In this paper we explore the use of group therapy as a tool to create a safe space for researchers to share their feelings on climate change. We examine the transcripts of a 2-day group therapy session provided to seven environmental scientists based in the United States by a professional therapist. We analyse more than 12 hours of anonymised audio transcripts to identify patterns, observations and shared experiences. Our results suggest that group therapy may provide positive and cathartic experiences for environmental scientists through sharing emotions and experiences with peers, both about the challenges of their professional lives and difficulties in processing feelings about their work subjects and the climate crisis. Further, results indicate that participants benefited from sharing strategies for coping with the emotional toll of the climate crisis.

## Keywords

climate emotions, climate anxiety, group therapy, climate therapy, climate crisis, scientists, grounded theory, safe spaces



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## Non-Technical Summary

### Background

Climate anxiety and environmental anxiety are real, growing concerns for many groups. In this paper we explore the use of group therapy as a tool to create a safe space for researchers to share their feelings on climate change. We analyse the transcripts from a group therapy session with USA based environmental scientists. Our results suggest that group therapy can provide positive and cathartic experiences for researchers as they process the climate crisis.

### Why was this study done?

Our goal was to explore more deeply how scientists feel about climate change and to determine whether group therapy may be an effective tool for addressing climate anxiety. An increase in understanding in this area could well lead to increased professional resilience for climate researchers.

### What did the researchers do and find?

We analysed the transcripts of a group therapy experience provided to seven USA-based environmental researchers. The therapy session was organised by a team of Sweden-based documentary film-makers for the purposes of communication to the public of the impacts of climate anxiety on environmental researchers and the potential for group therapy to support them. We found that group therapy does appear to be a place where scientists can show a range of positive, neutral and negative emotions, and that the frequency and type of these emotions vary between individuals and over time. Therapy did seem to create a safe space and appears to be a worthwhile approach that not only offers climate scientists an opportunity to reflect on their emotions around climate change, but also creates a space where all emotional drivers from their life and work can be presented and the interplay of these feelings explored.

### What do these findings mean?

This research supports our earlier calls for the creation of more safe spaces for climate scientists and provides a direction for further study. The next step is to unpack how climate anxiety and the efficacy of interventions may differ across cultural, professional, gender and identity divides.

## Highlights

- Climate anxiety is a growing phenomenon, with negative emotional responses such as anger, fear, sadness and despair keenly felt by climate and environmental scientists.
- We explored the use of group therapy to create a safe space for scientists to share their feelings by analysing 2 days of transcripts from a case study involving 7 US-based environmental scientists.
- We found that deep awareness of the climate crisis puts scientists at greater risk of mental health problems, and that scientists do not talk about the emotional toll of their working knowledge.
- The nature of academia means climate emotions overlap with “intersectionality” (the interconnected nature of race, class, gender and so on) to worsen their experience.
- Safe spaces such as group therapy can have an immediate valuable cathartic effect.

As we forge into the 21st Century we continue to see records being set in temperature (Rahmstorf & Coumou, 2011), rainfall (Fowler et al., 2021) and extreme weather events (Cai et al., 2014; Perkins-Kirkpatrick & Lewis, 2020), with discussions centring around tipping points (Lenton et al., 2019) and the need for systemic change. News of climate disasters appear with increasing frequency, most recently on the devastating flooding on a colossal scale across Pakistan, directly attributed to climate change (Otto et al., 2022). Acting to minimise loss and suffering caused by the climate crisis is the vital next step, through increasing awareness about the crises we face, and support for and action towards mitigation and adaptation (Patz et al., 2014; Vicedo-Cabrera et al., 2021).

Awareness of the crises weighs heavy. Increased knowledge of the climate crisis is linked to raised levels of anxiety (sometimes referred to as ‘climate anxiety’) (Whitmarsh et al., 2022), a term that has received considerable research attention of late (Coffey et al., 2021; Hayes et al., 2018; Ojala et al., 2021; Palinkas & Wong, 2020), and is the focus of increasing public concern (Hickman et al., 2021; Manning & Clayton, 2018). Climate anxiety has been described in a variety of ways in the literature: as a negative result of awareness of the climate crisis and the cause of barriers to action (e.g., Heeren et al., 2022); as a useful mediator of pro-environmental behaviours (e.g., Whitmarsh et al., 2022); as an undesirable mental health problem (e.g., Schwartz et al., 2023). Some researchers propose defining potentially positive aspects of climate concern as ‘climate anger’ (Stanley et al., 2021), ‘climate distress’ or ‘climate empathy’, as distinct from related ‘clinically maladaptive climate anxiety’ (i.e., ‘clinical climate anxiety’) (Crandon et al., 2022), and others refer to ‘eco-paralysis’ as the detrimental outcome of such an emotional state (Heeren et al., 2022).

As the literature exploring this phenomenon grows, so do the terms used to describe it (Coffey et al., 2021; Stanley et al., 2021). For us, ‘climate anxiety’ sits within the broader concept of ‘climate emotions’, which acknowledges that anxiety, as a secondary emotion (Braniecka et al., 2014), is a layered response to a suite of (often conflicting

and simultaneously experienced) positive and negative emotions. We believe that this broader conceptual model can improve our understanding of emotional responses and potential solutions to climate anxiety. It is important to note that while the majority of researchers and practitioners do not consider climate anxiety as a true mental health disorder in its own right, and caution that doing so may lead to a lack of action against climate change (Bhullar et al., 2022), it is clear that maladaptive aspects of climate anxiety may be a risk factor and exacerbate or trigger other mental health problems (Ogunbode et al., 2023). Whatever definition of climate anxiety is adopted, and however the impacts of this anxiety are framed, understanding how we feel about the climate crisis and the state of the planet is important (Wang et al., 2018).

For researchers working in social-environmental topics, climate change is increasingly viewed as an integral part of their work (Haunschild et al., 2016). This increasing attention is therefore likely to be associated with an increase in negative emotional responses, anxiety and possibly significant mental health problems including burnout (Gilford et al., 2019): particularly as many of these people will feel a professional duty to continue working towards climate adaptation and mitigation (Getson et al., 2021). Indeed, this professional attention is likely to be associated with a deep understanding of scientific uncertainty on the impacts and trajectory of the climate, and the limitations in public awareness and political action. We might expect to see greater impacts of this awareness and understanding on secondary emotions like anxiety (Braniecka et al., 2014) and, subsequently, mental health (Clayton, 2018).

There have been calls for further research into to what extent scientists feel anxiety related to the climate crisis, and how their professional roles and knowledge might predispose them to mental health problems or solutions (Clayton, 2018). Our own work has led us to call for 'safe spaces' to discuss how environmental and climate scientists feel (Duggan et al., 2021), driven by observations that scientists often feel unable to discuss their climate emotions. Understanding how professional awareness of environmental crises affects scientists could improve our ability to reduce and ameliorate negative impacts on mental health. Identifying potential interventions could aid in increasing professional resilience and support action-oriented, pro-environmental behaviours in everyday life.

Various solutions have been proposed for dealing with climate and environmental anxiety (e.g., Baudon & Jachens, 2021), including: raising awareness of the symptoms of and need for individual support related to burnout, trauma and other mental health issues; building capacity for self-care through, for example, mindfulness and meditation; increasing capacity of mental health professionals to support climate and environmental anxiety through improved frameworks and professional training; establishing and fostering support communities, such as peer-to-peer networks (Naslund et al., 2016); driving institutional change to modify the professional landscape scientists find themselves in, providing supportive working environments. For all of these solutions, an initial vital step is to support scientists in identifying and acknowledging their need for support: for

us (Duggan et al., 2021) and others (Kennedy-Woodard & Kennedy-Williams, 2022), this starts with the creation of safe spaces in which individual scientists can talk about their climate emotions.

The concept of ‘safe spaces’ originated in the psychology literature of the 1960s when exploring parent-child relationships (Winnicott, 1965). The idea has since been applied to more diverse contexts in psychology, medicine (Best et al., 2016), and education (Kisfalvi & Oliver, 2015). Typically, ‘a safe space’ refers to concerted efforts to promote the emotional and psychological well-being of marginalised people (Anderson, 2021). We extend this definition to embrace all people, but rely on the same underlying concept of protection: in this case, protection from the risk of judgement.

Safe spaces for researchers in environmental and climate science could lead to a range of positive outcomes, including consolidating and understanding anxiety as a complex secondary emotion and its root cause (Braniecka et al., 2014) and fostering or rebuilding a sense of community and belonging through shared experiences (Schultz et al., 2016).

Here, we describe the results of one effort to create a safe space for sharing experiences and feelings in the form of a 2-day group therapy session for a diverse group of seven environmental scientists based in the United States of America. Specifically, we seek to explore how scientists felt throughout group therapy to understand: i) can group climate therapy lead to the creation of a safe space for environmental researchers, ii) do participants see group climate therapy as worthwhile, and iii) what epiphanies or discoveries do participants make throughout a group climate therapy session. For a deeper consideration on the creation of a safe space during this particular intervention and for a positionality statement from the authors refer to Haddaway and Duggan (2023).

## Method

Here, we report on a case study involving a group therapy experience provided to seven USA-based environmental researchers. The therapy session was organised by a team of Sweden-based documentary film-makers for the purposes of communication to the public of the impacts of climate anxiety on environmental researchers and the potential for group therapy to support them. We were contacted during the planning stages of the project, and were offered the transcripts of the event for analysis. We did not organise or conduct the group therapy, nor did we have any input into this process. As such, no ethical approval was sought for the sessions, since the research conducted was isolated from the intervention. Ethical implications were discussed with the ethics board at the Australian National University, and it was deemed that no ethical review was required given the research conducted was isolated from the intervention and dissemination of research results does not allow identification of specific individuals.

## The Intervention

The therapy took place over two full days, in a residential setting, and was facilitated by a qualified therapist (with the following USA qualifications; Licensed Clinical Social Worker, Board Certified Diplomat, Certified Group Psychotherapist, Fellow of the American Group Psychotherapy Association). Individual sessions lasted between 52 minutes and 2 hours and 21 minutes, with a total of c. 12 hours 45 minutes of group discussion over the two days. Some sessions were guided, such that discussion was focused on specific tasks (e.g., participants drawing pictorial representations of their fears) or content (e.g., thinking about how to talk to a child about the state of the planet). For much of the time, however, discussion was unguided (i.e., only very occasional prompting questions). We elaborate the format and content of each session in Table 1. The content was summarised by reading through the therapist’s transcript and extracting themes that emerged. The therapy took place on the 18th and 19th February 2022 in New Jersey, USA.

**Table 1**

*Format and Content of Each Component Session of the 2-Day Group Therapy*

Session	Start	Finish	Content
<b>Day 1</b>			
Session 1	09:57	11:19	Introductions, Guided discussion: general emotions
Session 2	11:55	13:18	Guided discussion: general emotions
Session 3a	14:26	15:13	Exercise: short mindfulness session, visualising favourite place on earth, followed by discussion
Session 3b	15:13	16:46	Exercise: visualising greatest fear and drawing it, followed by discussion
Session 4	17:14	18:06	Guided discussion: impact of climate emotions on relationships
<b>Day 2</b>			
Session 5	08:53	10:38	Exercise: speaking to a child from the future
Session 6	11:14	12:36	Guided discussion: climate emotions and professional obligations
Session 7	14:03	15:44	Guided discussion: having children in the climate crisis
Session 8	16:11	17:36	Guided discussion: final thoughts and feedback

## The Participants

The seven participants all lived in the USA, and were selected purposively in an attempt to have balance, representativeness and diversity. A total of 92 participants were initially invited, with 15 responding positively and a final set of 7 participants chosen for the intervention. The participants had not met prior to the intervention. For a breakdown of demographic data, see Table 2.

**Table 2***Demographic Data of the Participants*

Characteristic	Category	n
Age group	35-44	4
	45-54	3
First Language	Swahili	1
	Japanese	1
	English	5
Cultural Background	Kenyan	1
	Japanese	1
	Indian American	1
	Afro American	1
	Anglo American	3
Place of Birth	Kenya	1
	Japan	1
	United States of America	5
Scientific Expertise	Agricultural science	1
	Ecology	1
	Climate science	1
	Atmospheric science	2
	Entomology	1
	Paleoclimatology	1

*Note.* This information was provided by the documentary production team based on their interactions with participants. As such we have opted not to include gender/sex.

## The Data

The data that we were provided took the form of an automatically transcribed word-by-word transcript of the audio recordings of the event. Transcription and processing were conducted by the documentary film-makers, and we were provided as text files for each day. Each participant had an independent microphone and eight audio channels were thus recorded independently, aiding isolation of the audio source. Only active sessions were recorded and transcribed – social discussions between sessions were not recorded. Audio tracks were transcribed, time-stamped and then combined, with any identifying information stripped and recoded with ‘Speaker 1’, ‘Speaker 2’, etc.

## The Methodology

We make use of what Pidgeon and Henwood (1997) describe as 'grounded theory-lite': we adopt grounded theory principles in the development of the categories and concepts that we use, without the intention of producing a full theory. Our project begins with data analysis and thus we do not refer to it as based on 'grounded theory full' (Glaser & Strauss, 1980; Strauss & Corbin, 2014).

### Manual Coding

We used an iterative 'reading-coding-reading-coding' process to develop our coding schema and identify core themes in our data. We constructed an initial draft coding schema based on previous research (Duggan et al., 2021) focusing on references to core positive and negative emotions. We both, independently read through a 30-minute transcript chosen at random and attempted to code the data in Nvivo. Following this, we met to discuss our experiences, revising our coding schema to include new codes. This novel schema was then used in a second trial of 50 minutes of transcript chosen at random. The schema was simplified after both authors shared their interpretations and classifications. We then randomly selected another 50-minute section of the transcript and coded the schema independently once more, comparing results to ensure suitability and applicability. The final coding schema is provided in Table 1.

JD then coded the entire transcript and NH checked, commented on, and revised the coding. We then met to discuss the coding at length before finalising it. Throughout the checking process, NH extracted detailed notes on cross code themes (i.e., surprising, interesting or unexpected linkages between codes, and other non-coded topics of interest). These notes were also discussed and summarised together. These summaries formed the basis of our results and discussion.

### Visualisations

Visualisations were produced in R Code and summary data for reproducing the visualisations are available in Haddaway and Duggan (2022).

## Results

We identified three groups of codes within the data: emotions, references to connectivity to others, and moments of conversational agreement or disagreement (see Table 3).

Throughout the entire two days of therapy, direct negative feelings were more commonly referenced ( $n = 135$ ) than direct positive ( $n = 56$ ) (Figure 1). Emotional self-regulation (i.e. expending effort in trying to control or prevent certain emotions) was mentioned on multiple occasions ( $n = 24$ ) with Speaker 2 being the only participant that did not reference it.



**Table 3***Emergent Codes From the Manual Coding Exercise and Their Explanations*

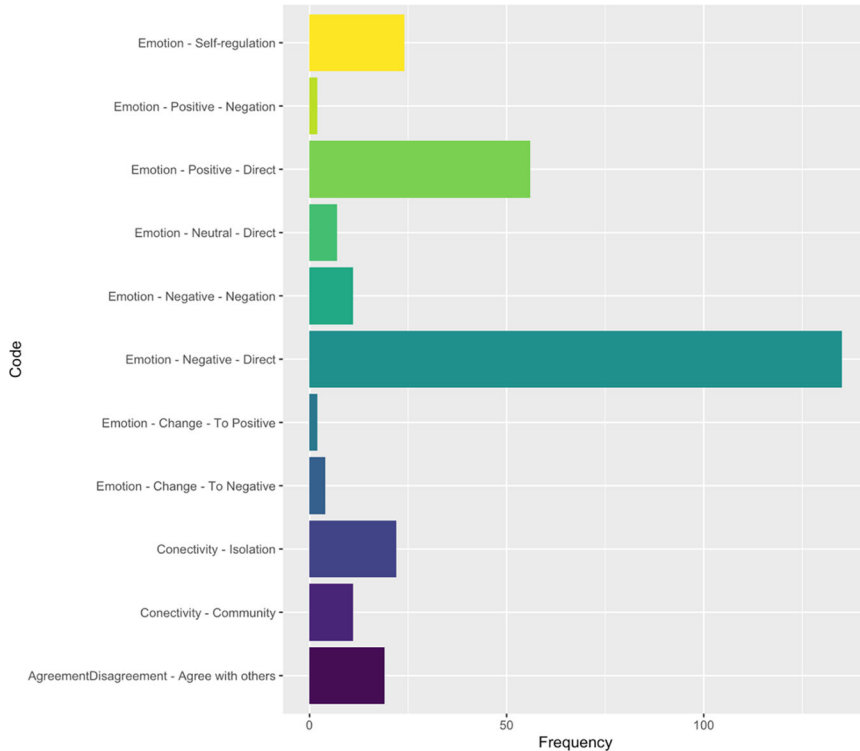
Code	Description
<b>Emotion</b>	
self-regulation	Speaker indicates that they exert effort in managing emotions, not allowing themselves to feel certain emotions or indicating that they ‘can’t feel a certain way or ‘won’t let themselves’
positive – direct	A positive emotion is expressed. E.g. ‘I feel happy’, ‘I feel excited’
positive – negation	A positive emotion is expressed with an opposing qualifier. E.g. ‘I don’t feel happy’
negative – direct	A negative emotion is expressed. E.g. ‘I feel sad’, ‘It makes me disappointed’
negative – negation	A negative emotion is expressed with an opposing qualifier. E.g. ‘I don’t feel sad’
neutral – direct	A neutral emotion is expressed. E.g. ‘I feel humbled’, ‘I feel impatient’
neutral – negation	A neutral emotion is expressed with an opposing qualifier. E.g. ‘I don’t feel humbled’
change – to positive	A change in emotion in a positive direction is expressed. E.g. ‘I used to feel sad but not I feel happy’ or ‘I used to feel happy, but now I am ecstatic’
change – to negative	A change in emotion in a negative direction is expressed. E.g. ‘I used to feel happy but now I feel sad or ‘I used to feel sad, but now I am devastated’
change – to neutral	A change from an emotion of either polarity towards neutral. E.g. ‘I was happy but now I am apathetic’
<b>Connectivity</b>	
isolation	A speaker indicating that they feel a sense of isolation, either with their peers in the room or more generally through their work or life. E.g. “I feel like no one is there for me”
community	A speaker indicating that they feel a sense of community, either with their peers in the room or more generally through their work or life. E.g. “I feel like I have new family now”
<b>Agreement/disagreement</b>	
agree with others	A speaker agreeing with another participant in the room. E.g. “Amen!”, “you are right”
disagree with others	A speaker disagreeing with another participant in the room. E.g. “I don’t necessarily think that is correct”

When looking at individuals across the two days, a number of patterns become clear (Figure 2). In absolute terms, Speaker 3 expressed both direct positive ( $n = 15$ ) and direct negative ( $n = 40$ ) emotions most often. Speaker 8 most frequently referenced some level of isolation ( $n = 8$ ) while Speakers 2 and 4 demonstrated direct positivity on the fewest occasions ( $n = 4$ ), and Speaker 2 was the only speaker who did not express an element of emotional self-regulation. Most speakers expressed more negative emotions

than positive, the only exceptions were Speaker 6 (positive  $n = 12$ , negative  $n = 11$ ) and Speaker 7 (positive  $n = 8$ , negative  $n = 5$ ).

**Figure 1**

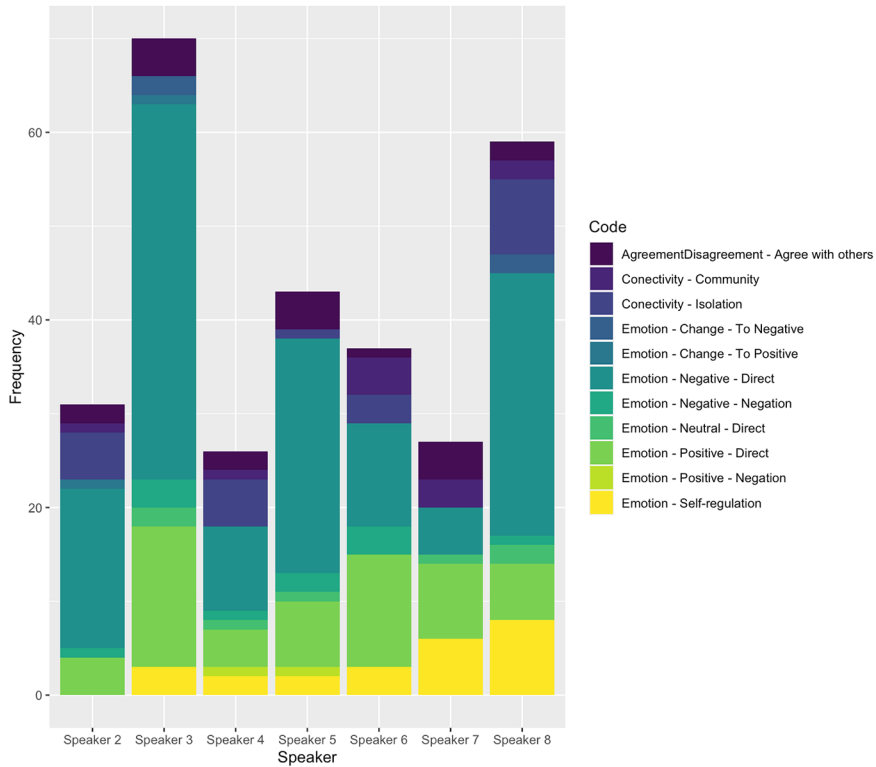
*Manually Coded Statement Frequency Across the 2-Day Therapy Session*



*Note.* See Table 1 and text for an explanation of the codes. Data and code are publicly available (Haddaway & Duggan, 2022).

**Figure 2**

*Manually Coded Statement Frequency Across the 2-Day Therapy Session Separated by Speaker*



*Note.* See the text for an explanation of the codes. Data and code are publicly available (Haddaway & Duggan, 2022).

### Was a Safe Space Created?

In reviewing and coding the transcripts, there are a number of indications that a safe space was indeed created over the 2-day therapy session. Firstly, all participants contributed to discussions, both in terms of presence in the conversations and emotional and intellectual contributions. Multiple participants also actively referenced feeling comfortable in the space:

*“[There is an] agreement that we are entering ...this space ... treating people with dignity.”*

*“We never said that aloud, but I think it was really heavily unspoken.”*

*“I don’t know all y’all politics at all or various beliefs, but it feels like we’re probably [from] within a relatively small delta on some things*

*and so we’re thinking about creating a ... brave space for people to talk about things that are really hard and where ...people are going to be on very differing parts of that spectrum.”*

Further supporting our belief that a safe space was created is the fact that participants shared personal and emotionally charged stories, indicating a sufficient perception of safety and trust. Related to this, participants also demonstrated vulnerability (for example by crying) and explicitly referenced this observation at the end of the session:

*“This was crazy. It was so crazy that everybody was willing to be so vulnerable and so introspective and to share everything, and that we all created this crazy situation that enabled everybody to do that with each other. It felt very natural and also really unlikely that that could have happened – that a collection of scientists could have been brought together and created this dynamic.”*

## Was the Group Therapy Worthwhile?

In general, we observe that the group session appears to have been a valuable one. This was both implicitly and explicitly stated by participants within the data towards the end of the session:

*“I’m privileged to be sitting here with an amazing group of people. I think what came out of this conversation ...[is] the way things have been framed and reframed and picked apart and put back together again – [it] is incredibly useful.”*

One participant explicitly stated that their hope of having a connection during the session was achieved:

*“Just having a connection like that was probably my biggest hope.”*

Several participants also stated that the experienced had been a useful one:

*“I think in conversing with you all, it really helped me actually pinpoint what it is I actually am afraid of – that climate was swirling around in there. But [it]... is not climate change itself, because I do strongly believe in human adaptability. I think it’s more the fear that we as humanity will choose to just let things keep happening the way they have been... and I think it got kind of swirled around with a bunch of other things. And I think really having [the] opportunity to peel a lot of this apart [has] really helped me to remember why I’ve pursued things and why I’ve gone after things the way I have.”*

*“I think it’s been like a bit of a return to center, which I think I definitely needed badly. So thank you, everyone.”*

*“I really am so impressed with people’s power, passion, commitment, resilience. And that just gives me more of all of those things, too. Seeing the complexity of everybody is helpful for me when I interact with the scientific community.”*

## Epiphanies

Throughout the group therapy session participants had several revelations or epiphanies either around their lives as scientists and how this interacts with and intersects their emotional experience of the current state of the planet, most notably the climate crisis. Or, on the concept of therapy and their reaction to it. We have summarised these major themes along with an exemplary quote in Table 2. Emotions and concepts exhibited included guilt, anger, motivation, self-censorship, professional objectivity, community and support, pastoral care and responsibility, trust and safety, sharing emotions and strategies, catharsis and relief, obligation, family, intersectionality with race and gender and impactfulness. These factors appeared to act antagonistically on participants’ wellbeing in their professional roles, leading to feelings of isolation, demotivation, guilt and grief. Layered on top of this, their work in environmental research in the face of the climate crisis appears to have exacerbated feelings of guilt, isolation and demotivation. In the face of this, group therapy shows signs of providing positive and cathartic experiences through sharing emotions and experiences with peers, both about the challenges of their professional lives and difficulties in processing feelings about their work subjects and the climate crisis. In addition, participants benefited by sharing strategies for coping with the emotional toll of the climate crisis and supporting students in their professional pastoral duties. Refer to Table 4 for key themes alongside exemplar quotes. For multiple examples and a full list of themes that emerged see Haddaway and Duggan (2023).

**Table 4**

*Summary of Epiphanies Emerging From the Data*

Theme	Example Quote
<b>Life as a scientist</b>	
A lack of impact affecting morale	“In terms of my scientific contribution, it’s not that great. I mean, I love what I do, and I ...don’t know how much I am actually doing service to the community.”
A motivation to keep working	“I don’t think I want to let go of my anger, within moderation.”
The importance of community support	“I think we expected to be strong for our students, but I feel like nobody is there for us as well.”

Theme	Example Quote
Intersectionality of race, gender and disability	“I always tell students you have to do experiments in pairs documented because as a person of color, I would be doubted, you know, if we made that great discovery.”
Self-censoring	“People may build a wall between me and society. So I really never share that [I am a scientist] with other folks.”
<b>Therapy</b>	
Challenges in self care	“I deal with stuff that [can] kill, maim, hurt people all the time and that’s both intellectually extremely stimulating and emotionally often pretty devastating.”
An opportunity to share	“I actually haven’t had a discussion like this before. And it’s making me realize and things.”
Emotional support	“And that sucks that you have to feel this way. It sucks that we have to feel this way.”
Thoughts on hope	“I personally don’t want to think about hope too much.”
Positive responses to therapy	“It’s actually good. I actually haven’t had a discussion like this before. And it’s making me realize things. So thank you.”

## Discussion

Climate anxiety is a phenomenon growing in prevalence, and with this growth comes a need to identify tools and techniques for its management. This study builds on an earlier exploration of climate emotions (Duggan et al., 2021) and investigates the use of group therapy as a tool for managing emotions around climate change. Our results suggest that safe spaces can be made amongst a group of scientists who are strangers, that the concepts discussed indicate an acceptance of the safe spaces and a willingness to engage in deep discussions about climate emotions. They also suggest that the majority of the participants felt the therapy was useful.

One important note must be made about the generalisability of this therapy session. While this study represents a valuable contribution to the literature and an important step towards understanding how safe spaces can support climate scientists to process climate emotions, we must be cautious in generalising the findings. This is a single case study, and as such does not necessarily offer a large breadth of understanding. It does however offer considerable depth (Flyvbjerg, 2006), and highlights a range of other concerns around the inclusivity of science research more broadly. In the following section we explore the results of this study, consider the limitations and propose future directions.

It is clear when reviewing the results that some themes were particularly infrequent in our coding, particularly considering the total length of discussions exceeded 12 hours. It should be noted that the frequency of codes is not reflective of the importance that

participants attribute to a given emotion (Cvitanovic et al., 2016; Cvitanovic et al., 2021), nor does it capture a participant's dominance in the conversation or the length or intensity of emotions described. An individual may have talked at length without interruption, exhibiting a given emotion, but this would still only be one occurrence of that emotion. At the start of the study, we hoped to make use of a pre-existing coding schema (Duggan et al., 2021), which coded explicitly referenced individual emotions (e.g., anger, fear, bewilderment). It soon became clear that this was impossible using audio transcripts (rather than letters, which was the subject of the previous schema). This was in part because the text was transcription of speech, which was often meandering, sometimes imprecisely transcribed, and involved frequent metaphors, implications, etc., as a result, the coding used here is necessarily more crude. While this approach is effective for the preliminary exploration conducted here, further research could explore opportunities for improving the coding schema, giving more attention to sentiment and intensity of emotion beyond just its occurrence.

### **Was a Safe Space Created?**

The clearest indication of the creation of a safe space perhaps comes from the explicit acknowledgement by participants that they could speak openly and be free of judgement. Similarly, the fact all participants had time and space to contribute to the conversation indicates cohesion amongst the group (Burlingame et al., 2011; Hornsey et al., 2007) which could feasibly be interpreted as a related to a safe space (Burlingame et al., 2001). The fact that there were numerous occurrences of agreement and no occurrences of disagreement may also support the idea of high group cohesion and the creation of a safe space (Kivlighan et al., 2020), but further research is required to confidently suggest this.

### **Was the Group Therapy Worthwhile?**

Again, the acknowledgement of appreciation and indication of worth directly voiced by participants is a strong indicator that the therapy was worthwhile. Retaining all participants for the full two days of the intervention could also be an indicator of at least short term 'success' (McCallum et al., 2002). To fully capture the magnitude and duration of this success, future research could consist of longitudinal studies and multiple interventions.

### **Epiphanies**

An unsurprising result in this analysis was the high frequency of negative emotions described by participants. Since the focus of the group therapy session was on emotions resulting from the climate crisis and we know from previous research that climate scientists do feel a range of negative emotions when considering the topic (Duggan et al., 2021) this is to be expected. Interestingly though, these climate emotions were often

linked with reflections on academia and personal circumstance, as summarised in Table 4. These related primarily to: a lack of impact affecting morale; motivation from negative emotions like anger; the importance of community support; intersectionality of race, gender and disability in the work place; and self-censoring when talking about their professions. This relationship could suggest that climate emotions may well exacerbate existing negative workplace dynamics, but further research is needed to fully understand this. Of particular interest would be an exploration of the institutional pressure to publish in 'high-impact' academic journals versus having a demonstrable, local-scale impact through participatory, socially-engaged, practical research.

## Limitations

It must also be noted that this therapy session was undertaken as part of a film documentary. While steps were taken to ensure the process would be *true*, we cannot be certain that this had no meaningful effect on participants' behaviour. It is possible that some behaviours were performative or that other responses were guarded as a result of the cameras. The purposefully diverse nature of the group of participants was a deliberate choice from the documentary film-makers. The sample of 7 participants may not be fully representative of the broader science community, but it does highlight important issues faced by some groups of people, namely the intersectionality of race and gender in participants' life as researchers and how they respond to group therapy for work-related subjects like climate anxiety. Future research should seek to investigate a broader sample of climate researchers from across different age, race, gender, and other social backgrounds. Further replications would also support analysis of different styles and formats of facilitation to account for possible biases and interactions amongst participants – that is, it is possible that during this intervention individual participants may have dominated the conversation as a result of social biases rooted in gender, academic seniority or age.

Whilst we anonymised the transcripts, there is no doubt that throughout the coding process we built pictures of who the participants were in our head. Along with personal information that they shared, this will have undoubtedly affected our view of who they were, and thus may have introduced unconscious biases in the coding (Berger, 2015). However, this risk of bias is largely unavoidable because of the nature of the flowing conversation across the 2-day session (i.e., personal information was integral to the coded speech). One possibility with these data is that participants were consciously or subconsciously presenting themselves according to counter-normative patterns due to the make-up of other participants (e.g., false-modesty, boastfully, or contrary to gender norms or racial tokenism) (Vohs et al., 2005), and there is a risk that the results may include some degree of performative bias. Similarly, the session was part of a public documentary project with the therapy provided free-of-charge. As a result, there is also a risk of selection bias in the type of participant who agreed to take part. Further



replications could seek to minimise or quantify these risks of bias, for example by seeking representation and balance in the type of participant selected to take part or by recruiting without self-selection.

A logical extension of this form of group therapy for environmental professionals in the face of the climate crisis would be organisational or institutional support for researchers working at the same institution. However, the participants in this study were strangers prior to the therapy session, and worked in related but different sub-fields. As a result, it is likely that this prior and continued social and professional disconnection affected the willingness to participate, along with the nature of the interactions and involvement across the group. In short, strangers may be more likely to take risks in sharing information and emotions than existing colleagues with social and professional hierarchies already in place (Vohs et al., 2005). Extreme care should therefore be taken before institutionalising group therapy such as this to ensure that participants are safeguarded and safe spaces are truly fostered. Here, more research is necessary to explore the functioning of group therapy in a setting where participants are colleagues.

## Conclusion

This study represents an important first step in understanding the value of therapy as a tool for creating safe spaces for environmental scientists to share and explore how they feel. We have shown that group therapy does appear to be a place where scientists can show a range of positive, neutral and negative emotions, and that the frequency and type of these emotions vary between individuals and over time. Results suggest that a safe space was indeed created, and that group therapy is a worthwhile approach that not only offers climate scientists an opportunity to reflect on their emotions around climate change, but also creates a space where all emotional drivers from their life and work can be presented and the interplay of these feelings explored. More data is needed to explore how the temporal element may correlate to changes in emotion, and to determine whether therapy can act as a community builder or lessen feelings of isolation. Further research is also required to unpack how results may differ across cultural, professional, gender and identity divides. Regardless, this study adds weight to our previous calls for the creation of more safe spaces for climate scientists.

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## Openness and Transparency Statements

The present article has been checked by its handling editor(s) for compliance with the journal's open science and transparency policies. The completed *Transparency Checklist* is publicly available at:

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**Author Contributions.**

NEAL R. HADDAWAY: Conceptualization. Data curation. Formal analysis. Investigation. Project administration. Visualization. Writing – original draft. Writing – review & editing.

JOE DUGGAN: Conceptualization. Data curation. Investigation. Project administration. Writing – original draft. Writing – review & editing.

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**Diversity Statement.** In the list below, the check mark (☑) indicates which steps were taken to increase diversity within the context of this paper. Steps that were not taken or did not apply are unmarked (☐).

- Ethnically or otherwise diverse sample(s)
- Gender balanced sample(s)
- Inclusive gender measure
- Inclusive materials
- Sampling justification
- Extensive sample description
- Discussion of generalizability
- Diverse reference list
- Underprivileged / minority author(s)
- Early career author(s)
- Degree of privilege/marginalization considered in authorship order
- Author(s) from sampled population (avoiding ‘helicopter science’)

**Supplementary Materials.** The following table provides an overview of the accessibility of supplementary materials (if any) for this paper.

Type of supplementary materials	Availability/Access
<b>Data</b>	
a) Therapy transcripts.	Therapy transcripts collected as part of a documentary are embargoed until the film's release. Contact the authors who will be able to provide materials following the film's release.
b) Distribution of codes over time and speakers.	Haddaway & Duggan, 2022
c) Expanded descriptive results for the emergent themes from the therapy transcripts.	Haddaway & Duggan, 2023
<b>Code</b>	
R Code (and data) to produce frequency visualisations.	Haddaway & Duggan, 2022

Type of supplementary materials	Availability/Access
<b>Material</b>	
No materials to share.	—
<b>Study/Analysis preregistration</b>	
The study was not preregistered.	—

#### Badges for Good Research Practices.

Open data: NO.

Open code: YES.

Open materials: NO.

Preregistration: NO.

Diversity statement: YES.

Note: YES = the present article meets the criteria for awarding the badge. NO = the present article does not meet the criteria for awarding the badge or the criteria are not applicable.

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