



Climate Change and Mental Health

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Abstract

Purpose of Review This essay reviews evidence for the current and potential effects of climate change on mental health.

Recent Findings A growing body of research demonstrates not only that the extreme weather events associated with a changing climate can impair mental health, in particular leading to increases in depression and post-traumatic stress disorder, but also that more gradual changes in climatic conditions, such as rising temperatures and reduced air quality, are also harmful to mental health. In addition, there is increasing evidence that a significant proportion of people might be experiencing a harmful level of anxiety associated with their perception of climate change.

Summary Mental health impacts of climate change have the potential to affect a significant proportion of the population. More research is needed to document the extent of these impacts as well as the best options for mitigating and treating them.

Keywords Climate change · Mental health · Climate anxiety · Solastalgia · Extreme weather

Introduction

The climate is changing due to the influence of human behavior, and these changes seem to be looming much larger in the public eye in just the last few years [1]. In addition, there is growing awareness of the ways in which people will be affected. Early depictions of climate change in public media tended to emphasize melting ice floes and starving polar bears [2], but recent portrayals include more focus on the human impacts, and more people seem to be recognizing the ways in which they are at risk [3].

The objective physical manifestations of climate change can be distinguished from the subjective perception of climate change and its associated risks, and both can affect mental health. This paper describes four pathways through which climate change can affect mental health. First, discrete events such as natural disasters and extreme weather events can have a direct impact on mental health. Second, there are also direct effects from more gradual changes such as rising sea levels,

warmer temperatures, and altered patterns of precipitation. Third, there are indirect effects associated with climate-induced changes to physical and social systems. And finally, there are effects associated with perceptions of climate change. See Fig. 1. I discuss each of these in turn.

Discrete Events

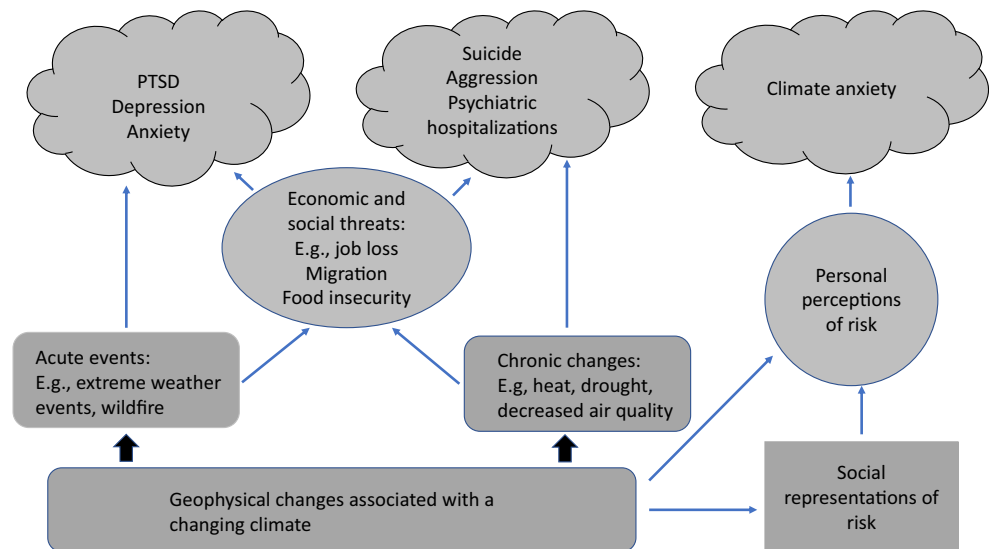
Climate change is projected to lead to increases in floods, droughts, wildfires, and major storms [4]. Psychologists have been studying the impact of extreme weather events on mental health for decades, before those events were widely associated with climate change, and a substantial amount of evidence has been accumulated. Several systematic reviews of the literature have been conducted, concluding that the most common mental health problems in the wake of extreme weather events are depression and post-traumatic stress disorder [5•]; other consequences include substance abuse, domestic abuse, and suicidal ideation. Rates of 20–30% depression and/or post-traumatic stress disorder (PTSD) have been found among survivors of hurricanes [6, 7], and similar rates have been seen among people who have experienced flooding [8, 9]. Wildfires have also been found to have significant negative impacts on mental health [10, 11]. Drought is a more gradual but still dramatic event, and it has been associated with increased risk of suicide among farmers [12, 13]. The reasons for this are debated, probably including simple economic hardship but also potentially linked to grief

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Fig. 1 Impacts of climate change on mental health



about changes to the land and loss of identity linked to occupational role and/or gender [14].

Prevalence estimates for mental health problems vary widely depending on a number of factors, some of them related to measurement issues as well as sample and timing of the assessment, but a conservative estimate might be that 20% of the population affected by an extreme weather event would experience some mental health problem. These mental health impacts may persist long after the original event, with some resolving as the physical and social environment gradually return to something like normalcy but others persisting for months and even years [e.g., 15]. The threat is greater for those who have experienced more direct harm, for women, and for first responders, who tend to have more concentrated exposure to the impacts of the event. It is also greater for those who have fewer financial resources to draw on and less economic power; the fact that low-income and minority communities are disproportionately affected by extreme weather events is well documented [16, 17]. However, vulnerability is lower for those who have good social support systems [18].

Gradual Changes

Less visible than storms or wildfires are the gradual changes in ambient environmental conditions that are part of a changing climate, but these changes will ultimately affect a greater number of people. The feature most clearly associated with climate change is warming. Although the amount of warming will vary across different geographic locations, most places will see higher temperatures as the climate continues to change. Psychological research suggests that this will have negative impacts on psychosocial well-being. For decades, researchers examining the impacts of heat on social behavior, in both field and lab settings, have found a causal relationship with increased aggression [19]. This aggression can be directed

against others, leading to rises in violence and homicide, but also against oneself, with consequent increases in suicide. Recent research has confirmed that higher temperatures are associated with higher suicide rates [20, 12, 21]. Other negative impacts of heat on mental health are also apparent, with data showing that hospitalizations associated with mental health problems are higher when the temperature is warmer [22–25], as are self-reported decrements in mental health [26]. The causal mechanism for these effects is not clear, but may include increased stress and frustration associated with unpleasant conditions (i.e., the frustration-aggression hypothesis), decreased opportunities for normal physical activity [27], or impaired sleep [7].

Other ways in which people will have direct physical experience of climate change include changes in air quality. The burning of fossil fuels is associated not only with warmer temperatures, due to the greenhouse effect, but also with greater pollution; warmer air also holds greater levels of ozone near ground level [28]. The research in this area is less well established than the research pertaining to heat, and often fails to distinguish between different sources of pollution, but there is evidence that declining air quality is associated with psychological distress and psychotic episodes [29, 30]. In addition, air pollution has direct and possibly long-lasting effects on brain function [31]; it can also reduce people's tendency to spend time outdoors, with possible negative consequences for physical health, social relations, and stress [32].

Indirect Impacts

The indirect impacts of climate change will be extensive, and an in-depth examination is beyond the reach of this paper. To briefly review some of the ways in which they are likely to threaten mental health: First, for some people, climate change will result in food and/or economic insecurity, because of

changing occupational structure as well as direct impacts on agricultural conditions [4]. This will increase stress for many families and consequently contribute to a mental health burden. Second, climate change is also likely to increase involuntary migration, as some inhabited areas become less habitable or even vanish (e.g., low-lying islands or coastal communities) [4]. Some of this has already occurred, even in the USA, where the residents of the Isle de Jean Charles off the coast of Louisiana became the nation's first recognized climate refugees [33]. Involuntary migration itself is associated with impaired mental health, as people cope with the loss of home, the need to adjust to new conditions and culture, and potential hostility from residents of location to which they have moved [34]. Third, climate change is associated with increases in conflict, both at the intergroup and at the international level [35]. The US Defense Department has considered it a “threat multiplier” [36].

Inequities in Vulnerability

It is important to recognize that climate change will not affect all groups equally. Some nations, and some areas within nations, are geographically vulnerable: low-lying islands, or areas prone to drought, flood, melting glaciers, or thawing permafrost. Some nations, and some groups within nations, are more economically vulnerable: Financial resources can serve to buffer some of the effects of climate change as well as to help people recover from natural disasters. Both between and within countries, groups that lack sociopolitical power may face more extensive impacts, or have less access to information and other resources that can help them to prepare. The World Health Organization describes women, for example, as more vulnerable to the effects of climate change, largely because of the relative lack of power associated with female gender roles [37]. Other people are simply vulnerable due to physiological differences: People with pre-existing disorders, including mental disorders, are at risk from potential interruption to their treatment; in addition, they may be taking medications that make them more vulnerable to heat [38]. Children are particularly vulnerable due to the fact that their physiological and neurological systems are not fully developed; for example, young children are less able to regulate their body temperature [39]. There is also evidence that early exposure to trauma can permanently impair children's ability to regulate their emotions in later life [40].

Among the categories of people who are disproportionately impacted, indigenous communities are often geographically, economically, and socially vulnerable. In addition, indigenous cultures are typically characterized by close connections to place and to the natural environment. Changes to their environment, or forced relocations, may have a detrimental impact on traditional practices and thus on their culture more generally. Researchers have begun to investigate the impact of climate

change on some such groups, such as the Inuit in northern Canada. Cunsolo reports increases in substance abuse and use of mental health services that were associated with the change in climate [41•]. Among indigenous Saami, Jaakkola et al. [42] discuss some evidence for increased suicidality associated with fear about loss of traditional culture associated with climate change. However, it is also the case that indigenous peoples are experienced in adjusting to changing environmental conditions, and may have resources of cultural knowledge that enable them to adapt to these changes more quickly than majority populations [e.g., 43].

Perceptual Impacts and Climate Anxiety

Recently, attention has begun to shift to the possibility of mental health decrements that are based not on direct experiences of climate change, but rather on anxiety or concern about the problem. Anecdotal reports of climate anxiety have proliferated in the media [44], which has described parents worried about their children's futures as well as young adults who are reluctant to procreate because of their fears about the future. A number of terms, with similar but distinct meanings, have also appeared: Solastalgia [45] was one of the first used to describe an emotional response to environmental degradation, but other terms include ecological grief and eco-anxiety. Climate anxiety—the term used here—can be prompted by grief about the loss of places, activities, and traditions because of climate change, as well as fear about the potential scope of the impact, and above all, the uncertainty about the specific effects, their timing, and their precise location. Surveys in a number of countries have described high levels of worry and concern about climate change [46••].

There is little direct evidence for mental health problems associated with climate anxiety, but a number of clinicians are reporting that their clients are talking about it. Recent work [46••] has presented a measure of climate change anxiety that emphasizes the potential for impairment. Scale items include questions adapted from clinical measures of functional impairment and rumination, such as whether thinking about climate change has made it difficult for the respondent to concentrate, or work, or socialize or whether they have had nightmares or crying spells about climate change. In several US samples (not necessarily representative of the general population), between 17 and 25% of people report experiencing such effects at least some of the time. Climate anxiety is likely to become a greater focus for mental health professionals in the coming years.

The Social Context

To a greater extent than physical health impacts, mental health impacts are mediated by social contexts. Social networks can exaggerate or minimize the threat posed by climate change, which is likely to affect the extent to which people find it a source

of stress or anxiety. Thus, ironically, people who recognize the problem of climate change, because they are attending to reliable sources of information provided by their social networks, may experience decreased mental health compared with those who remain in ignorance or denial. Indeed, worry about climate change is prevalent in a number of countries and is associated with environmental concern [46••]. However, although denial about climate change may temporarily lower stress, the effectiveness of denial as an emotional coping strategy is limited. Because denial fails to address the underlying problem and therefore increases the magnitude of the problem, it is ultimately likely to increase the amount of stress with which people will be faced (associated with phenomena described above such as migration, conflict, food insecurity, and climate anxiety) and, thereby, presumably increase the mental health burden.

The social context can also provide tools to mitigate mental health problems. People with supportive social networks tend to be more resilient to stressors than people without such networks [18]. Thus, one of the ways in which societies should prepare to adapt to climate change is by strengthening the available social support, including mental health treatment, that is available. Resources designed to address physical needs, such as for food and shelter following a natural disaster, are also likely to reduce mental health problems [16].

Psychotherapists should inform themselves about the risks to mental health posed by climate change, and prepare to address them. More research is needed to identify the best treatment options, which will certainly vary according to the source of the problem. For those who are experiencing stress or anxiety based on perceptions of climate change rather than on direct and traumatic experience, social engagement may be an effective way of mitigating their symptoms. Social engagement can enhance self-efficacy and provide a source of meaning as well as furnishing positive social experiences that can themselves reduce stress [47].

Conclusions

The evidence that climate change will have a detrimental effect on mental health is convincing. Effects can be both direct and indirect, and result from both acute events and chronic environmental conditions. The effects can be both mitigated and addressed through social mechanisms, including support networks and mental health services. More informal mechanisms, like getting involved in environmental activism, are also likely to be helpful, especially for those whose symptoms are relatively mild [48, 49].

Many questions remain for further research. We need better estimates of the prevalence of mental health problems associated with climate change, and information about which

categories of people are most vulnerable. We also need information about effective therapies. Most fundamentally, we need research on sources of resilience that will enable people to continue to function effectively as the world that they have learned to live in changes around them.

Compliance with Ethical Standards

Conflict of Interest The author declares that she has no conflict of interest.

Human and Animal Rights and Informed Consent This article does not include any new studies with human or animal subjects performed by the author.

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- Of major importance

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