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## Climate change: The next challenge for public mental health?

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### Abstract

Climate change is increasingly recognized as one of the greatest threats to human health of the 21st century, with consequences that mental health professionals are also likely to face. While physical health impacts have been increasingly emphasized in literature and practice, recent scholarly literature indicates that climate change and related weather events and environmental changes can profoundly impact psychological well-being and mental health through both direct and indirect pathways, particularly among those with pre-existing vulnerabilities or those living in ecologically sensitive areas. Although knowledge is still limited about the connections between climate change and mental health, evidence is indicating that impacts may be felt at both the individual and community levels, with mental health outcomes ranging from psychological distress, depression and anxiety, to increased addictions and suicide rates. Drawing on examples from diverse geographical areas, this article highlights some climate-sensitive impacts that may be encountered by mental health professionals. We then suggest potential avenues for public mental health in light of current and projected changes, in order to stimulate thought, debate, and action.

### Introduction

Anthropogenic climate change is recognized as one of the greatest threats to human health this Century (Costello et al., 2009; Myers & Patz, 2009), leading to wide-ranging consequences globally, which the health community will inevitably face (CMA, 2010; Sibbald, 2013). While there has been increasing focus on the physical health effects of climate change and related environmental alterations, it is only recently that their psychological and mental health impacts have been addressed (Swim et al., 2010, 2011). Indeed, it is increasingly recognized that mental health professionals will also face climate-related mental health issues in their professional practices, particularly those practising in vulnerable areas or in communities relying on their natural environment for their sustainability.

Although knowledge is still limited about the pathways between climate change and mental health outcomes, its impacts on individuals and communities are thought to occur through both direct and indirect mechanisms as a result of a variety of weather events, ranging from acute natural disasters to longer term environmental changes (Berry et al., 2010). Understanding the importance of considering climate change not only as a public health hazard, but also

a mental health determinant is, then, a priority. Responding to this need, this article synthesizes emerging evidence on climate change and mental health globally to inform mental health professionals and to stimulate discussion and debate. Drawing on examples from diverse geographic areas, we highlight some climate-sensitive impacts that may be encountered by mental health professionals and suggest potential avenues for public mental health practice, policies, and programming in light of current and projected changes.

### Climate change and human health

It is well-established that human health is sensitive to shifts in weather patterns and climate change (IPCC, 2014). Evidence suggests that climate change is causing increased risk, frequency, and distribution of foodborne, waterborne, vectorborne, and zoonotic diseases sensitive to climate factors (e.g. *Escherichia coli*, campylobacteriosis, giardiasis, botulism, rabies, malaria, Lyme disease, dengue, West Nile virus) (CMA, 2010; Costello et al., 2009; Frumkin et al., 2008; IPCC, 2014; Parkinson et al., 2005; St Louis & Hess, 2008). It is also expected that climate-related health impacts will result from decreased

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nutritional opportunities from food shortages and agricultural losses, particularly in food-insecure areas (IPCC, 2014).

Variability in temperatures is, in itself, recognized as a risk factor for heat-related deaths, with a robust association between the proportion of hot days and mortality rates (Honda et al., 2013). The epidemiological literature also reports greater risks of injury, disease and mortality from extreme weather events, heat stress and heat-related violence, respiratory and cardio-vascular illness and disease from decreased air quality, and population displacement (CMA, 2010; Costello et al., 2009; Frumkin et al., 2008; IPCC, 2014; Myers & Patz, 2009; Parkinson & Butler, 2005; St Louis & Hess, 2008). Costello et al.'s (2009) seminal report estimated that climate change has been responsible for 5.5 million disability-adjusted life years (DALYs) lost in the year 2000 alone, supporting their claim that climate change is the biggest threat to human health in the 21st century.

In response to the 18th United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties, health and medical organizations from around the globe signed and endorsed the Doha Declaration on Climate, Health, and Well-being in December 2012, calling for the health effects from climate change to become an international policy priority and for 'the health sector to be engaged and informed on climate action' (Doha, 2012, <http://dohadeclaration.weebly.com>). Similar positions were endorsed by various official medical and public health bodies; for instance, the Canadian Medical Association released a policy statement arguing that Canada and the wider medical community must now prepare for the current and potential impacts of climate change on public health (CMA, 2010). Anticipating and responding to these climate-related health impacts is then both a priority and a defining issue for public mental health stakeholders (Campbell-Lendrum et al., 2009; CMA, 2010; Costello et al., 2009; Doha, 2012; Sibbald, 2013).

### **Climate change and mental health**

While physical health concerns from climate change have been increasingly documented in the medical literature, mental health impacts have been given less consideration. Yet scholars increasingly expect that many adverse outcomes from climate change will be psychological and that mental health impacts from climate change will be widespread, profound, and cumulative (Doherty & Clayton, 2011; Swim et al., 2010, 2011). Indeed, epidemiological and qualitative studies have linked climate change to mental health impacts (Berry, 2009; Berry et al., 2010; Cunsolo Willox et al., 2012, 2013a, 2013b;

Fritze et al., 2008), stemming from extreme weather events and natural disasters (storms and floods), sub-acute weather events (droughts, heat waves), environmental degradation, and other environmental changes (global temperature rise, sea level rise, changing precipitation levels, and altered snow patterns and ice regimes in northern regions) (Coyle & Susteren, 2012; Stanke et al., 2012; Swim et al., 2010, 2011).

A wide range of climate-related mental health outcomes have already been documented as a result of both acute and longer term climate and environmental changes: elevated rates of anxiety and mood disorders, acute stress reactions and post-traumatic stress disorders, higher frequency of violence and conflicts, increased drug and alcohol abuse, strong emotional reactions such as despair, fear, helplessness and suicidal ideation, decreased sense of self and identity from loss of place and grief reactions (Berry, 2009; Berry et al., 2010; Coyle & Susteren, 2012; Cunsolo Willox et al., 2012, 2013a, 2013b; Doherty & Clayton, 2011; Fritze et al., 2008; Page & Howard, 2010; Stanke et al., 2012; Swim et al., 2010, 2011). The evidence for psychological and mental health impacts of climate change is drawn from various populations in diverse geographical areas, from rural Australia to Northern Canada.

### *Evidence from Australia and the impacts of drought*

Over the last decade, Australian physicians and researchers have been pioneers in documenting the relation between climate change, weather events and mental health. Using both qualitative and quantitative methods, Australian researchers reported higher levels of psychological distress and hopelessness among people exposed to environmental degradation and disruptions to agriculture as a result of persistent drought and weather disasters (Albrecht et al., 2007; Berry, 2009; Berry et al., 2010, 2011; Fritze et al., 2008; Polain et al., 2011; Speldewinde et al., 2009). In particular, the severe chronic drought in Australia in the last decade has been linked to adverse mental health outcomes, including chronic psychological distress, generalized anxiety, depression and an increased incidence of suicide (Albrecht et al., 2007; Berry, 2009; Berry et al., 2010, 2011; Hanigan, 2012).

Farming communities in Australia appear to be particularly vulnerable to these negative mental health outcomes, with the most severe impacts potentially affecting older farmers, who reported experiencing an overwhelming sense of loss as a result of chronic drought and its consequences (Polain et al., 2011). While socio-economic disadvantage and demographic factors may contribute to the higher susceptibility of farming communities, it may also

partly result from their limited access to mental health services and support (Berry et al., 2011).

Apart from drought-specific impacts, the Australian literature also reported that landscape and environmental degradation may adversely impact mental health. Using dry land salinity as an indicator of environmental degradation, an ecological study in Western Australia found that the level of environmental degradation was associated with an increased risk of hospital admission for depressive disorders, independent of socio-economic status (Spedelwinde et al., 2009). While caution is needed in inferring causality from such results, it is plausible that residents may experience higher psychosocial distress from a range of related mechanisms, such as lower agricultural productivity and economic insecurity.

While much of the Australian evidence on the mental health impacts of climate change was derived from rural communities dependent on agriculture, further literature emphasized that Australian Indigenous populations may be particularly vulnerable to environmental degradation and climate change (Albrecht et al., 2007; Hunter, 2009; Rigby et al., 2011). It has been suggested that the degradation – or destruction – of the land experienced by Indigenous people may compound their loss of cultural traditions, and thus may contribute to higher levels of distress resulting in substance abuse, psychiatric problems, and suicide (Albrecht et al., 2007).

#### *Evidence from Inuit populations in northern Canada*

Inuit populations across Canada's north are experiencing some of the most rapid changes in climate and environment in the world. Indeed, with a projected 5°C warming over this century (IPCC, 2013), northern Canada is already experiencing rising temperatures, decline in sea ice thickness and extent, warming permafrost, increased frequency and intensity of storms, and disruptions to wildlife and vegetation patterns (ACIA, 2005; IPCC, 2013, 2014). These ongoing changes are currently disrupting livelihoods, lifestyles, and health of Inuit (Ford et al., 2010). These issues are compounded by precarious living conditions (housing shortages, overcrowding), pre-existing health disparities rooted in historical trauma with profound social and cultural impacts, and inadequate access to health-sustaining resources in the north (ITK, 2010; Kirmayer et al., 2009; Lehti et al., 2009).

Inuit populations in Canada experience significant mental health disparities relative to the non-Indigenous Canadian population stemming from enduring impacts of colonization (Kirmayer et al., 2009; Lehti et al., 2009; Young, 2012). Suicide rates are often used as the signifier of these mental health disparities, with Inuit communities experiencing rates up to 11 times higher than the Canadian average, and even

higher among teenagers and youth populations under age 25 (ITK, 2010). Further compounding these issues is the lack of access to mental health services and resources, and on-site mental health practitioners typically struggle with limited supports, high staff turnover, and lack of culturally appropriate resources (Kirmayer et al., 2009; Marrone, 2007; Minore et al., 2009; Wexler & Graves, 2008).

Since Inuit continue to live closely with the natural environment, relying on the land for sustenance, livelihoods, and cultural continuity, these alterations in climate and environment have negative impacts on their health and well-being (Cunsolo Willox et al., 2012, 2013a, 2013b), and pre-existing mental health disparities are likely to be further exacerbated by ongoing climate and environmental changes. For example, a recent community-based research study in Nunatsiavut, Labrador, has identified that due to changes in weather, snow, and ice, Inuit in the region experienced regular and serious disruptions to travel- and land-based activities, such as hunting, trapping, and fishing. This study reported that Inuit experienced strong emotional reactions associated with loss of land-based activities, identity, and sense of place, increased family stress, increased opportunities for drug and alcohol usage, and potential increases in suicide ideation. Climate change was also identified as compounding pre-existing forms of stress and distress, and magnifying socio-economic disparities (Cunsolo Willox et al., 2012, 2013a, 2013b).

With similar health disparities and reliance on the land for sustenance and wellness, other Indigenous populations are also likely to experience mental health challenges as a result of their changing environment and lifestyle, especially those living in northernmost areas or those living in ecologically sensitive areas or areas undergoing rapid transformation from human activities such as deforestation and resource extraction. While research on climate change and mental health in the circumpolar regions is relatively new, it is likely that these changes are going to continue and worsen from climate change related impacts (Cunsolo Willox et al., 2014). Indeed, given these early findings from the circumpolar regions and from indigenous populations in Australia, it is becoming an increasingly serious concern that the psychological well-being of communities most sensitive to climate change, including Indigenous, farming, rural, and remote communities, may further deteriorate as climate and environmental changes accumulate in the absence of any significant public health intervention.

#### *Evidence from extreme weather events and floods*

Extreme weather events, such as hurricanes, typhoons, and major storms are anticipated to increase in both

severity and numbers with climate change. Among the climate change associated phenomena, floods have been repeatedly associated with adverse mental health outcomes in countries across the world (Stanke et al., 2012). For instance, a cohort study conducted in the aftermath of severe flooding in England in 2000 found that exposed individuals presented four times the risk of psychological distress, and that this was associated with a significant excess of physical illness among both children and adults affected (Reacher et al., 2004). Another study of flooding in the UK documented that individuals affected by floods suffered from both physical and mental health impacts, and that they perceived the impacts on their mental health and well-being to be the most severe (Tapsell & Tunstall, 2008).

More immediately destructive events – such as Hurricane Katrina in 2005 – have been associated with acute stress and post-traumatic stress disorders, domestic violence, and higher rates of depression and suicide (attempted and completed) in affected communities (Coyle & Susteren, 2012). With the added impacts of drastic disruption of care for people with pre-existing mental health needs, Hurricane Katrina resulted in huge mental health costs, both in health-care services and in lost productivity while simultaneously enhancing socio-economic disparities and access to mental health services. Within the given climate change projections, it is therefore likely that there will be increasing psychological distress globally, directly and indirectly tied to extreme storms, flooding, and other weather-related disasters.

Interestingly, while climate change is likely to be manifest through natural phenomena and disasters, it is plausible that these may be perceived more painfully in the awareness of their origin in human activities. For example, natural disasters are understood to be accidental and to follow a predictable course after their acute manifestations; as a result, they are typically associated with a better recovery and less painful psychological reactions than human-caused disasters (Coyle & Susteren, 2012; Doherty & Clayton, 2011). In contrast, ‘human induced’ disasters

are typically associated with a more complex grieving and recovery process, especially when the disaster is perceived as an event that could have been prevented. Extreme events and disasters related to climate change may expectedly be perceived as human-caused, rather than as unavoidable natural phenomena.

### **Considering pathways between climate change and mental health**

It is generally accepted that climate change and related weather events will primarily impact those with pre-existing vulnerabilities. For instance, most forms of adverse weather conditions – including heat waves, floods or droughts – are likely to exacerbate the stress of affected individuals and communities, and to compound the conditions of those who are already experiencing mental health difficulties (Berry et al., 2010). However, a range of other factors are thought to increase vulnerability to the psychological and mental health impacts of climate change. According to the American Psychological Association’s Task Force on the Interface between Psychology and Climate Change (Swim et al., 2010), climate-related events are anticipated to most severely impact those with reduced mobility (children, elderly, and people with disabilities) or pre-existing mental health challenges, communities who rely closely on the natural environment for sustenance and livelihoods, and populations living in areas most susceptible to climate change, such as coastal areas and circumpolar regions (Doherty & Clayton, 2011; Swim et al., 2010, 2011). Also, as highlighted in the aftermath of many natural disasters, climatic events are likely to be experienced differentially along socio-economic disparities, with low-income people disproportionately experiencing the most negative impacts (Swim et al., 2010).

Climate change is likely to affect individual mental health and community well-being through both direct and indirect pathways stemming from acute or sub-acute weather events as well as from longer term or chronic environmental changes (Table 1). Indeed,

Table 1. Potential direct and indirect pathways through which climate change and related events impact mental health.

Type of climate events	Direct impacts	Indirect impacts
Acute or extreme weather events (e.g. hurricanes, severe storms, floods)	Exposure to danger, injury and death; acute stress and traumatic responses; increased risk of post-traumatic stress disorders	Damage/loss of home and infrastructures; disruption of community and healthcare resources; forced relocations; consequences of injury and physical co-morbidity
Subacute weather events (e.g. droughts, heat waves)	Heat-related exacerbation of pre-existing mental health issues; increased rates of violence and aggressive behaviour	Unemployment from agricultural activities; increased socio-economic disparities and community strain; relocation and urban drift
Long-term environmental changes (e.g. desertification, erosion, biodiversity loss)	Sadness, helplessness and anxiety; loss of sense of place (solace) and grief reactions	Loss of livelihoods or economic means; involuntary migration and related mental health impacts; potential for increased conflicts due to migration and resource scarcity



adverse mental health outcomes may occur directly as a result of extreme weather events and natural disasters, leading to problems such as acute stress or post-traumatic stress disorders. However, climatic and environmental changes may also affect mental health indirectly through their impact on ecosystems and human activities (e.g. agriculture) or through other consequences, such as population displacement (Swim et al., 2010, 2011) – circumstances which can lead to increased stress, hopelessness and adverse mental health outcomes such as depression and suicide (Berry et al. 2010; Cunsolo Willox et al., 2013a; Doherty & Clayton, 2011).

Global rises in temperatures are thought to contribute to adverse mental health outcomes. Indeed, a relationship between rising temperatures and increasing mortality has been established in the epidemiological literature, which appears to be particularly pronounced beyond a certain threshold, such as in heat waves (Basu & Samet, 2002). It has even been suggested that the proportion of death by suicide might increase beyond a certain temperature threshold, possibly through increased impulsive and aggressive behaviours in hot weather (Page et al., 2007; Page & Howard, 2010; Qi et al., 2009).

Finally, the effects of climate change, in particular longer term changes in landscape or environmental degradation, may also manifest themselves through the distressed sense of loss and threat to one's 'sense of place'. Known as 'solastalgia' (conjunction of 'nostalgia' and 'solace'), Albrecht et al. (2007) introduced this notion to conceptualize how environmental changes may lead to psychological distress, based on fieldwork among residents exposed to persistent drought as well as in residents of open-cut mining areas in New South Wales, Australia. Akin to nostalgia, a form of melancholia experienced by people distant from their home and longing to return, the notion of solastalgia describes a similar sense of dislocation and homesickness experienced while one is still 'at home'. The experience of solastalgia is thought to be particularly salient among people with stronger attachment to their land, such as farming communities and indigenous peoples (Albrecht et al., 2007), and has been observed in northern Canada as a response to rapidly changing climate and environment (Cunsolo Willox et al., 2013b).

### **Implications and potential avenues for public mental health**

While the above examples highlight specific geographic locales and pathways, the emerging evidence of negative psychological consequences of climate change can be regarded as early indicators of mental health impacts that may eventually be experienced across the globe, given the seemingly

ineluctable progression of human-induced climate change. Although much of the early evidence on the potential mental health impacts of climate change was derived from the impacts of chronic droughts, there is an increasing body of literature highlighting that a range of weather events and environmental changes are likely to impact individual and community mental health through both direct and indirect mechanisms. In particular, individuals who rely on climate-sensitive activities (agriculture or fishing) or on the natural environment for livelihoods, or those who live in coastal areas are considered especially vulnerable to such adverse mental health impacts (Cunsolo Willox et al., 2013a, 2014; Swim et al., 2010, 2011). Yet, these are the peoples and populations who often have inadequate access to mental health services and resources.

It is thus timely and crucial for the mental health community to anticipate the potential mental health burden of climate change and to begin to strive to mitigate its impacts, especially among climate-sensitive communities that may be at highest risk for negative mental health outcomes (CMA, 2010; Sibbald, 2013). Here we suggest possible avenues for attention and action from a public mental health perspective, not as a prescriptive list, but as a starting point for further consideration, exchange, and debate.

#### *Increasing awareness and education of mental health professionals*

It appears necessary for mental health professionals and related stakeholders to be better aware of, and educated on, climate change and its relevance for human health, particularly mental health. There is also a need to better recognize and assess the potential health impacts of climate change as they arise. Following a call from the Australian medical community (Hamel Green et al., 2009), we suggest that mental health professional curricula further highlight the relevance of the environment to human health, and that the health impacts of climate change be incorporated into the training and continuing education of the mental health workforce, with priority to those serving the most vulnerable population groups (Coyle & Susteren, 2012; CMA, 2010, Doha, 2013).

#### *Increasing preparation for intervention in natural disasters and climate emergencies*

There is also a need to further prepare the mental health workforce to intervene in climate-related emergencies and to deal with their aftermath, such as food and housing crises, death and injury, and their ensuing psychological impacts, such as post-traumatic

stress disorders. Mental healthcare professionals would benefit from further training and guidance in assessing and providing assistance to people suffering from climate-related psychological distress and mental health problems. Comprehensive guidelines would benefit first-responders, primary care professionals, and mental health workers in providing assistance to patients facing climate-related events and natural disasters. Public health officials and health policy planners can also play an important role in researching best practices and in implementing evidence-based strategies to support mental health.

#### *Identifying vulnerable communities and promoting resilience*

Mental healthcare professionals may mitigate mental health impacts of climate change by identifying the most underserved communities and those most susceptible to climate change and extreme weather events, and work to pro-actively address their needs. Mental health professionals may also play an active role in fostering the resilience of those communities by creating preventive strategies and advocate for increased support and adequate healthcare capacity in the most vulnerable communities. For instance, the mental health community may also play a significant role to improve mental health literacy and reduce the stigma associated with psychological distress and mental health issues among vulnerable communities, even before the occurrence of adverse climate-related mental health effects.

#### *Cross-sectoral and interdisciplinary collaboration for knowledge development and mobilization*

There still remain numerous gaps in knowledge regarding the human health consequences of climate change, especially around its psychological impacts and mental health outcomes. Mental health professionals and other public mental health stakeholders now have the opportunity, and indeed the responsibility, to collaborate in developing knowledge on climate-related mental health outcomes and on potential interventions. Mixed-methods research and other innovative approaches are needed to document and investigate the complex association between climatically related exposures and their mental health outcomes as they unfold, as well as to develop and evaluate approaches to enhance the resilience of individuals and communities.

#### *Advocacy and public awareness*

Finally, through their professional perspectives on the mental health impacts of climate change on individuals and communities, mental health professionals are

well-poised to educate patients and the public on potential mental health impacts of climate change and to bring this issue to the forefront of climate discussions and of health priorities. They can also advocate for further efforts to mitigate climate change at the societal and political level, with the perspective of preventing the future health burden for our communities. In this light, it could be argued that mental health professionals – indeed health professionals more generally – have not only the opportunity, but also the duty to call for climate change action (Sibbald, 2013).

#### **Conclusion: looking forward**

While the anticipated outlook of climate change related impacts may appear overwhelmingly negative, it has been argued that this concern may also represent an important mental health promotion opportunity among disadvantaged people and communities (Berry, 2009), and may present an opportunity to enhance our awareness of and action towards climate-sensitive mental health issues. Indeed, it was recently argued that physicians and health professionals will be among the first responders to the effects of climate change (Sibbald, 2013), and the emerging body of evidence on the mental health consequences of climate change further supports this view. Mental health professionals are well-placed to utilize their health expertise, positions, and resources to assist individuals and communities experiencing climate-related mental health impacts, to raise public awareness of these issues, and to advocate for urgent responses at political and societal levels for the well-being of current and future generations (CMA, 2010; Hamel Green et al., 2009; Sibbald, 2013).

That said, as climate change is an evolving global phenomenon, with diffuse responsibility and complex social justice issues, responding to the increasing threats posed to human health and well-being clearly represents an unprecedented challenge to the medical and public health communities, the scale of which may call for a new paradigm for transforming our understanding of human health and well-being and its relationship to the environment and natural world. This view was recently asserted in a manifesto of the *Lancet* calling for a shift ‘from public to planetary health’ (Horton et al., 2014). Building from the evidence presented in this paper, we would suggest that this vision is perhaps even more compelling in relation to global mental health and wellbeing.

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