The psychological impact of climate change

Climate Security National Foresight Group

Report 6

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This report provides a summary of tools that can be used to understand local climate risk now and in the future. It then concludes with recommendations and further questions for consideration by the CS NFG.

Reports by this group will provide key insights on topics of importance tasked by this group or key stakeholders. They intend to provide a context and start point for discussions.

Contents

Within the policy work of adaptation and managing the impacts of a changing climate, it is essential to understand and acknowledge the psychology involved. This broadly fits into three categories;

1. the psychology involved in acute or chronic emergencies
2. the psychology involved in our changing climate
3. the psychology involved in creating community resilience or action to reduce the impact of these changes

This document seeks to summarise the main areas of note or misunderstanding that is the current state of the art of knowledge in this area to provide policy makers and decision makers with a high-level understanding of the main relevant areas. This is divided up into three parts;

1. psychology relating to managing an emergency
2. considerations of psychology, the environment and climate change
3. how some of these concepts and ideas play out in practice

Before those areas are covered, it is important to establish a shared understanding of what we mean by mental health, to understand the impacts alongside other key concepts and terms.

General Concepts

Wellbeing is the physical, psychological and social health of an individual. This includes their mental health within their psychological health, which can be good or bad. Within the climate literature there is a focus on mental health and how the impact of a changing climate can alter where the mental health of an individual is on the continuum from good mental health to negative mental health.

Resilience used to simply be defined as the ability to bounce back and recover to a previous level of wellness, but increasingly papers being published related to climate change and psychological impacts are starting to think of it more like elasticity, the ability to adapt and accommodate impacts and changes to our ecology and lifestyles as they happen. This resilience concept is developed further by some researchers in the context of climate change. This is due to the permanent changes occurring in our climate mean that some ways of living and thriving cannot support the ability to 'bounce back'. So some researchers (Nasi, Jans and Steg, 2023) argue that a permanent psychological adaptation needs to occur. They call this transresilience when considering the aspects of environmental psychology. This is not yet widespread but does address the challenge to conventional notions of psychological resilience.

Risk perception can be the perceived risk of harm to self, or in comparison to, the perceived risk of harm to others (both strangers and family or friends). Risk perception and communication of that risk is a complex area with different interconnecting layers.

From a policy or decision makers perspective, the communication and understanding of climate risks is the assumed relevant interest and there are lots of ways in which risk communication is complicated due to how individuals perceive risk.

Risk is often communicated in probability and likelihood, for example in the communication of side effects of medicines we often see risk presented out of 100 people. 'Typically, 20 people out of 100 will experience this side effect when taking this medicine'. Concepts like absolute risk, baseline risk, relative risk, comparative risk, and optimism bias differentiate our risk judgements when comparing risks to ourselves, to others, or to other potential risks.

Generally, we tend to increase our perception of something happening to other people because of how we reduce the probability of something happening to ourselves or those close to us compared to our working knowledge of the base rate. The base rate is the (over)estimation of the risk happening to other people within the public that the individual does not know, and the underestimation of that risk happening to themselves or their close relative. The notion of 'it will never happen to me' is partly due to this underestimation, alongside the discomfort of thinking of the likelihood of harm to ourselves and those closest to us.

Psychology related to managing an emergency

There are a range of different dynamics which influence how both the publics and the decision makers/responders react and behave in civil continency emergencies. This section of this report will define each of these in turn.

Normalcy bias is when individuals try to maintain consistency in their lives and this is sometimes expressed as minimising or disbelieving a risk or threat. We underestimate the probability or extent of expected disruption from that threat. We have seen this a lot from the learning from previous major incidents, when someone tells us that there is a threat coming, we tend not to take account of that warning, or we think it can't be as bad as people are saying. But it starts even before the risk is experienced. As you read this, it is likely you have experienced normalcy bias through people's reactions to your role when you share with people you meet that some of your work focusses on climate risks. The conversation inevitably gets on to the question 'well what risks and impacts are we planning for?'. When we talk about those risks and their likely impacts, you might have heard reactions and responses that align with normalcy bias. Reactions such as 'but that won't happen', 'the likelihood of that is too remote,' 'it won't be that bad', 'you're over-dramatising' are seeking to underestimate the likelihood and reduce the impact in favour of normal social norms and the way things were. These reactions of minimising the chances of that scenario happening, dismissing the likelihood of that happening, or minimising the consequences, that is normalcy bias, particularly for those things we find uncomfortable to think about. Those reactions are normalcy bias as we try to maintain consistency in our lives.

We also see normalcy bias in those who are responsible for managing the emergency. This is where we see the underestimation of the disruption caused either by the incident itself, or by the mitigation measures put in place to manage that incident.

The enduring myth of panic has unfortunately remained in emergency planning circles despite it being debunked consistently and extensively by evidence and empirical evidence. Evidence is clear that people make very sensible rational decisions in those contexts; they are trying to get to safety, they are trying to protect their resources that might have just become more scarce; they may simply be trying to get home, or let those that will be worried about them know that they are safe. They might not be doing what the managers of the event want them to do, but this is not panic. The literature frequently cites that there are no known incidences of panic in any empirical studies across the world.

Entrepreneurship describes the behaviours that we see after an incident that people try to help at the scene of an event in the initial stages of the response. This can also be seen in the literature as something more structured (in the Kerslake review we see this termed 'zero responders'). This is the behaviour we see from members of the public who are initially on the scene who try to help and want to offer their services. This can range from setting up triage stations (such as the behaviour we saw in the London July 7th bombings) or offering to start clearing debris. This behaviour is frequently seen as detrimental to those emergency services managing the scene but understanding and coordinating this behaviour at the scene (rather than suppressing or overriding it) is the overall conclusion that most academic studies suggest.

Learning from risk communication from other societal wide risks/threats/hazards has provided one of the only recent comparator situations for us to take learning and propose how that might perform in the climate change context. The Covid-19 pandemic saw that in the context of needing to achieve collective action through behaviour change, was motivated by the messaging that completing the change in behaviour would protect those we care about (our families and friends) far more effectively than messages that changing our behaviour would benefit ourselves. In other words, we are motivated to protect others more than we are motivated to protect ourselves.

Mutual aid and collective action provide key tools to understand how we can facilitate a whole of society approach to managing civil contingencies. The helping behaviours we experienced during the Covid 19 pandemic have been studied widely and the UK lead in this area has been the University of Sussex and Prof John Drury. This research group has produced practical outputs from their academic studies and the wider evidence base in academia in collaboration with practitioners and activists. This information can be found here:

https://www.sussex.ac.uk/research/projects/groups-and-covid/community-support-and-mutual-aid/lessons-from-activists

https://www.sussex.ac.uk/research/projects/groups-and-covid/community-support-and-mutual-aid/mutual-aid-toolbox/outputs

This work tries to understand how we can support and galvanise helping behaviours within communities and support them to continue over time. This is based on a conceptual model that is well evidenced (Social Identity Theory) which suggests that we try to help others we feel we are connected to or have a sense of belonging to. This connectedness and belonging are within and to groups and our communities (either where we live or communities of interest).

Social identity is a key concept in understanding how we can develop a whole of society approach within our communities by ensuring this is incorporated in our preparedness and collaborative work. We see that the groups we belong to as being an extension of ourselves, so we are motivated to protect and reduce harm if that community is threatened or vulnerable.

Community resilience most literature acknowledges that this is predicated on social identity mentioned above. The evidence suggests this is achieved through many different actions and dynamics all based on our shared sense of connectedness and belonging including mutual aid and collective action mentioned before with an emergent civic leadership and coordination of actions. They interplay to create community resilience which allows communities to formulate support, organising and coordination independent of any more formal response roles. The way in which formal structures can support community resilience includes;

- recognition that the leadership and management structures of these are collective
- highly networked and flat, which typically does not align to the formal agencies expectation and experience of a linear management structure
- the commitment to facilitate community led projects such as mutual aid and projects to address complex challenges related to that community even if that feels novel or risky
- acknowledging the need for reduced institutional membership, and instead increased community led and defined flexible membership
- membership recruited on shared interests and objectives, mutual benefits and collective ideas not on skill sets or need of the civil contingencies frameworks
- the need to support the development of new capabilities and new civic leaders

Responders and emergency decision makers have a suite of psychology attached to them including decision making, situational awareness, how connection to communities can influence behaviour, how tiredness or stretched attention can impact on decision making, how to sustain continued response and recovery well, how to engage with communities to recover and manage the incident, health and wellbeing impacts of the work and the impact on individuals and their families from career long aggregation of experiences.

Environmental Psychology

Environmental psychology is concerned with the interactions between humans and their socio-physical surroundings, meaning the spaces and places that humans occupy, including elements of culture (Tam & Milfont, 2020).

According to Steg et al (2018), there are four key characterising features of environmental psychology. These are:

- **the interactive approach** – concerned with the reciprocal relationship between humans and their built and natural environments such as connectedness with nature and a subsequent willingness to preserve nature
- **interdisciplinary collaboration** – concerned with how environmental psychology (heavily influenced by social and cognitive psychology) works with other disciplines, such as architectural and geographical domains as well as environmental science
- **the problem-focused approach** – environmental psychology looks to contribute to solving real-world problems and has major implications and applications across various levels and sectors, looking to encompass a holistic view
- **diversity of methods** – environmental psychology uses a combination of quantitative and qualitative methods, with a focus on both external validity (generalisability and solving specific problems) and internal validity (theory testing)

Environmental psychology focussed research often seeks to identify factors and variables that preserve human wellbeing whilst leaning towards change and is often guided by the concept of sustainability (Steg et al., 2018). There are five key domains in contemporary environmental psychology research (Bonnes & Carrus, 2017). These are:

1. **spatial behaviour and social space** - Centres around place-based attachment and identity, particularly in relation to residential identity, community, and safety
2. **environmental cognition, cognitive mapping and way finding** - Centres around how people make sense of spaces and places and how people store information about their surroundings
3. **environmental stress, extreme environments, and restoration** - Centres around the psychological distress caused by adverse conditions, how people cope with these conditions and the negative psychological impact of adapting to adverse conditions
4. **environmental perception: preferences, evaluation, appraisal, and assessment** - Centres around how people perceive, evaluate and assess their surroundings, often focusing on natural versus built-up environments
5. **environmental concern and environmentally friendly behaviour, natural resources use and conservation** - Centres around environmental concern, particularly in relation to local and global environmental changes, as well as the driving factors in environmentally friendly behaviours

Climate Psychology

This section of the report highlights the differences of climate psychology specifically to be considered amongst the wider civil contingencies psychology mentioned above. The challenge with most of this evidence base is that it tends to be limited to western, educated, industrial, rich and democratic societies. However, the evidence suggests that the impacts and nuances of this psychology is different in global north and the global south.

In defining where the evidence differs, we can see where some of the future work needs to focus or understand perspectives more fully:

- perception of chronic rather than acute risks, such as changes in the climate mixed with differing sense of urgency
- the evidence suggests that people's reactions to this risk are not just be about people who experience adverse weather or other impacts, typically as traumatic reactions post event – there is a wider more population spread impacts than that through worry about the climate and the impact on the future

Consequently, the evidence suggests that we should not simply view these reactions as negative behaviours to manage, but a normal reaction to a recognised threat.

The climate worry and sense of anxiety that is the focus of a substantial amount of the literature in this area focusses on facets of perceived ability to impact the way in which we react to the changing climate, specifically self-efficacy and outcome expectancy. Outcome-expectancy is the degree to which an individual believes that a particular outcome will occur (for example collective response to climate change), whereas self-efficacy is the degree of belief that an individual can change their behaviour to produce an outcome such as their ability to successfully participate in a local flood response.

Regarding our ability to influence how our communities feel about climate change, the evidence base is currently exploring our ability to intergenerational perceptions. If we suggest that the changes to the climate are due to impact on future generations more than current generations, how can we ask them to think about the perception of risk and experiences of those future generations. This brings two questions to the fore when using those techniques (Rickard, Yang and Schuldt, 2016):

- who do individuals think about when we ask people to think about the future?
- what are boundaries of time in this thinking?

In other words, who and how far into the future can we care for?

The literature has drawn on such things as personal legacy (Grolleau, Mzoughi, Napoleone, and Pellegrin, 2020; Hurlstone et al., 2020; Wickersham et al., 2020), our responsibility to our children in the future (Shrum, 2021), and our perceived responsibility towards future generations (Syropoulos et al., 2021; 2020; Watkins and

Goodwin, 2020). These concepts suggest that they can account for concern for future generations and might increase pro-environmental beliefs and action.

Climate change risk perception models

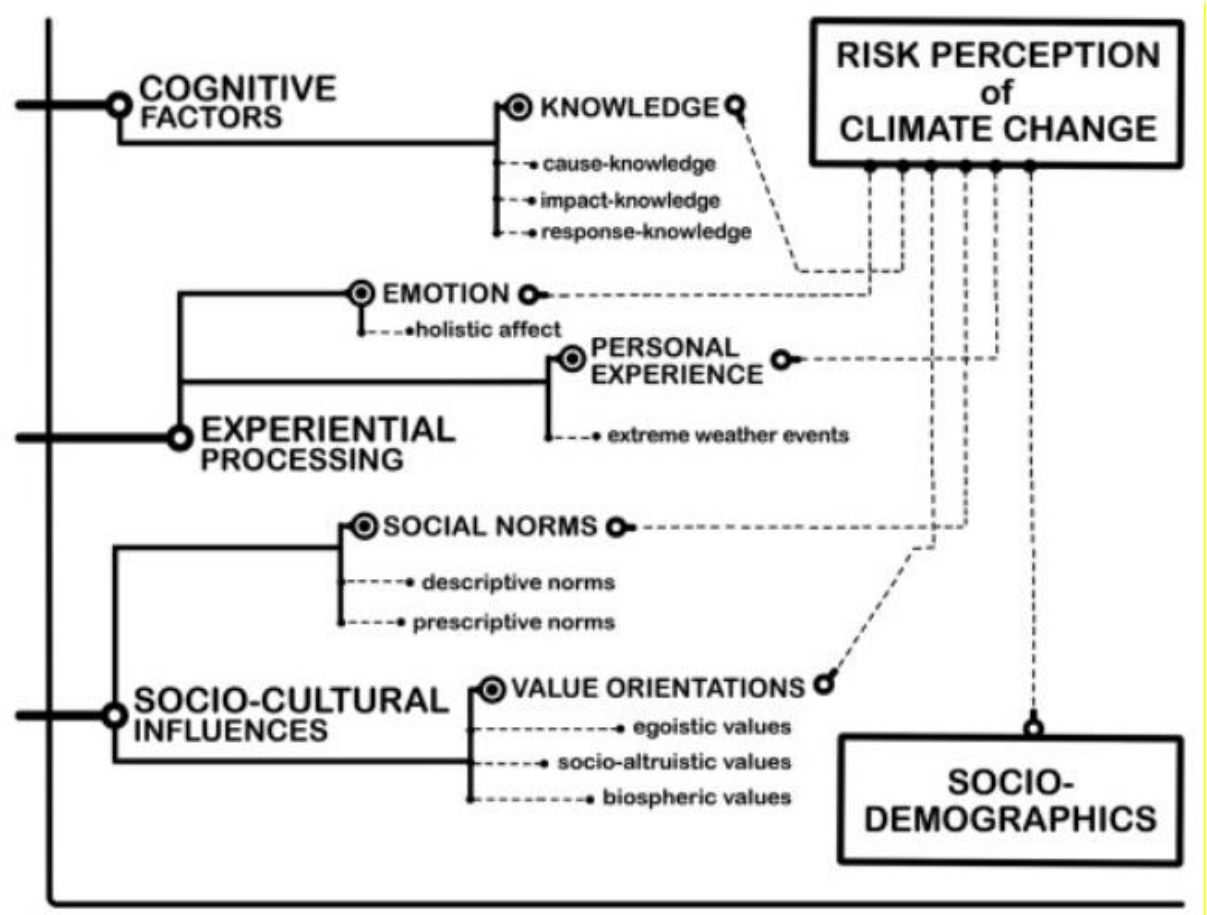

Figure 1: Van der Linden, S., (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology*, *41*, pp.112-124.

This (figure 1) has been included as one example of a model (there are many) that are being developed to understand and explain how we perceive climate related risks. Although the evidence base is still developing and maturing, we have included this example as it highlights the main points specific to climate change in our understanding of how we perceive climate risks. This gives an overview of how most of the population process the risks you are trying to communicate with them about.

Psychology and practice

The psychological impact of extreme environments and environmental stress

Research surrounding the psychological impact of climate change on humans often centres around the concept of sustainability, with the aim of preserving wellbeing whilst leaning towards positive changes (Steg et al., 2018). The World Health Organisation (WHO) define mental wellbeing as the ability and capacity to cope, thrive, connect with and contribute to communities and to function in society (Chappell & London, 2022).

Aside from physical impacts to human life, increased extreme weather events due to changing climates are suggested to have major negative impacts on the psychological health of humans, particularly vulnerable populations. Each phase of an extreme weather event may have different direct and indirect emotional impacts. For example, populations may experience feelings of anxiety during anticipatory periods, events themselves may lead to traumatic experiences, those impacted by events may experience grief following loss and populations may experience feelings of outrage towards responsible bodies related to feeling unprepared for disaster (Van Susteren & Al-Delaimy, 2020).

Furthermore, the negative psychological impacts of climate change are suggested to increase as the duration of events increase. Chronic climate conditions (such as rising temperatures, leading to drought, and rising sea levels) may have different psychological impacts on populations, due to their sustained and potentially life-altering effects (Vins et al., 2015). Populations who depend on natural environments for their livelihoods, such as those working in the agricultural industry, may be greatly affected by chronic climate risk and experience greater levels of anxiety, depression and stress (Palinkas & Wong, 2020). Beyond direct impacts from chronic climate change, subsequent displacement, migration and conflict may also have psychological impacts on populations. Forced displacement and migration as an adaptation measure are suggested to increase stress and perceptions of cultural loss, regardless of potential positive impacts to security (Adger et al., 2015).

Research suggests that community resilience and active belonging (i.e., perceived membership and inclusion in a community, as well as participation in social events) **are consistently beneficial for well-being after high-impact and long duration climate events**, and relational capital (i.e., trust and reciprocal tendencies towards other members of a community) is **beneficial for well-being at later stages in recovery processes** (Quinn et al., 2020).

In practice

- Preparedness in communities should not solely focus on physical responses and structural resilience but should consider psychological and social wellbeing and mental resilience

- It is recommended that greater focus be placed on the wellbeing of at risk or vulnerable communities experiencing chronic and longer-lasting climate changes
- The accessibility and availability of resources for citizens experiencing negative psychological impacts of climate change should be considered
- Promotion of community togetherness and feelings of belonging may be beneficial in reducing the negative psychological impacts of climate change and increasing community resilience

Environmental perception, concern and behaviour change – The importance of cross-cultural perspectives

Tam & Milfont (2020) suggest that Environmental Psychology research lacks focus on cultural diversity and cross-border collaboration and argue that cross-cultural perspectives are crucial to understanding how culture impacts environmental behaviours, due to vastly different global perceptions, attitudes and beliefs surrounding the environment and the urgency of the climate change social dilemma.

Cultures defined by individualism typically exhibit less concern for the environment (Eom et al., 2016), with pro-environmental action having culture-specific predictors, such as collectivism and established perceived prevalence of environmental behaviours. Furthermore, Tam & Chan (2018) found that generalised trust in others (more positive perceptions surrounding collectivism) increased pro-environmental behaviour and reduced the concern-behaviour gap (i.e., moving from environmental concern with no action to pro-environmental behaviour).

Additionally, some cultures exhibit stronger levels of connectedness to nature, which in turn promotes increased environmental concern and pro-environmental behaviours, as well as wellbeing (Liu et al., 2022). Western cultures are suggested to experience a greater disconnect between the 'self' and nature than Eastern cultures, due to underlying Western belief surrounding individuality and the belief that humans should maintain themselves through the external environment (K. Wang, 2021).

It is argued that increased exposure to natural environments increases engagement and connectedness with nature by invoking feelings of awe (i.e., the experience of something greater than the 'self', diminishing individualism in favour of collectivism and altruistic behaviours), which subsequently results in greater environmental concern and pro-environmental behaviour (Ng et al., 2023). Similarly, exposure to nature, even through the consumption of digital media, is suggested to increase cooperation and willingness to engage in collective pro-environmental behaviour (Zelenski et al., 2015).

However, it should be noted that those who exhibit concern about environmental issues experience greater levels of climate anxiety (Clayton, 2020). It is suggested that this can act as a motivator for pro-environmental behaviour (Reser et al., 2012), but can also lead to 'eco-paralysis' (Albrecht, 2011), whereby populations become

detached from issues due to the feelings of helplessness surrounding climate issues. As such, increasing self-efficacy (an individual's belief about their ability to cope with problems) in individuals and communities is suggested to reduce eco-paralysis, and instead increase resilience and pro-environmental behaviour (Clayton, 2020).

In practice

- Developing a national narrative focussing on togetherness and reporting the positive impacts of pro-environmental behaviours in local communities may be beneficial in promoting climate-related behaviour change, rather than solely increasing environmental concern
- Increasing exposure to natural environments, both in physical places and digital spaces may work to increase collaborative pro-environmental behaviour and mental well-being related to climate issues through an increased human-nature connection
- Focusing on increasing self-efficacy in individuals and at a community level may work to reduce anxiety around climate issues, leading to pro-environmental behaviour and more mentally resilient communities

Pro-environmental behaviours – Psychological distance and theories of behaviour change

Pro-environmental behaviour can be defined as actions taken to avoid harm to or safeguard the environment (Balundė et al., 2019).

It is suggested that there are external and individual factors that impact pro-environmental behaviour (Li et al., 2019). External factors may include social norms, convenience, interventions, rewards and punishments and the use of innovative technology. Individual factors may include socio-demographics, attitudes and beliefs and perceived behavioural control (i.e., how individuals behave based on what they perceive to be easy or hard and their sense of readiness).

Psychological distance is also suggested to impact pro-environmental behaviours. This means that those who perceive climate change and the impacts of climate change to be abstract or psychologically distant may be less inclined to engage in pro-environmental behaviours and climate-related action (Wang et al., 2019), whereas those who perceive climate change to be concrete may exhibit more resilient behaviours (Maiella et al., 2020).

There are several theories relating to behavioural change that may explain what motivates individuals to adopt pro-environmental behaviours. According to Abrahamse (2019), individuals can be motivated by:

- self-interest – relating to **the theory of planned behaviour** (based on an individual's behavioural beliefs surrounding the positive/negative consequences of engaging in a behaviour and the resulting attitudes towards

these, normative beliefs surrounding social pressure to engage in the behaviour, and control beliefs surrounding ability to perform a behaviour)
- altruism – relating to **the value-belief-norm theory** (i.e., altruistic and environmental values typically lead to more pro-environmental beliefs, moral obligation to the environmental, and consequently more pro-environmental behaviours)
- readiness to change – relating to **the stages of change model** (the concept of self-regulation to achieve goals that are important to an individual through a series of stages, dependent on levels of self-efficacy and a consideration of the pros and cons of the 'new' behaviour)
- social norms – relating to **the theory of normative conduct** (based on how an individual perceives their immediate surroundings and the behaviours of those in their immediate surroundings, and an individual's perception of what behaviours others will approve of)

In practice

- There are a range of external and individual factors that will impact on individuals' pro-environmental behaviours which need to be considered when engaging with citizens and staff with a focus on the motivations outlined by Abrahamse above
- The distance from climate impacts has been shown to affect people's ability to act and manage climate events. Considerations should be made relating to the way climate change and adaption needs are framed to build on these factors

How do we, and how should we, communicate about climate change to encourage pro-environmental behaviour?

Research is emerging with a focus on climate change communication, and effective strategies for climate change communication. How climate change is communicated to the public is suggested to be a key consideration for catalysing behavioural change and changing perceptions of the environment.

Klöckner (2020) highlights a framework for behaviour change, with four main stages (pre-decision, pre-action, action and post-action) and suggests that individuals may need different kinds of communication at each of the stages. To move from **the pre-decision to the pre-action stage**, an individual must understand why action is necessary and communications appealing to individuals on an emotional level may align with an individual's morals and values, leading to a desire for action. To move from **the pre-action to the action phase**, communications outlining what kind of action is needed are suggested, with the pros and cons of adopting the behaviour clearly stated, with an emphasis on the ease of adopting the behaviour. To move from **the action to the post-action phase**, communications should focus on practical implications and applications of adopting the behaviour, with a focus on positive outcomes and the positive experiences of others. Finally, the **post-action** phase focuses on the ability of an individual to 'bounce back' after a setback, to maintain the

behaviour and as such, it is suggested that communications focus on humanising 'relapse' and continuing the behaviour, rather than abandoning it.

Communication about psychological distance may also impact environmental behaviours. Loy & Spence (2020) examined the usefulness of two strategies for climate change focused communication. These are:

- **proximity to climate change** – shifting the focus to local consequences to reduce the perceived psychological distance of climate issues using construal level theory (how people construe thinking and perceptions of event and objects), with the goal of increasing the relevance of and engagement with climate related issues
- **bridging the psychological socio-spatial distance of climate change** – rather than reducing the psychological socio-spatial distance, the focus is to increase global identification with those in distant locations and increase perceived importance of distant issues using self-categorisation theory (concerned with situational cues to trigger personal, social, or global identity to guide actions).

Loy & Spence (2020) found that proximising climate change by focussing on local areas reduced the psychological socio-spatial distance of climate issues, indirectly motivating public engagement, but suggested that the study should be replicated, and repeat-exposure studies should be conducted. Furthermore, the study found that global identity salience did not impact perceived relevance but did serve to boost a feeling of connectedness when distant climate impacts were reported. It was suggested that increasing global identity salience (increasing a feeling of holistic humanity and identity as group of humans) may be beneficial for climate change communication.

In practice

- Motivations, values, and perceptions should be considered when planning climate-related communications
- Communications should be dynamic and flexible, based on the stage of action a community is in
- The psychological distance of climate change should be reduced and a focus on increasing global identity and connectedness should be considered in climate change-related communications

Climate Impacts on Mental Health

The literature emphasises the impact of climate change on mental health, particularly via exploring notions such as ecological grief. Ecological grief has been defined as a sense of loss, anxiety, despair and hopelessness arising from direct or indirect experiences of environmental destruction related to climate changes. Ecological grief is where the literature started to explore the impacts on mental health across populations, but the more recent literature is moving in a different direction. As explored earlier in this report, we have established that individuals do not need to have

direct contact/experience of environmental impacts related to climate change for climate change to have an impact on our mental health.

Climate anxiety or eco-anxiety is typically defined as the distress related to worries about the *effects* of climate change. Climate change worries are widely reported and score high in many countries across the globe, whereas climate anxiety is reported at low levels in most populations. This extends to people who do not have a direct experience of climate-related extreme events or disasters, so it is not a direct cause and impact relationship.

Established symptoms sit in two clusters: cognitive-emotional impairment (i.e., cognitive and emotional impairment in response to climate change, as reflected in sleep difficulties, nightmares, difficulty in concentrating, and rumination), and functional impairment (i.e., interference with the person's work or school and social life). As stated previously in this report, increasingly this is not something that psychology evidence suggests we need to 'treat' as it is a normal reaction to a credible threat.

To try and gain some consistency a tool was developed to measure climate anxiety across different countries and populations in a consistent manner to be able to compare results from different groups. This widely used and recognised tool to measure climate anxiety (not climate worry which has higher reported levels in most populations) has been used in lots of research, but the cross-country work is less reported, but more revealing about what findings holds consistently between populations and countries, rather than individual country studies.

A study on international and demographic differences of climate anxiety was completed by Tam et al., in 2023. This tool measures climate anxiety without the individual having any relationship with climate risk experience but has been evidenced to be higher when associated with vicarious exposure to climate change impacts such as on social media. It has also been linked with the country's vulnerability to climate change and the lower national ability to prepare and adapt. It has been associated with age groups, but this does not behave in consistent ways across countries. This study established that anxiety was higher in younger people in India and US, older people in China, but had no association in Japan. Evidence has mixed findings relating to demographics. But this cross-country study found weak or no link to gender, education, income (and class in the UK). Conclusion is that the concept holds across societies, but the patterns within societies are not universal/global, so policy makers are warned not to use findings between countries with extreme caution.

The findings from these studies tries to tie the climate psychology with behaviours that might protect or support action on climate change. Overall, findings suggest that climate change does impact on the mental health of populations, and it does predict climate action behaviours overall, but this action is less about resource conservation and support for climate policy and is more associated with sustainable diet and climate activism.

The term climate traumas is a contested term as trauma has a very clear definition. But it is trying to describe how climate change affects group consciousness, memories, and future identity, sometimes independent of direct exposure to climate events. It is concerned with challenges to power. Research on psychological impacts of climate change recognises the clear link to power, influence and politics. It is these influences that the research on moral injury tries to acknowledge.

Moral injury has recently been developed in the last ten years across the psychological literature associated with other contexts outside of climate change. However recently researchers are using this concept to try and understand the psychological impacts across groups and contexts in different ways. It is also being used to try and help explain how we can support our communities and respond to their needs.

Moral injury results from experiencing a moral violation to a deep level. This can occur when we, or another acts against our sense of what is right or when our values are betrayed or violated. Henritze, Goldman, Simon, and Brown (2023) suggest that in the context of climate change, moral injury can be generated by self or other. Moral injury–other is associated with greater anger, while moral injury–self is associated with greater shame and guilt. They argue that using this framework climate change-related distress develops through moral conflict, across agency and responsibility and powerlessness. It takes learning from the power threat and meaning framework developed by the professional body of psychologists in the UK (https://www.bps.org.uk/member-networks/division-clinical-psychology/power-threat-meaning-framework).

Researchers argue that we can explain the differences in ecological distress conditions by identifying how social position informs beliefs and experiences, alongside social identities and an individual or groups ability to influence political power. As we have seen earlier in this report, the findings of studies are not universal findings across countries and populations. Henritze et al (2023) suggest that this can also explain "why the emotions of activists in the global north differ from those in the global south, with the global north's engagement motivated primarily by fear and hope and the global south motivated by primarily by guilt, anger, and fear. Partly this is because of perceived proximity to power, and partly because to those who climate change is still somewhat of an abstract, but recognised concept (global north activists), moral injury–self might be more predominant. Those who frequently witness environmental degradation in their communities will experience moral injury- other (global south activists)". By acknowledging the influence of ethics, values, power, morality, inequalities, accountability, social justice, identity and wellness, we can understand and engage with how the psychological impacts are experienced across populations and how we can address those or understand how they might support different behaviours.

In practice

- Policies and approaches need to be able to appropriately scaffold and hold space for the expression of difficult emotions related to climate change, as well as recognising power and supporting hope for the future
- Individuals do not need to have direct contact/experience of environmental impacts related to climate change for climate change to have an impact on their mental health
- Climate change is associated with negative mental health outcomes (including anxiety, anger, guilt, and hopelessness) and increased risks of harm and clinically significant conditions.
- There is considerable variability in the extent to which climate change and associated forms of distress are experienced throughout the world so care should be taken when transposing policy solutions and tools from other contexts

Summary

This summary of the psychology relating to climate change provides a reference point for further investigation and reflection allowing the reader to consider key concepts, influences and affects within their professional experiences that should be considered and integrated into work relating to climate adaptation and climate security.

This report began by outlining a number of the key conceptual starting points and issues before delving into more depth to support the reader on topics of emergencies, climate and environmental psychology. It has then delved deeper and provided some top-level practical actions relating to the impacts of extreme events, the role of differing cultural positions, positive engagement and behaviour change, ways of communicating about climate and the impact on people's mental health from a psychological perspective.

References

Abrahamse, W. (2019). Chapter 2—Understanding the Drivers of Human Behaviour. In W. Abrahamse (Ed.), *Encouraging Pro-Environmental Behaviour* (pp. 11–25). Academic Press. https://doi.org/10.1016/B978-0-12-811359-2.00002-0

Adger, W. N., Pulhin, J. M., Barnett, J., Dabelko, G. D., Hovelsrud, G. K., Levy, M., Spring, Ú. O., & Vogel, C. H. (2015). Human Security. In P. Aldunce & R. Leichenko (Eds.), *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 755–791). Cambridge University Press.

Albrecht, G. (2011). Chronic Environmental Change: Emerging 'Psychoterratic' Syndromes. In I. Weissbecker (Ed.), *Climate Change and Human Well-Being: Global Challenges and Opportunities* (pp. 43–56). Springer. https://doi.org/10.1007/978-1-4419-9742-5_3

Athy, A. E., Milojev, P., Gray, N. H., Osborne, D., Sibley, C. G., & Milfont, T. L. (2022). Clarifying longitudinal relations between individuals' support for human rights and climate change beliefs. *Journal of Environmental Psychology*, *84*, 101875.

Ayal, D. Y., Tilahun, K., Ture, K., & Terefe Zeleke, T. (2021). Psychological dimensions of climate change: Perceptions, collective efficacy, and responses in Berehet District, north Shoa, Ethiopia. *Climatic Change*, *165*, 1-18.

Balundė, A., Perlaviciute, G., & Steg, L. (2019). The Relationship Between People's Environmental Considerations and Pro-environmental Behavior in Lithuania. *Frontiers in Psychology*, *10*. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02319

Bechtoldt, M. N., Götmann, A., Moslener, U., & Pauw, W. P. (2021). Addressing the climate change adaptation puzzle: a psychological science perspective. *Climate Policy*, *21*(2), 186-202.

Bonnes, M., & Carrus, G. (2017). Environmental Psychology, Overview. In *Reference Module in Neuroscience and Biobehavioral Psychology*. Elsevier. https://doi.org/10.1016/B978-0-12-809324-5.05554-1

Burke, S. E., Sanson, A. V., & Van Hoorn, J. (2018). The psychological effects of climate change on children. *Current psychiatry reports*, *20*, 1-8.

Busch, K. C., & Ayala Chávez, R. (2022). Adolescent framings of climate change, psychological distancing, and implications for climate change concern and behaviour. *Climatic Change*, *171*(3-4), 21.

Chappell, J., & London, E. (2022, November 1). *Mental health and human resilience are key to climate action*. World Economic Forum. https://www.weforum.org/agenda/2022/11/cop27-how-mental-health-and-human-resilience-are-key-to-climate-action/

Charlson, F., Ali, S., Benmarhnia, T., Pearl, M., Massazza, A., Augustinavicius, J., & Scott, J. G. (2021). Climate change and mental health: a scoping review. *International journal of environmental research and public health*, *18*(9), 4486.

Chu, H., & Yang, J. Z. (2018). Taking climate change here and now–mitigating ideological polarization with psychological distance. *Global Environmental Change*, *53*, 174-181.

Clayton, S. (2020). Climate anxiety: Psychological responses to climate change. *Journal of Anxiety Disorders*, *74*, 102263. https://doi.org/10.1016/j.janxdis.2020.102263

Cunsolo, A., Harper, S. L., Minor, K., Hayes, K., Williams, K. G., & Howard, C. (2020). Ecological grief and anxiety: the start of a healthy response to climate change?. *The Lancet Planetary Health*, *4*(7), e261-e263.

Doherty, T. J., & Clayton, S. (2011). The psychological impacts of global climate change. *American Psychologist*, *66*(4), 265.

Eom, K., Kim, H. S., Sherman, D. K., & Ishii, K. (2016). Cultural Variability in the Link Between Environmental Concern and Support for Environmental Action. *Psychological Science*, *27*(10), 1331–1339. https://doi.org/10.1177/0956797616660078

Gregersen, T., Doran, R., Böhm, G., & Pfister, H. R. (2023). Expected climate change consequences and their role in explaining individual risk judgments. *Plos one*, *18*(2), e0281258.

Henritze, E., Goldman, S., Simon, S., & Brown, A. D. (2023). Moral injury as an inclusive mental health framework for addressing climate change distress and promoting justice-oriented care. *The Lancet Planetary Health*, *7*(3), e238-e241.

Kaiser, F. G., Gerdes, R., & König, F. (2023). Supporting and expressing support for environmental policies. *Journal of Environmental Psychology*, *87*, 101997.

Klöckner, C., A. (2020). Communication to change climate-related behaviour. In D. C. Holmes & L. M. Richardson (Eds.), *Research Handbook on Communicating Climate Change* (pp. 116–126). Edward Elgar Publishing.

Lawrance, E. L., Jennings, N., Kioupi, V., Thompson, R., Diffey, J., & Vercammen, A. (2022). Psychological responses, mental health, and sense of agency for the dual challenges of climate change and the COVID-19 pandemic in young people in the UK: an online survey study. *The Lancet Planetary Health*, *6*(9), e726-e738.

Li, D., Zhao, L., Ma, S., Shao, S., & Zhang, L. (2019). What influences an individual's pro-environmental behavior? A literature review. *Resources, Conservation and Recycling*, *146*, 28–34. https://doi.org/10.1016/j.resconrec.2019.03.024

Liu, Y., Cleary, A., Fielding, K. S., Murray, Z., & Roiko, A. (2022). Nature connection, pro-environmental behaviours and wellbeing: Understanding the mediating role of nature contact. *Landscape and Urban Planning*, *228*, 104550. https://doi.org/10.1016/j.landurbplan.2022.104550

Loy, L. S., & Spence, A. (2020). Reducing, and bridging, the psychological distance of climate change. *Journal of Environmental Psychology*, *67*, 101388. https://doi.org/10.1016/j.jenvp.2020.101388

Maiella, R., La Malva, P., Marchetti, D., Pomarico, E., Di Crosta, A., Palumbo, R., Cetara, L., Di Domenico, A., & Verrocchio, M. C. (2020). The Psychological Distance and Climate Change: A Systematic Review on the Mitigation and Adaptation Behaviors. *Frontiers in Psychology*, *11*. https://www.frontiersin.org/articles/10.3389/fpsyg.2020.568899

Manning, C., & Clayton, S. (2018). Threats to mental health and wellbeing associated with climate change. In *Psychology and climate change* (pp. 217-244). Academic Press.

Matiiuk, Y., Krikštolaitis, R., & Liobikienė, G. (2023). The Covid-19 pandemic in context of climate change perception and resource-saving behavior in the European Union countries. *Journal of Cleaner Production*, *395*, 136433.

McBride, S. E., Hammond, M. D., Sibley, C. G., & Milfont, T. L. (2021). Longitudinal relations between climate change concern and psychological wellbeing. *Journal of Environmental Psychology*, *78*, 101713.

Nasi, V. L., Jans, L., & Steg, L. (2023). Can we do more than "bounce back"? Transilience in the face of climate change risks. *Journal of Environmental Psychology*, *86*, 101947.

Ng, S. T., Leung, A. K.-y., & Chan, S. H. M. (2023). Through the lens of a naturalist: How learning about nature promotes nature connectedness via awe. *Journal of Environmental Psychology*, *92*, 102069. https://doi.org/10.1016/j.jenvp.2023.102069

Palinkas, L. A., & Wong, M. (2020). Global climate change and mental health. *Current Opinion in Psychology*, *32*, 12–16. https://doi.org/10.1016/j.copsyc.2019.06.023

Quinn, T., Adger, W. N., Butler, C., & Walker-Springett, K. (2020). Community Resilience and Well-Being: An Exploration of Relationality and Belonging after Disasters. *Annals of the American Association of Geographers*, *111*(2), 577–590. https://doi.org/10.1080/24694452.2020.1782167

Reser, J., Bradley, Graham. L., Glendon, Ian. A., Ellul, Michelle. C., & Callaghan, R. (2012). *Public Risk Perceptions, Understandings, and Responses to Climate Change and Natural Disasters in Australia and Great Britain*. National Climate Change Adaptation Research Facility. https://research-repository.griffith.edu.au/bitstream/handle/10072/49216/84369_1.pdf

Ramadan, R., Randell, A., Lavoie, S., Gao, C. X., Manrique, P. C., Anderson, R., ... & Zbukvic, I. (2023). Empirical evidence for climate concerns, negative emotions and climate-related mental ill-health in young people: A scoping review. Early Intervention in Psychiatry.

Reser, J. P., & Swim, J. K. (2011). Adapting to and coping with the threat and impacts of climate change. American Psychologist, 66(4), 277.

Rice, S. M., & McIver, L. J. (2016). Climate change and mental health: Rationale for research and intervention planning. Asian Journal of Psychiatry, 20, 1-2.

Rickard, L. N., Yang, Z. J., & Schuldt, J. P. (2016). Here and now, there and then: How "departure dates" influence climate change engagement. Global Environmental Change, 38, 97-107.

Schwartz, S. E., Benoit, L., Clayton, S., Parnes, M. F., Swenson, L., & Lowe, S. R. (2023). Climate change anxiety and mental health: Environmental activism as buffer. Current Psychology, 42(20), 16708-16721.

Steg, L., van den Berg, A., E., & de Groot, J., I. M. (2018). Environmental Psychology: History, Scope, and Methods. In L. Steg & J. de Groot I. M. (Eds.), *Environmental Psychology: An Introduction* (2nd ed., pp. 1–11). John Wiley & Sons.

Syropoulos, S., & Markowitz, E. (2023). Our responsibility to future generations: The case for intergenerational approaches to the study of climate change. Journal of Environmental Psychology, 87, 102006.

Tam, K.-P., & Chan, H.-W. (2018). Generalized trust narrows the gap between environmental concern and pro-environmental behavior: Multilevel evidence. *Global Environmental Change*, *48*, 182–194. https://doi.org/10.1016/j.gloenvcha.2017.12.001

Tam, K. P., Chan, H. W., & Clayton, S. (2023). Climate change anxiety in China, India, Japan, and the United States. Journal of Environmental Psychology, 87, 101991.

Tam, K.-P., & Milfont, T. L. (2020). Towards cross-cultural environmental psychology: A state-of-the-art review and recommendations. *Journal of Environmental Psychology*, *71*, 101474. https://doi.org/10.1016/j.jenvp.2020.101474

Van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. Journal of Environmental Psychology, 41, 112-124.

Van der Linden, J. P., Baztan, J., Chouinard, O., Cordier, M., Da Cunha, C., Huctin, J. M., ... & Thomson, K. T. (2020). Meaning in the face of changing climate risks: Connecting agency, sensemaking and narratives of change through transdisciplinary research. Climate Risk Management, 29, 100224.

Van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving public engagement with climate change: Five "best practice" insights from psychological science. Perspectives on psychological science, 10(6), 758-763.

Van der Linden, S., Maibach, E., & Leiserowitz, A. (2023). Exposure to scientific consensus does not cause psychological reactance. Environmental Communication, 17(1), 1-8.

Van Susteren, L., & Al-Delaimy, W. K. (2020). Psychological Impacts of Climate Change and Recommendations. In W. K. Al-Delaimy, V. Ramanathan, & M. Sánchez Sorondo (Eds.), *Health of People, Health of Planet and Our Responsibility: Climate Change, Air Pollution and Health* (pp. 177–192). Springer International Publishing. https://doi.org/10.1007/978-3-030-31125-4_14

Vins, H., Bell, J., Saha, S., & Hess, J. J. (2015). The Mental Health Outcomes of Drought: A Systematic Review and Causal Process Diagram. *International Journal of Environmental Research and Public Health*, *12*(10), 13251–13275. https://doi.org/10.3390/ijerph121013251

Wang, K. (2021). The "One Mind, Two Aspects" Model of the Self: The Self Model and Self-Cultivation Theory of Chinese Buddhism. *Frontiers in Psychology*, *12*. https://www.frontiersin.org/articles/10.3389/fpsyg.2021.652465

Wang, S., Hurlstone, M. J., Leviston, Z., Walker, I., & Lawrence, C. (2019). Climate Change from a Distance: An Analysis of Construal Level and Psychological Distance From Climate Change. *Frontiers in Psychology*, *10*. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00230

Van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. Journal of Environmental Psychology, 41, 112-124.

Van der Linden, J. P., Baztan, J., Chouinard, O., Cordier, M., Da Cunha, C., Huctin, J. M., ... & Thomson, K. T. (2020). Meaning in the face of changing climate risks: Connecting agency, sensemaking and narratives of change through transdisciplinary research. Climate Risk Management, 29, 100224.

Van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving public engagement with climate change: Five "best practice" insights from psychological science. Perspectives on psychological science, 10(6), 758-763.

Van der Linden, S., Maibach, E., & Leiserowitz, A. (2023). Exposure to scientific consensus does not cause psychological reactance. Environmental Communication, 17(1), 1-8.

Weissbecker, I. (Ed.). (2011). Climate change and human well-being: Global challenges and opportunities. Springer Science & Business Media.

Zelenski, J. M., Dopko, R. L., & Capaldi, C. A. (2015). Cooperation is in our nature: Nature exposure may promote cooperative and environmentally sustainable behavior. *Journal of Environmental Psychology*, *42*, 24–31. https://doi.org/10.1016/j.jenvp.2015.01.005

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