



MENTAL HEALTH AND OUR CHANGING CLIMATE IMPACTS, INEQUITIES, RESPONSES

2021 Edition



AMERICAN
PSYCHOLOGICAL
ASSOCIATION



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ACKNOWLEDGEMENTS

Authors

Susan Clayton, PhD,
Whitmore-Williams Professor
of Psychology, College of
Wooster

Christie Manning, PhD,
Director of Sustainability
and Assistant Professor of
Environmental Studies,
Macalester College

Meighen Speiser,
Executive Director,
ecoAmerica

Alison Nicole Hill, MPH,
ecoAmerica

Special Thanks

ecoAmerica would like to
thank all of our generous
funders who supported this
work, especially:

Well Being Trust
Camalotte Foundation
Joseph and Susan Gatto
Lise van Susteren
Bonwood Social Investments

Suggested Citation

Clayton, S., Manning, C. M., Speiser,
M., & Hill, A. N. (2021). *Mental Health
and Our Changing Climate: Impacts,
Inequities, Responses*. Washington, D.C.:
American Psychological Association, and
ecoAmerica.

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Editors and Contributors

Gary Belkin, MD, PhD, MPH, Visiting Scientist, Harvard T.H. Chan School
of Public Health, Founder and President, Billion Minds Institute

Jennifer Giordano, Vice President of Marketing, ecoAmerica

Emily Hilton, Executive Assistant to the President, ecoAmerica

Cathy Jordan, PhD, Consulting Research Director, Children & Nature
Network, Director for Leadership & Education, Institute on the
Environment, and Professor of Pediatrics, University of Minnesota

Howard Kurtzman, PhD, Senior Science Advisor, American
Psychological Association

Sasha Lewis-Norelle, Environmental Health and Justice Organizer for
Clean Water Action Minnesota, Core Organizer for Sunrise Saint Paul,
and Leadership Circle Member for MN350's Pipeline Resistance Team

Sarah Milligan-Toffler, President & CEO, Children & Nature Network

Sadiya Muqueeth, DrPH, MPH, Director of Community Health, The
Trust for Public Land

Leah Prussia, DSW, LICSW, SEP, Associate Professor, The College of St.
Scholastica

Rebecca Rehr, MPH, Director, Climate for Health, ecoAmerica

Lise Van Susteren, MD, General and Forensic Psychiatry, Climate
Psychiatry Alliance

Reviewers

A/Prof. Fiona Charlson, PhD (Queensland Centre for Mental Health
Research, Australia)

Kai Chen, PhD (Yale School of Public Health and Yale Center on Climate
Change and Health)

Katie Hayes, PhD (Climate Change and Mental Health Researcher)

Ezra Markowitz, PhD (University of Massachusetts Amherst)

Leyla McCurdy, MPhil (Chair, Climate for Health Leadership Circle)

Tyler Norris, MDiv (Well Being Trust)

Sara Walker, PhD (Oregon Health & Science University)

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WHY WE OFFER THIS REPORT

The American Psychological Association and ecoAmerica are pleased to offer this update of our 2017 report, *Mental Health and Our Changing Climate*. Since that report appeared, concerns about the mental health impacts of climate change have grown among health professionals, policymakers, and the public. Research on climate and health has accelerated and many new findings have emerged. With this update, we aim to provide readers with the information and guidance they need to stay current in this field and take effective action.

Indeed, now is the time to act. Climate change has become a crisis. As recent studies confirm, our society must begin now to adapt to the inevitable impacts of climate change on health and well-being and move toward reducing climate change. We know how to do this. What is needed is the commitment of individuals, communities, and nations to act.

This report provides the latest information on the multiple effects of climate change on mental health, the structural inequities that lead to some populations bearing greater impacts, and how people think about and respond to climate change. It goes on to describe how individuals and communities can strengthen their resilience in the face of climate change and work for climate policies that will lead to a healthier and more just society.

It is encouraging that so many people are now devoting their talents and energies to finding solutions to the climate crisis. We thank the authors of the report and the many scholars and professionals who contributed to the work presented here. We also thank the Well Being Trust and the other funders for their generous support of the preparation of the report.

We hope you will find this report useful and inspiring. Please join us in taking action to overcome the climate crisis and strengthen the health of everyone.



Arthur C. Evans, Jr., PhD
Chief Executive Officer
American Psychological Association



Meighen Speiser
Executive Director
ecoAmerica

EXECUTIVE SUMMARY

*Since the American Psychological Association and ecoAmerica released *Mental Health and Our Changing Climate in 2017*, concerns about the mental health impacts of climate change have grown among health professionals, policymakers, and the public. Research on climate and health has accelerated and many new findings have emerged. This update for 2021 offers the latest information and guidance to help readers stay current in this field and take effective action for a healthier and more just society.*

Our climate is changing at an unprecedented and alarming rate with profound impacts on human life. Climate change-fueled acute disaster events are causing deleterious impacts on human health. Longer term climate change leads to temperature-related illness and mortality, spread of vector-borne disease, respiratory issues and allergic response, compromised fetal and child development, and threats to water and food supply and safety — among other impacts.

Knowledge of the human health impacts of climate change offers a primer for learning the interconnected relationship of physical, mental, and community health and well-being. Compromised physical health can be a source of stress that threatens psychological well-being. *Mental health* problems can threaten physical health, such as weakening the immune system. Community health and well-being are interconnected with both. And, structural and systemic inequity and disinvestment shape all forms of health.

Concern is an important ingredient in mobilizing action. Over three quarters of Americans report that they are concerned about climate change, and those who are most “Alarmed” (about 25% of the United States population) nearly doubled from 2017 to 2021. This concern, however, has not yet translated into needed personal and political action for solutions. *Psychological distance**, belief systems, skepticism, *pluralistic ignorance*, fractured hope, and the need for efficacy act as barriers to a proactive response.

A majority of Americans favor efforts to ensure a sustainable planet for future generations and nearly three quarters believe they have a personal responsibility to contribute. Visible leadership, personal experience, making the health and climate connection, and involvement by health professionals can increase support for solutions and diminish issue partisanship.

*Italicized words can be found in the glossary.

Actions to address climate change benefit mental health. This includes improved mood, social behavior, cognitive function, academic performance, and the senses of control, *agency*, and well-being, and reduced stress, *anxiety*, depression, and post-traumatic stress disorder (PTSD). Local solutions can also enhance community cohesion and *resilience*.

The impacts of a changing climate on mental health stem from both acute events and longer-term change. Climate change-fueled disaster events impact individual mental health and include trauma and shock, PTSD, anxiety and depression that can lead to *suicidal ideation* and *risky behavior*, feelings of abandonment, and physical health impacts (such as digestive conditions and weakened immune system). Community-wide impacts include strains on social relationships, reduced *social cohesion*, interpersonal violence including domestic and child abuse, and increases in stress and PTSD amongst vulnerable populations.

Longer term climate change can cause equally significant mental health impacts. Heat can fuel mood and anxiety disorders, schizophrenia, vascular dementia, use of emergency *mental health services*, suicide*, interpersonal aggression, and violence. Drought can lead to stress, anxiety, depression, uncertainty, shame, humiliation, and suicide, particularly amongst farmers. Air pollution has been linked to increased anxiety and use of mental health services, lower happiness and life satisfaction, and other negative well-being impacts. Changes in the local environment can cause grief, emotional pain, disorientation, and poor work performance as well as harm interpersonal relationships and self-esteem. Displacement can cause a range of negative mental health impacts due to loss of place, community, and livelihoods. The loss of personal identity, autonomy, control, and culture can lead to mental

distress, insecurity, diminished self-worth, sadness, anxiety, depression, anger, and weakened social and community cohesion. A warming climate can also lead to aggravated interpersonal aggression (such as domestic violence, assault, and rape) and interpersonal violence (murder). Heightened anxiety and uncertainty likewise negatively impact social relationships and attitudes toward other people. Migration and competition for scarce resources can lead to *intergroup* hostility, aggression, violence (political conflict, war), and even terrorism.

Concern about climate change coupled with worry about the future can lead to fear, anger, feelings of powerlessness, exhaustion, stress, and sadness, referred to as *ecoanxiety* and climate anxiety. Studies indicate this anxiety is more prevalent among young people. For some individuals it may be associated with increases in substance abuse and suicidal ideation.

The inequities of climate change are vast and significant. While the destructive impacts of climate change will be felt by everyone, the burdens will fall heavily on those oppressed by historic and present day social, economic, and political power dynamics. No group is homogenous, however those who are economically disadvantaged, from communities of color, are indigenous, children, older, or women, have disabilities or pre-existing mental health conditions, or are outdoor workers may be more prone to mental health difficulties as climate change exacerbates pre-existing vulnerabilities. Structural and systemic racism, discrimination, disinvestment, and other challenges coupled with high exposure to climate impacts can lead to: stress, anxiety, depression, mood disorders, PTSD, mental illness, suicide, neurological complications, behavioral problems, cognitive deficits, reduced memory, academic performance, and IQ, violence, crime, higher exposure to violence and crime, and higher rates of incarceration. Some medications used

* If you need help, seek it out. There's a national helpline that offers 24/7 treatment referral and information for individuals and families facing mental or substance use disorders: 800-662-HELP (4357). The National Suicide Prevention Lifeline is 800-273-TALK (8255).

to treat mental illness make people more susceptible to the effects of heat.

The impacts of climate change on mental health can seem overwhelming, however solutions are accessible and abundant. Individuals, families, practitioners, policymakers, community and human service organizations, and communicators can all help to build individual and community-wide resilience with shared responsibility, and to bring about solutions to climate change in order to protect mental health and well-being.

Solutions start with building individual resilience.

Resilient people anticipate risks, take action to reduce their vulnerability to those risks, respond effectively when negative events occur, and recover more quickly. Helping an individual to build resilience is complex and individualized, but these factors contribute to resilient outcomes:

1. Building belief in one's own resilience;
2. Fostering optimism and hope;
3. Cultivating active coping and *self-regulation*;
4. Bolstering interpersonal sources of support;
5. Encouraging connection and care for children;
6. Finding a source of personal meaning;
7. Boosting personal preparedness, and;
8. When health and safety allow, upholding connection to place.

Individuals' capacities to mitigate disaster risk are shaped by policies and decisions made by those in power at the community, state, and federal levels.

Communities can also be a source of stability and safety. Tips to build *resilient communities* include:

1. Expanding disaster response and resiliency plans;
2. Increasing social cohesion including through programs and *social infrastructure* like parks;
3. Addressing disparities;
4. Preserving cultural connections;
5. Involving the community in planning

(particularly community groups who have faced historic discrimination and disinvestment);

6. Strengthening mental health services, including making them more accessible and affordable;
7. Updating physical infrastructure including municipal services and healthy access to nature;
8. Developing a trusted and effective warning and communication system;
9. Training people who will serve the community during a disaster, and;
10. Preparing and responding quickly for post-disaster recovery.

While resilience efforts are necessary to protect the physical and mental health of people and communities in the face of climate change, they fall short of addressing the problem at its root. Rapid transitions to clean energy and transportation, sustainable infrastructure, and sustainable agricultural practices are critical, requiring multilevel governance, policy instruments, institutional capacity, and investment — inclusive of justice, equity, and mental health considerations.

Meaningful local climate solutions are within reach and can be achieved.

Local decision makers can accelerate community climate solutions by:

1. Making a visible climate commitment;
2. Taking stock and aiming quickly for success;
3. Establishing priorities and making informed plans;
4. Engaging and communicating with the community;
5. Embedding the solutions into ongoing local governance and recycling the savings, and;
6. Building on and adapting to results.

Individual people can take several tangible actions at home and in the community to prepare for the

impacts, be part of the solution to climate change, and care for their mental health and well-being with a greater sense of individual security, *self-efficacy*, and control.

Actions in the home include:

1. Having an emergency plan;
2. Creating an emergency kit;
3. Understanding one’s own medical needs;
4. Learning new skills to build resilience;
5. Staying physically active;
6. Sharing concerns with others, and;
7. Actively reducing one’s own climate impact.

Actions in the community can include:

1. Developing and maintaining social connections;
2. Discussing the benefits of solutions to our health with others;
3. Supporting solutions with votes or advocacy;
4. Organizing efforts that bring people together;
5. Starting a community resilience project, and;
6. Joining an existing group working on solutions.

Mental health and health professionals broadly can play a powerful role in influencing their professional communities, the public, and policymakers on solutions to climate change. Visible leadership, education, awareness, communication, and involvement are key components in motivating engagement and action, and Americans in particular trust health professionals to lead in this way.

Steps professionals can take include:

1. Becoming a climate-literate professional;
2. Engaging other health and mental health professionals to share information, ideas, and best practices;
3. Being visible and vocal leaders within local communities through education, dialogue,

participation in planning, programs, and communications, and;

4. Supporting national and international solutions through media outreach, briefings, testimony, research, and advocacy.

I. CONTEXT

OUR CHANGING CLIMATE: A PRIMER

Our climate is changing at an accelerating rate and continues to have profound impacts on human health. This change jeopardizes not only physical health but also mental health. This section provides a primer on the geophysical impacts of climate change.¹

Climate Change Is Accelerating at an Unprecedented and Alarming Rate

From wildfires and drought in the west to excessive flooding in the midwest and east, stronger storms in the east, record-breaking hurricanes in the south, Alaskan communities threatened by rising seas, and intense heat in all areas of the country, the United States is experiencing dramatic increases in severe weather events as a result of human-inflicted damage to our climate.

Climate change is creating visible impacts worldwide. According to the Intergovernmental Panel on Climate Change Sixth Assessment Report, “widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred” and “human influence has warmed the climate at a rate that is unprecedented” (2021).

Climate Change Is Impacting People, Ecosystems, Infrastructure, and the Economy

Extreme temperature events, such as heat waves and droughts, contribute to the over five million deaths per year that can be attributed to climate change (Zhao et al., 2021). In the coming years, wildfires will become more frequent and more severe due to the changing climate, with devastating effects on ecosystems, infrastructure, and human lives (IPCC, 2021). On the other hand, severe winter weather is increasing, which results in human and economic cost as exemplified during the Texas cold wave of February 2021 (Cohen et al., 2021). Since the 1980s, the prevalence of marine heat waves has approximately doubled (IPCC, 2021), which has been connected to poor water quality and disease among marine life and humans (Burge & Hershberger, 2020). The average rate of sea level rise tripled from 1901-1971 to 2006-2018 (IPCC, 2021), leaving coastal communities vulnerable to loss of human lives and economic distress from severe property and infrastructure damage (Rifat et al., 2020).

¹ For more information on climate change, the causes, and the role of human activity, view the National Climate Assessment Report and the Intergovernmental Panel on Climate Change Sixth Assessment Report.

Furthermore, economic disruption across the United States continues with increased frequency of severe weather events, which have been connected to reduced growth in industrial production, increased unemployment, and increased inflation (Kim et al., 2021). There were 22 individual weather disaster events that cost the United States economy over one billion dollars in 2020, shattering the record of 16 from 2011 and 2017 (NOAA, 2020). Almost every child on earth is exposed to at least one climate-related impact such as severe drought and flooding, air pollution, or water scarcity, leaving them vulnerable to malnutrition and disease (UNICEF, 2021). As these climate disturbances become more dramatic and persistent, we must prepare for these climate conditions.

These impacts on our environment, in turn, affect human health and community well-being (Behera et al., 2020).

Communities Are Impacted

Communities' health, infrastructure, and economy are directly connected to our climate (USGCRP, 2018). As temperatures increase, communities experience higher levels of pollution and diseases (IPCC, 2021). Many vulnerable communities are ill-equipped for these increases in heat, which are exacerbated by the urban heat island effect (Heaviside et al., 2017). Severe weather events threaten businesses and vulnerable communities. Pollution and drought undermine our food and water supplies, and drought also increases the prevalence of wildfires that can destroy homes and communities (IPCC, 2021). Long-term social and community effects of climate change include forms of violence, struggle over limited resources, displacement, and forced migration (Cianconi et al., 2020). Together, communities can build resilience to a changing climate (Ziska et al., 2016).

All People are Affected by Climate Change, Some More Than Others

Although certain populations will feel the impacts more severely (USGCRP, 2016), all Americans are affected by climate change — whether or not they are aware of this. Directly or indirectly, Americans are already experiencing a wide array of climate impacts, ranging from economic (higher prices for meat, damages from storms, higher costs for energy to heat or cool their homes, etc.), to quality of life, physical health, and mental health and well-being. The following sections in this report will show the interconnected nature of climate impacts on people and mental health, and how additional support is needed for the populations that are most impacted.

HOW CLIMATE CHANGE IMPACTS PERSONAL AND PUBLIC HEALTH

As severe weather events, poorer air quality, degraded food and water systems, and physical illnesses increase, the direct and indirect impacts on health are becoming better understood. This section highlights the physical health impacts of climate change as a primer to the following section that describes the interconnectedness of physical health, mental health, and community well-being.

Health is more than the absence of disease. Health includes mental and physical well-being, and communities that fail to provide basic services and social support challenge both. As we think about the impacts of climate change on our communities, we need to identify and address the direct effects, as well as the indirect and chronic consequences for human health from damage to physical and social community infrastructure. Some of these impacts are new and caused by a rapidly changing climate, and some impacts are exacerbated due to systemic inequities (e.g., redlining; Hoffman et al., 2020). Regardless of how these impacts surface, whether they occur within a matter of hours or over several decades, the outcomes of climate change are interconnected to nearly all facets of our health.

This section reviews the primary ways in which geophysical changes affect human health in the short and long term.

Extreme Weather and Disaster Events Cause Injury, Morbidity, and Mortality

Recent increases in both the number and scale of disasters such as floods, fires, drought, and hurricanes illustrate the relationship between the acceleration of climate change and severe weather. There were 22 separate billion-dollar weather events in the United States in 2020 (NOAA, 2021). Areas that endure such disasters face a number of risks and difficulties. Direct physical impacts range from brute physical trauma to more pernicious effects, like increased incidence of infectious disease, asthma, heart disease, and lung problems. These physical health impacts interact with mental health impacts — detailed in this report on page 28.

In this section, we use floods, the most common form of disaster event (Myers, 2016), as an initial example to illustrate the ways in which direct health impacts of disasters come about. Please note that while floods are globally the most common disaster event, heat waves are the most deadly (Lewis, 2021) and cyclones are the most expensive (NOAA, 2021).

Physical Injuries from Disaster Events

Disaster events lead to increased rates of death and injury. The most common causes of mortality during floods are drowning and acute physical trauma (e.g., being struck by debris; Alderman et al., 2012). During and after a flood, many people may also sustain non-fatal injuries, such as cuts and broken bones. Hypothermia, electrocution, burns (from flammable liquids on floodwater surfaces), and carbon monoxide poisoning are common after floods (Paterson et al., 2018). On average, 127 people die in flash floods per year in the United States; nearly half of these are vehicle-related and, more tragically, all of them are preventable (National Weather Service, n.d.).

How Disaster Events Impact Infrastructure, Food, Water, and Health

The direct effect of a disaster event is often exacerbated by a cascade of indirect consequences that follow, as well as by underlying factors that were already in place. Disaster events can lead to technological disasters (e.g., power outages); breakdowns in water, sewer, and other infrastructure; or urban fires. Disruptions to medical infrastructure, including the provision of medical supplies, loss of paper-based medical records, and lack of access to electronic medical records in the case of power failure (Paterson et al., 2018), can transform minor issues into major and even fatal problems. In addition, disruptions in other types of services (e.g., cell phone communication, transportation, or waste management) add stress and difficulty during the aftermath of a disaster.

These disruptions may impact people's physical health by making it more difficult to access health care or by potentially increasing exposure to pests or hazardous substances (e.g., when there is no garbage pick-up; Bell et al., 2016). Loss of income, while businesses are closed due to disasters, can be a major threat to food security, especially for non-professionals or small business owners. Disabilities and systemic inequities, like access to transportation, can impact a person or family's ability to evacuate during a flood, and failure to

provide warnings in multiple languages can endanger communities with limited English proficiency.

Health Effects After Disaster Events

Additional health threats follow in the wake of a disaster. Floodwater has been shown to introduce toxic materials, water-borne diseases (e.g., respiratory illnesses, skin infections, and neurological and gastrointestinal illness where there are poor hygiene resources), and vector-borne illnesses (e.g., West Nile; Trtanj et al., 2016). Other after-effects of flooding include heart attack, heatstroke, dehydration, and stroke, particularly when affected areas lack necessary medical supplies (Jonkman et al., 2009, as reported in Alderman et al., 2012). In addition, post-flood mold, due to fungal growth inside houses, can worsen allergy or asthma symptoms. During Hurricane Harvey in 2017, floodwaters carried a high concentration of chemicals as they first rushed through industrial facilities before reaching people's homes. In some areas, the water was also mixed with toxic metals and slightly acidic, so standing water became more dangerous (Bourzac, 2019).

Longer Term Climate Change Could Have Profound Health Impacts

In addition to the acute effects of disaster events, climate change includes rising sea levels, increases in temperature, and changes in precipitation, all of which lead to direct and indirect health impacts. Unlike extreme weather events, these changes are ongoing with no anticipated return to baseline conditions.

Communities in which people's livelihoods are directly tied to the natural environment, through agriculture, fishing, or tourism, are at greater risk. Even within the United States, some areas are clearly being more strongly threatened by wildfires (e.g., the West coast), drought (e.g., California, Arizona), or hurricanes and flooding (e.g., Texas, Florida). Additionally, some communities in coastal Louisiana are losing their land to erosion (Davenport & Robertson, 2016). While some places are relatively protected from direct climate change impacts, no place is completely immune. In

addition, residents of the more protected locations are likely to have to absorb refugees from the more vulnerable locations, with consequences for social conflict as well as experiences of xenophobia and racism.

Severe and Changing Temperatures Are Grave Threats to Health

Periods of higher-than-normal heat result in higher rates of heat exhaustion, heat cramps, heat stroke, hospital admission for heart-related illnesses, and death (Sarofim et al., 2016). During 2004–2018, an annual average of 702 heat-related deaths (415 with heat as the underlying cause and 287 as a contributing cause) occurred in the United States, based on specific ICD-10 codes on death certificates for heat (Vaidyanathan et al., 2020); this is most likely a vast underestimate of total heat-related mortality. In the past two decades, heat-related mortality for people over 65 has increased significantly, reaching a record high 19,000 deaths in 2018 (Watts et al., 2020).

In contrast, extreme winter storms can expose people to hypothermia and frostbite (Bell et al., 2016). As of July 2021, the Texas Department of State Health Services was still determining the official death toll from the unexpected deep freeze that happened across the state in February 2021. Altered growing seasons and ocean temperatures change the timing and occurrence of diarrhea, fever, and abdominal cramps from pathogen transmissions in raw food (e.g., Salmonella; Ziska et al., 2016). Additionally, changing weather patterns influence the expansion of the migration patterns of animals and insects. This expansion has already begun to result in the spread of vector-borne illness, such as Lyme disease, malaria, dengue fever, plague, and Zika virus to new United States geographic areas (Beard et al., 2016; Shuman, 2010). For example, vector-borne illnesses carried by mosquitoes can capitalize on receding floodwaters for mosquito breeding.

Respiratory Issues and Allergic Responses Rise

People exposed to ozone air pollution, which is emitted mostly by vehicles and industrial facilities and is intensified by warmer temperatures, are more

likely to visit the hospital for respiratory issues, suffer from asthma, and die prematurely of strokes or heart attacks (Fann et al., 2016). Pollution has severe acute respiratory impacts, especially for those living near energy-generating facilities reliant on fossil fuels, which are disproportionately communities of color and low-income communities. Long-term exposure to air pollution can make people more susceptible to airborne infections like COVID-19 (Wu et al., 2020). Hotter and drier summers increase the frequency and intensity of large wildfires that contribute to smoke inhalation (Bell et al., 2016). Finally, increasing temperatures and increasing carbon dioxide concentrations can increase the duration and severity of the pollen season, aggravating allergies and asthma (USGCRP, 2018).

Fetal and Child Development Is Compromised

Climate-driven physical stress on mothers can cause adverse birth outcomes, such as preterm birth, low birth weight, and stillbirth (Bekkar et al., 2020; Bell et al., 2016). Scientific research shows that children and developing fetuses are at particular risk from air pollution, heat, malnutrition, infectious diseases, allergies, and mental illnesses, which have detrimental impacts on development (Bekkar et al., 2020; Perera, 2016).

Water and Food Supply Is Threatened

Nutrition and *food safety* can be affected because climate change can lower crop yields, reduce the nutritional quality of food, interrupt distribution chains, and reduce access to food because families lose income. For example, higher carbon dioxide concentrations lower the levels of protein and essential minerals of widely consumed crops such as wheat, rice, and potatoes (Ziska et al., 2016). Barriers to food transport, such as damage to infrastructure and displacement of employees, affect food markets by increasing food costs (Lal et al., 2012). Droughts, floods, and changes in the availability of fertile land lead to hunger and malnutrition, though these changes are less likely in wealthy countries, such as

the United States (Friel et al., 2011; McMichael, 2013). Nevertheless, there will be an increased likelihood of a global food market crisis as climate change accelerates (Paloviita et al., 2016). A two-degree Celsius increase in temperature places 100–400 million people at risk of hunger, according to the World Bank (Friel et al., 2011; McMichael, 2013).

General Fitness Wanes

Increased average temperatures and decreased air quality also lead to changes in the types of activities that people engage in, particularly outdoor activities and recreation. These changes, in turn, may be associated with increased rates of obesity and cardiovascular disease. Physical activity has an important role in childhood and adolescent mental health (Rodriguez-Ayllon et al., 2019), but as heat increases, so do the risks to high school athletes' health, with heat illness being a leading cause of death and disability for them (Gilchrist et al., 2010). Although people may compensate by exercising in indoor environments, reduced access to the restorative potential of outdoor environments may indirectly increase stress and bypass the long-term emotional benefits of outdoor physical activity (Hartig & Catalano, 2013; Pasanen et al., 2014).

MENTAL, PHYSICAL, AND COMMUNITY WELL-BEING: LINKS TO INEQUITY

Physical health, mental health, and community well-being have an interconnected relationship. This section highlights the linkages as a primer. Information on how climate change impacts individual mental health, community well-being, and inequities is in the sections that follow.

Mental Health

The American Psychological Association defines mental health as “a state of mind characterized by emotional well-being, good behavioral adjustment, relative freedom from anxiety and disabling symptoms, and a capacity to establish constructive relationships and cope with the ordinary demands and stresses of life” (American Psychological Association, 2020). The ability to process information and make decisions without being hindered by extreme emotional responses, however, is threatened by climate change. Some emotional response to adversity is normal, and even negative emotions are a necessary part of a fulfilling life. In the extreme case, however, emotional responses can interfere with the ability to think rationally, plan behavior, and consider alternative actions. As this report will demonstrate, climate change directly impacts individual and community mental health, both through acute climate-fueled events and longer-term climate change. In addition, people can be negatively affected by hearing about the traumatic experiences of others, and by fears — founded or unfounded — about their own potential vulnerability (Hudson et al., 2019).

Physical Health

Physical and mental health are tightly connected. Compromised physical health can be a source of stress that threatens psychological well-being, and mental health problems can also threaten physical health. For example by changing patterns of sleep, eating, or exercise and by reducing immune system function.

Community Well-Being

Individual and community health are similarly interconnected. Climate change impinges upon community health first and foremost by harming the health of individuals. The physical impacts of climate change may also destroy or damage infrastructure critical to many people’s health and well-being, such as pharmacies, clinics, power generation, roads, etc. Then, if people decide to leave a community, this migration can further degrade social fabric. Altered local conditions can dramatically curtail the opportunities people have for social interaction, change the ways they relate to one another, and create community tensions, with far-reaching effects in the short- and long-term.

Systemic Inequality Shapes All Forms of Health

Although stress is a normal part of everyone’s life, for populations made vulnerable by social and economic circumstances, the stress of climate change takes a deeper toll. Individual physical and mental health outcomes are shaped not only by biology, but also by a range of social factors that intensify risk for some groups of people, including educational and occupational opportunity, poverty, access to safe housing, adequate nutrition, and affordable medical care. These factors, described in detail by the World Health Organization, are known as the social determinants of mental health (Commission on Social Determinants of Health, 2008). In a society marked by inequality, physical and mental health complications are significantly more likely among members of groups with the lowest access to wealth, power, and status, namely people of color, Indigenous people, immigrants, people with disabilities, older adults, women, children, and LGBTQIA+ individuals. Social, political, and economic disparities put these populations on the frontlines of climate impacts; in addition, climate change exacerbates the negative effects of the social determinants, deepening the burden on people from marginalized groups. This effect is sometimes called stress proliferation (Pearlin, 2005).



CLIMATE CHANGE CONCERNS IN THE UNITED STATES

Concerns about climate change are growing in the United States. This section outlines how perspectives have changed over time and how concern differs across demographic groups.

Concern is a basic and important ingredient in mobilizing engagement and action for personal and collective change (Bouman et al., 2020). In April 2021, 78% adults in the United States reported that they were either very (48%) or somewhat (31%) concerned about climate change (Speiser & Hill, 2021a). Those who are most “Alarmed,” as described by Yale and George Mason University and the Six Americas of Climate Change, nearly doubled between 2017 and 2021 and now comprise nearly a quarter (24%) of the United States population (Goldberg et al., 2021).

Stronger levels of climate worry are expressed by young people. Sixty-seven percent of adults in the United States between 18-23 years old say they are somewhat or very concerned about the impact of climate change on their mental health, compared to 42% of adults in the United States between 56-74 years old (American Psychiatric Association, 2020). Concern also varies across political parties. Eighty-eight percent of those who identify as Democrats and Independents who lean Democrat believe climate change is a major threat compared to 31% of Republicans and Independents who lean Republican (Pew Research Center, 2020). People of color in the United States tend to express levels of concern equal to or greater than those who are white (Elias et al., 2019), though public perceptions often falsely assume their concern is lower (Pearson et al., 2018).



A CLOSER LOOK — The Fight for a Livable Future

Sasha Lewis-Norelle, Environmental Health and Justice Organizer for Clean Water Action Minnesota, Core Organizer for Sunrise Saint Paul, and Leadership Circle Member for MN350's Pipeline Resistance Team



Growing up, it was hard to imagine anything but the current state of the world. I had no concept of what societal and ecological collapse might look like. My concerns involved figuring out where to go to college, what career I'd

want to pursue, and how to best live a healthy and fulfilling life. I had heard about climate change, we all had at some point — but I never expected it to someday consume my every waking moment.

Fast forward 10 years and it now shapes my entire life. I live as an activist and organizer, driven out of fury at our situation. It feels like the more I learn, the more dire the situation becomes. Initially, this knowledge led to anger, which caused me to act. After a while, this just became what I do. I rarely feel similar levels of rage as I did when I began — it's hard to maintain that level of emotion when fighting such a big battle with seemingly little progress.

Part of me wonders if I've lost my passion. Why am I still doing this if I no longer feel the intense emotions that drove me to action in the first place? For a while, I failed to realize the extreme mental and emotional toll this work involves. Constantly thinking and talking about the end of the world, reconciling with the slow rate of progress, and desperately trying to find ways to enact change at any level. Eventually, it was easier to just feel numbness than constant anger and anxiety. Even

when I feel most burnt out and numb, I continue moving forward because of how much is at stake.

No matter what, our world is being forced to change. Climate chaos will crumble institutions and the basic functions of our society that we take for granted. We either have to embrace proactive change or be forced to play catch up as the climate crisis strips away every societal function we saw as normal.

I know that change will be difficult, but that's why I take action. To create a future, with my own hands, that centers sustainability, equity, and environmental justice. This is our chance; change must come, and I will do everything in my power to steer us in the right direction. This is a fight for a liveable and just future, and for the planet itself.

PSYCHOLOGICAL BARRIERS TO A PROACTIVE RESPONSE

While most adults in the United States express concern about climate change, this has not yet translated into the personal and political action necessary to dramatically reduce greenhouse gas emissions. The relationship between concern and action is complex. This section outlines some of the factors that move people toward, or away from, a proactive response to the climate crisis.

Psychological Distance

While many express some level of concern about climate change, for a majority of Americans, and particularly those outside of the “Alarmed” group, it does not feel like an urgent or personally relevant risk. Despite the prevalence of concern across many demographic groups, in an early 2021 poll, fewer than half (42%) of Americans said they have experienced any effects of climate change, and slightly more than that (45%) believed themselves to be personally at risk of harm (Leiserowitz et al., 2021). Climate change is instead a psychologically distant worry: something that will happen to others, in another place, at some unspecified future date (McDonald et al., 2015). This sense of psychological distance creates a barrier to personal and public engagement with the climate crisis (Spence et al., 2012; Jones et al., 2017).

The incremental nature of many climate change impacts may help explain psychological distance. Though climate change has already significantly impacted weather patterns around the United States, its signal is sometimes obscured by the noise of daily and seasonal weather variation (Hulme, 2009; Swim et al., 2009; Weber & Stern, 2011), making it difficult for people to see or feel the direct and personal effects of climate change in their lives. Most local climate change trends, such as increases in extreme rainfall events, are not perceived as personal experience with climate change (Marlon et al., 2021). Ironically, climate-change-fueled variability in temperature extremes may even make it harder for humans to detect climate change; when anomalous extreme temperatures occur frequently, people no longer feel they are all that unusual or alarming (Moore et al., 2019).

Belief Systems and Climate Skepticism

Even a devastating experience with a climate-linked extreme event may not convince some people of the seriousness of climate change. The way people perceive the world is never neutral. Instead, through *motivated cognition*, individuals strive to maintain a world that is consistent with the belief systems and values of their social groups. Many of the proposed solutions to mitigate climate change, such as large-scale governmental programs, regulations on industry and businesses, and a tax on carbon,

directly conflict with a conservative political worldview that prioritizes free, unregulated markets and limited government power (Hornsey & Fielding, 2020). This explains, in part, why a conservative political identity has become a consistent predictor of climate change skepticism (Hornsey & Fielding, 2020). In addition, for a variety of reasons, climate change has become politically polarized in the United States and is perceived as an issue that belongs with the political left (Dunlap et al., 2016).

As a result of this conflict with belief systems and political polarization, research consistently finds that conservative-identifying people in the United States tend to downplay the climate crisis (Campbell & Kay, 2014; Clarke et al., 2019), misremember past winter temperatures as colder than they actually were (Hamilton et al., 2018), or doubt that a wildfire or other disaster was worsened by climate change (Zanocco et al., 2018). Further scientific evidence is unlikely to change this belief-system-driven rejection of climate science; one study found that providing vetted scientific information about the climate crisis did not increase concern among conservative participants, only among liberals (Carmichael et al., 2017). However, climate skeptics represent a small segment of the American public. Only 20% of adults in the United States remain doubtful or dismissive of climate change (Leiserowitz et al., 2021).

Pluralistic Ignorance

Because humans are social creatures, people need to feel that their concern and their actions are socially acceptable and supported; in the absence of clear social support, people may be reluctant to talk about a problem, even though each individual is privately concerned. This illustrates pluralistic ignorance, in which people's beliefs about group consensus can differ from the actual opinions of the individual group members and inhibit the acknowledgement of a problem (American Psychological Association, 2020). Talking about climate change with others is a first step toward engagement, yet only 33% of Americans report even occasionally discussing the issue with friends or family (Leiserowitz et al., 2021). This may be due to what has been termed the "spiral of

silence;" people avoid bringing up climate change with others because they falsely believe it is unwelcome, and widespread avoidance of the topic reinforces this social taboo (Maibach et al., 2016). Sharing data showing that many people are, in fact, concerned about climate change may help disrupt this, for people falsely believe climate worry is not widespread. This pluralistic ignorance is illustrated by the 19 percentage point gap between the number of adults in the United States who believe others are concerned (59%) and actual levels of expressed concern (78%) (Buttel et al., 2020; Speiser & Hill, 2021a).

Fractured Hope

An important ingredient for a proactive response is the belief that climate change can, indeed, be addressed. Those who lack that hope, or hold implicit beliefs that the crisis cannot be solved, are less likely to take steps to do anything about it (Duchi et al., 2020); fear in the absence of hope is more likely to lead to paralysis or denial than to action. Those taking action are not naïvely hopeful; feeling negative emotions in response to climate change can co-exist with hope and serve as an important motivator for getting involved (Wong-Parodi & Feygina, 2021; Chu & Yang, 2019). Negative emotions are probably necessary to move people away from inertia and a reluctance to change their comfortable lifestyles (Hine et al., 2016), but without some measure of hope, negative emotions may just lead to passivity and resignation.

Need for Efficacy

Proactive engagement also hinges on a sense of efficacy. Several studies suggest that at least two types of efficacy are key: self-efficacy, the belief that one has the ability to do what needs to be done, and outcome efficacy, a belief that one's efforts will result in the desired results (Doherty & Webler, 2016; van Valkengoed & Steg, 2019). Self-efficacy and outcome efficacy are important for both personal sphere protective actions (van Valkengoed & Steg, 2019) and actions aimed at changing the political system (Doherty & Webler, 2016).

CLIMATE ATTITUDES THAT CAN SPUR ACTION

Building public support and political will for climate solutions in the United States requires that a broad diversity of people can connect and engage with the issue. This section offers actionable results from recent research: findings that may prove useful to inspire and empower climate action.

Climate Action is Personal

A majority of adults in the United States (64%) say efforts to reduce climate change need to be prioritized to ensure a sustainable planet for future generations (Pew Research Center, 2021). Furthermore, 73% of respondents in an ecoAmerica survey believe they have a personal responsibility to contribute to climate and environmental protection (Speiser & Hill, 2021a). Many adults in the United States, including some who doubt the seriousness of the climate crisis (Hall et al., 2018), are already taking action in their own homes — using energy efficient light bulbs, purchasing energy efficient kitchen appliances, and eating less red meat, for example (Carman et al., 2021). While individual sphere actions are important, the scientific community has emphasized that mitigating climate change necessitates far-reaching transformations in energy production, transportation, food and agriculture, buildings, and more, all of which depend on national and global policy shifts (IPCC, 2018).

Visible Leadership and Personal Experience Can Build Action

People need to see others taking action on climate change, for it is not (yet) a social norm. Thirty-six percent of American respondents in one survey reported seeing friends and family members making at least “a moderate amount of effort” to address the climate crisis (Leiserowitz et al., 2021). Another study found that people were far more likely to get involved in public-sphere action (e.g., donating money, contacting policymakers, attending protests) if they believed their social group was participating (Doherty & Webler, 2016; van Valkengoed & Steg, 2019).

In addition, direct and personal experience with a catastrophic weather event, such as a flood, hurricane, or wildfire, appears to make climate change more salient in people’s minds and increase their propensity toward personal and political action. People in the United Kingdom who had experienced a severe flooding event not only felt more risk from climate change, they also expressed greater support for policies that address climate change (Demski et al., 2017). After living through Hurricane Irma in 2017, Florida residents who responded to a survey were more convinced that the hurricane was caused by climate change, and they expressed greater willingness to pay higher taxes to

address climate change (Bergquist et al., 2019). As of September 2021, as many as one in three people in the United States live in a county that had experienced an acute weather event, extreme enough to be declared a disaster area, in the preceding three months (Washington Post, 2021). As climate-fueled disasters increasingly touch people's lives, the psychological distance of climate change will likely diminish.

Health Is A Priority

Personal health and public health are important to adults in the United States. In fact, protecting personal and public health is a top reason respondents in an ecoAmerica survey say they would support climate change solutions, with 85% saying they have a moral responsibility to create a safe and healthy climate for themselves and their children (Speiser & Hill, 2021b).

People are Making the Health and Climate Connection

Understanding the links between climate change and health has deepened over time. For example, more people understand the connection between climate change and the increasing severity of wildfires. Within just six years, the percentage of Americans who believe global warming will increase physical harm from wildfires has more than doubled. Furthermore, over half of surveyed adults in the United States say global warming will increase heat stroke, asthma, and/or other lung conditions (Kotcher et al., 2020).

The connection between climate change and mental health impacts is also becoming more widely understood. In 2020, 44% of Americans say that severe anxiety will become more common as a result of global warming, up from only 27% in 2014 (Kotcher et al., 2020). More Americans also say that depression will become more common (Kotcher et al., 2020). While most (64%) believe that United States action on climate will benefit their health, there are variations in awareness, particularly between younger and older adults in the United States. Seventy-two percent of young adults between 18-29 say that actions to address climate change will benefit their health, compared to

56% of older adults over 60 (Speiser & Hill, 2021b).

Concern About Health Diminishes Partisanship

Concerns about health provide common ground for discussion and increase climate engagement across the political spectrum (Petrovic et al., 2014; Kotcher et al., 2018). Providing information about the personal health benefits of specific climate-mitigating behaviors can lead to greater expressed willingness to adopt those behaviors, such as replacing driving with other forms of transportation, or eating more vegetarian meals (Amelung et al., 2019). To avoid polarization, discussions of actions that benefit individual and community health can focus on specific impacts such as flooding or heat waves; they do not have to center on climate change.

Health Professionals Are Trusted And Can Lead

Medical professionals, such as doctors and nurses, play a key role in caring for patients recovering from climate change-related injuries and morbidities. They can also help patients make the connection between climate change and their health. In 2021, 68% of adults in the United States said they trust health professionals as a source of climate change information (Speiser & Hill, 2021b). The connection between climate change and health is an area for further growth in health fields. Medical students feel that the relationship between climate change and health should be covered in classes and clinical settings (Ryan et al., 2020). Public health nurses and assistants recognize a role for the public health system in addressing health impacts of climate change but have reported feeling there are limited resources to accomplish this (Polivka et al., 2012).

CLIMATE SOLUTIONS BENEFIT MENTAL HEALTH

When people hear about climate change, all too often it is about the devastating impacts or dire consequences of inaction. The following section offers information to shift the narrative toward solutions and benefits, outlining how climate solutions can support mental health and community well-being.

Fortunately, steps that are taken to mitigate climate change or adapt to its impacts will also have clear benefits to health, including mental health. For example, one of the most important ways to reduce climate change is to limit the burning of fossil fuels. In addition to being climate friendly, a switch to clean energy, such as wind or solar power, reduces the air pollution that comes from fossil fuels. Air pollution not only harms physical health, such as through reduced lung function (Gauderman et al., 2015) but also has harmful impacts on mood, social behavior, and cognitive functioning (Lu, 2020). For example, children exposed to higher levels of urban pollution are more likely to develop attention problems and symptoms of anxiety and depression, as well as reduced academic performance (Perera et al., 2012; Wang et al., 2009). So, cleaner air should enhance mental as well as physical health. Communities with marginalized populations are particularly likely to be exposed to, and suffer the effects of, air pollution near their homes (Colmer et al., 2020; Perera, 2018); if the burning of fossil fuels is reduced across the board, cleaner air can potentially reduce these environmental inequities.

In addition, people can reduce their use of fossil fuels by driving less and walking more. Walking, as exercise, has benefits to mental health, and if people are walking around inhabited areas they may engage in more social interactions, which also benefit mental health (Younger et al., 2008). Driving, meanwhile, can increase risk for depression, anxiety, PTSD, and other mental illnesses (California Department of Public Health, 2016). People who bike or walk to work rather than driving experience lower stress levels than car commuters (Alberts et al., 2012; Lambiase et al., 2010; Martin et al., 2014; Van Dijk et al., 2014). Several studies have shown that using public transportation, rather than driving, is associated with greater community cohesion and reduced symptoms of depression and stress (Allen, 2007; Appleyard, 1981; Bell & Cohen, 2009; Berke et al., 2007; Ma et al., 2021; Reinhard et al., 2018).

Actions that preserve the health of the ecosystem are likely to affect both physical and mental health for people, too. A rapidly growing body of research demonstrates benefits to mental health from time spent in “green” or “blue” (that is, near water) settings. Time spent in,

or with views of, nature is associated with reduced stress, increased physical activity, and social cohesion, leading overall to better mental health (Hartig et al., 2014; Liu et al., 2020). Urban design that provides more green spaces and trees can serve to reduce the urban heat island effect and also help to absorb carbon dioxide. Urban tree cover was linked to a reduction of prescriptions for antidepressants in a recent study (Marselle et al., 2020). This can also instigate a virtuous cycle: the manufacture and disposal of pharmaceuticals used to address psychological problems have a significant carbon footprint (Lewis, 2021), so better mental health could reduce the environmental impact of psychopharmacological therapy. Inequities in access to urban nature, which disadvantage poor and marginalized communities, are another reason to incorporate trees more widely into urban design (McDonald et al., 2021).



Perhaps less obviously, it has been argued that there is an “ethical co-benefit” of having people expand their circle of concern (e.g., to include concern for ecosystems or concern about the ways in which other people are being affected by climate change). This broadened concern could not only lead to action to reduce current inequities in exposure to climate change (as well as other social ills), but also benefit psychological well-being (Lewis, 2021). Taking action to address climate change can provide people, particularly youth, with a sense of control and agency that is beneficial to mental health (Gislason et al., 2021). Similarly, coming together as a community to address climate challenges can enhance mental health and resilience (Berry, 2009; Younger et al., 2008). It has been suggested that community character can be improved if community members come together to address climate change. Bain et al. (2016) studied people in 24 countries and found that participants believed societies that had come together to address climate change would not only be more competent but also more benevolent. If addressing climate change improves social functioning and strengthens *social capital*, that would be a significant co-benefit.

II. THE MENTAL HEALTH IMPACTS OF CLIMATE CHANGE

INTRODUCTION

The mental health effects of climate change are gaining greater public attention. A number of recent reviews and large-scale studies summarize the current state of knowledge (e.g., Charlson et al., 2021; Cianconi et al., 2020; Obradovich et al., 2020). The evidence is unequivocal that exposure to climate- and weather-related disasters has serious impacts on psychological well-being, and that the chronic impacts of climate change, such as higher temperatures and drought, also have significant negative effects on mental health. Research increasingly points to another psychological outcome of climate change: stress, anxiety, and debilitating worry about the present and future damage of higher global temperatures. This portion of the report synthesizes the most recent and enduring peer-reviewed scientific research.

We start by describing short- and long-term mental health effects of climate change, the stressors that accumulate in the aftermath of a disaster, and the impacts that more frequent and intense weather-related disasters have on individuals and communities, with clear consequences for health and well-being. We move on to discussing impacts of more gradual changes in climate, including impacts on aggression and violence, the ways in which people think about themselves and one another, and wider impacts on communities and society. We then discuss evidence for climate anxiety, the negative emotional impacts of understanding and contemplating the climate crisis. Finally, we address the problem of inequity — the fact that certain populations are more vulnerable to these mental health impacts because of systemic disparities in our social and economic systems.

IMPACTS OF SEVERE WEATHER AND DISASTER EVENTS

This section discusses how severe weather and disaster events caused or exacerbated by climate change have both direct and indirect impacts on well-being for individuals and communities. Across all types of severe weather, those who have been marginalized or living in communities facing disinvestment often face a double burden: suffering the consequences of the storm in addition to limited access to health-promoting infrastructure and recovery resources.

Trauma And Shock

Data collected from a variety of sources and using a range of research methods provide converging support for the high potential for both immediate and longer-term psychological trauma from acute climate-fueled disasters, such as floods, extreme storms, heat waves, or wildfires. Direct trauma from extreme events occurs through personal injury, injury or death of a loved one, damage to or loss of personal property and pets, and disruption in or loss of livelihood (Neria & Schultz, 2012; Terpstra, 2011; Simpson et al., 2011). Terror, anger, shock, and other intense negative emotions are likely to dominate people's initial response to a disaster (Raphael, 2007). Interview participants who had experienced a flood used words such as "horrifying," "panic," and "petrified" to describe their experience during the flood itself (Carroll et al., 2009, p. 542; see also Tapsell & Tunstall, 2008). As the initial experience of the event subsides, most people's mental health symptoms resolve (Goldmann & Galea, 2014); however, a number of individuals experience serious problems post-disaster. A 2018 *meta-analysis* of 27 studies, chosen for methodological soundness, found evidence for higher incidence of psychological distress and psychiatric disorder in environmental disaster-exposed populations, measured between one month and 48 months post-disaster (Beaglehole et al., 2018). There is a great deal of variability in findings between studies of disaster mental health impacts, suggesting that characteristics of specific disasters and specific communities are important, as are the timing, measurements, and methods used to assess mental health outcomes. A few studies find no increase in symptoms such as PTSD, while others find PTSD rates as high as 30-40% among the disaster-exposed (Beaglehole et al., 2018; Galea et al., 2005). Some of the highest rates of *psychopathology* observed among those exposed to disasters compared to the general population include PTSD, traumatic stress, general anxiety, depression, phobias, and alcohol and drug impairment (Rubonis & Bickman, 1991; Fritze & Blashki et al., 2008; Trombley et al., 2017; Cianconi et al., 2020; Fernandez et al., 2015).

Post-Traumatic Stress Disorder (PTSD)

PTSD is one of the most frequently reported and well-studied forms of post-disaster mental health outcomes. It has been measured in populations affected by hurricanes, such as Hurricane Katrina (2005) in Mississippi and Louisiana, where at least one in six people met the diagnostic criteria for PTSD (Galea et al., 2008; Kessler et al., 2008; Lowe et al., 2013), and Hurricane Sandy (2012) which caused PTSD symptoms in approximately 14.5% of affected residents in and around New York City (Boscarino et al., 2014). At least a quarter of Houston residents impacted by Hurricane Harvey in 2017 reported symptoms meeting the diagnostic criteria for PTSD three months after the event (Fitzpatrick, 2021). PTSD rates were even higher for Puerto Ricans six months after Hurricane Maria (2017): 43.6% for those displaced within the island, and 65.7% for those forced to flee to Florida in the aftermath of the storm (Scaramutti et al., 2019). Experiencing a wildfire also puts people at significant risk of suffering from PTSD; rates of PTSD among residents exposed to a wildfire on a Greek island were as high as 46.7% one month after the event (Psarros et al., 2017). Firefighters who respond to major wildfires are also impacted; 10-20% experience PTSD (Groot et al., 2019). Floods are another type of climate-change-fueled disaster that creates high levels of PTSD. For example, among flood victims surveyed in Great Britain, PTSD rates were between 26% and 43% (Munro et al., 2017).

Anxiety, Depression, And Poor Mental Health Outcomes

PTSD is linked to a host of other mental health problems, including higher levels of suicide, depression, anxiety, substance abuse (Cianconi et al., 2020; Charlson et al., 2021; Cruz et al., 2020; Lee et al., 2020), insomnia (Psarros et al., 2017), and even violence, aggression, interpersonal difficulties, and job-related difficulties (Simpson et al., 2011). In communities impacted by Hurricane Katrina, suicide and suicidal ideation more than doubled within two years of the hurricane and 49% of people in affected

areas developed an anxiety or mood disorder such as depression (Kessler et al., 2008; Galea et al., 2007). Survivors of acute events may turn to alcohol or other substances to cope with their trauma (Alexander & Ward, 2018); higher rates of substance abuse have been observed in PTSD sufferers in the wake of Hurricane Katrina (Kishore et al., 2008; Flory et al., 2009) and Hurricane Sandy (Lowe et al., 2017). In addition to substance abuse, post-disaster stress has also been shown to make people more likely to engage in other types of behavior that contribute to poorer health (e.g., smoking, risky behavior, and unhealthy eating habits) (Beaudoin, 2011; Bryant et al., 2014; Flory et al., 2009).

Post-disaster mental health symptoms may linger for months or even longer; timeframes of 5-7 months after the event are typical in research on mental health effects, but some studies have found mental health impacts after a year or more. Victims of a flood disaster express psychological distress several years following the flood (Simpson et al., 2011; Crabtree, 2012; Alderman et al., 2012). Five years after living through a wildfire, rates of PTSD and depression were 10.9% in highly affected populations compared to rates of 1.9% for PTSD and 4.6% for depression among those minimally affected by the fires (Bryant et al., 2018).

Individuals who experience particularly intense, multiple, or long-lasting acute events — such as a flood that inundates the home, or more than one life-threatening extreme storm or wildfire — are likely to experience more severe trauma and may be even more susceptible to PTSD and other types of mental health problems (Edwards & Wiseman, 2011; Foudi et al., 2017; Hobfoll, 2007; Matthews et al., 2019; Trombley et al., 2017). Tangible losses, such as damage to the home or other personal items, increase the risk of psychological distress, even several years after the disaster (Tapsell et al., 2002; Schwartz et al., 2017). Incidence of PTSD is more likely among those who have lost close family members or experienced significant property loss (Wasini et al., 2014), and the likelihood of suicide is higher among those who have been exposed

to more severe disasters (Norris et al., 2002). Among a population of refugees, those exposed to multiple traumatic events showed a higher rate of immediate and lifetime PTSD and lower probability of remission than those refugees who had experienced fewer traumatic events (Kolassa et al., 2010).

Impacts Of Stress On Physical Health

High levels of distress and anxiety also appear to be linked to physical health effects. One research review of 22 longitudinal studies found PTSD symptoms linked to later poor physical health and higher utilization of healthcare services, increased pain, and higher risk of death from any cause (Garfin et al., 2018). Other studies find chronic distress results in a lowered immune system response, leaving people more vulnerable to pathogens in the air and water and at greater risk for a number of physical ailments (Alderman et al., 2012; Simpson et al., 2011). Sleep disorders also increase in response to chronic distress (Han et al., 2012). Doppelt (2016) has described potential physiological responses to the stress of climate change, such as increased levels of the stress hormone cortisol, which if prolonged, can affect digestion, lead to memory loss, and suppress the immune system.

Strains On Social Relationships

One review of research on impacts of natural disasters identified problems with family and interpersonal relations, as well as social disruption, concerns about the wider community, and feelings of obligation to support others (Norris et al., 2001). Within the community, feelings of connection and social support often increase directly after an acute event, as offers of aid pour in from those within and outside of the community. Once offers of help begin to diminish, residents report feeling abandoned and alone (Kaniasty, 2020; Hayes et al., 2020). Displacement can also curtail social connections among community members, particularly during the initial, chaotic phase of recovery.

Within households, the psychological distress of an acute event can have serious consequences. After an

extreme storm or flood, children may lose a sense of their home as a safe and secure environment (Tapsell & Tunstall, 2008). More significantly, a number of studies find that violence in the home, including domestic abuse and child abuse, often increases in families who have experienced disasters (Fritze et al., 2008; Harville et al., 2011; Keenan et al., 2004; Yun et al., 2010; Gearhart et al., 2018; Rosenthal et al., 2021). A 2021 review of the literature points to certain conditions that make post-disaster violence against children more likely, including caregiver stress and household economic stress (Cerna-Turoff et al., 2021).

Community Displacement And Migration

Experiencing a disaster so intense that one is forced to leave one's home and community is particularly traumatic, and displacement is linked to more than double the risk of PTSD (Schwartz et al., 2018) along with higher negative mental health outcomes, anxiety, depression (Cruz et al., 2020; Lamond et al., 2015; Munro et al., 2017; Schwarz et al., 2017; Woodhall-Melnik & Grogan, 2019), and insomnia (Belleville et al., 2021). Those whose homes are damaged by a flood, storm, or wildfire may need to be relocated, sometimes multiple times, before resettling permanently. Family relationships may suffer, particularly if family members experience separation. Parents may find themselves less able to be effective caregivers because of their own stress, and this places increased stress on children (Pfefferbaum et al., 2016). Children may have to attend a new school or miss school altogether, putting them at further risk for psychological distress or behavioral issues (Pfefferbaum et al., 2016). Displacement disrupts the wider social connections people depend upon for support, and this appears to be a key mechanism through which it adversely affects mental health (Torres & Casey, 2017; Bryant et al., 2017). Displaced people who stayed in a shelter had significantly higher rates of PTSD compared to those placed with family or friends after Hurricane Sandy (Schwartz et al., 2018). Navigating post-disaster life and accessing social services and healthcare in unfamiliar surroundings adds further strain and stress.

When people lose their home to a wildfire, flood, or rising sea levels, or when it becomes unsuitable for human habitation, they may decide to migrate. Although it is difficult to identify climate change as the singular causal factor in a complex sequence of events affecting migration, a common figure is that 200 million people will be displaced due to climate change by 2050 (Fritze et al., 2008), becoming *environmental refugees*. Migration in and of itself constitutes a health risk. A review of the global literature on migrant mental health suggests the experience of multiple stressors, including mourning, physical danger, and marginalization, among others, can lead to PTSD rates as high as 47% in immigrant populations (Bustamante et al., 2018).

Migration separates people from personally or culturally important places. Adger et al. (2013) find that being forced to permanently leave one's home territory can threaten both a sense of continuity and sense of belonging. Because of the importance of connection to place in personal identity (Scannell & Gifford, 2016), displacement and migration can leave people literally alienated, with a diminished *sense of self* and increased vulnerability to stress.

Community Mental Health Post-Disaster

The stress burden of a disaster is greater the closer and more direct the exposure, but all members of a community, even those not directly impacted, are likely to feel its effects, and some may show symptoms of post-traumatic stress (Cianconi et al., 2020). For example, healthcare workers and social service providers become worn down by the constant exposure to the trauma of others and thus are at risk themselves for psychological distress, including PTSD, anxiety, and secondary traumatic stress (Powell et al., 2020). Bearing witness to neighbors' struggles with damaged homes reduces the sense of well-being for those in the wider community (Hudson & Poussin, 2019). The physical destruction of infrastructure and community resources, such as communication systems, water and sewer facilities, and the electrical grid, puts extra stress and strain on all residents and make it difficult for people to access basic necessities (Klotzbach

et al., 2018; Wyczalkowski et al., 2019). Residents whose homes were spared may nevertheless face economic insecurity because of destroyed or damaged workplaces, or greater housing insecurity due to the sudden need to house those displaced (Rosenthal et al., 2021).

Of course, these stresses hit hardest for those who were already underserved by existing systems and infrastructure prior to the acute event, as detailed further below in the inequities section of this report. Disasters may reduce the public's trust in community institutions meant to serve them (Thoresen et al., 2018), and disasters tend to increase economic inequality in a community, which can undermine community cohesion (Howell & Elliott, 2019).

A CLOSER LOOK — American Youth: Angry, Terrified, and in Despair

Lise Van Susteren, MD, General and Forensic Psychiatry, Climate Psychiatry Alliance



As the expert witness on the psychological damages to 21 youth plaintiffs in the Juliana v. US case, I saw first-hand the fear, anger, and despair that climate disruption is causing young people. I also saw the role the US government has in

not only failing to take appropriate action but in engaging in practices that make it worse.

Awash in feelings of betrayal — worldwide — children are flooding the streets in protest. Seeing a planet that may soon be unrecognizably damaged, some see no future.

UNICEF reports that one billion children are at ‘extremely high risk’ from climate disruption. The Lancet published a recent global survey of youth showing that climate anxiety affects the daily life of nearly half of them; and 63% of US youth say the government is failing them. Children, as with many of us, have personally experienced the floods, fires, and hell-on-earth heat. They can see what is happening with their own eyes.

Experiencing, witnessing, or even hearing the details of life-threatening events can cause deep and persistent psychological trauma, unleashing a multitude of conditions including post-traumatic stress disorder (PTSD). Struggling with images of future harm they can’t put out of their minds, some children suffer pre-traumatic stress.

When disasters are experienced as entirely “accidental,” healing from the injuries or losses is less arduous. With disasters due to human error, carelessness, or negligence, healing is dramatically encumbered by the knowledge that the disasters could have been averted.

Natural disasters are no longer experienced as entirely natural anymore: their frequency and intensity is caused by the dangerous choices humans are making.

Our children cannot be relieved of their fears with words. Real menace is thrusting them into existential uncertainty. We must acknowledge that the psychological well-being of our children is on the line. Holding ourselves accountable for their outrage and despair is crucial and time-sensitive. Unless we act, the injustice they and future generations face will have them regard adults today, who stood by informed and idle, as depraved.

Across the globe, youth are crying out to leaders of the world: “Can you hear us now? What’s the plan? Will you be helping to save us because we know that our survival depends on government action.”

More of us are waking up, looking for policies that chart a course for ambitious and equitable climate action. But we have to hurry because time is running out.

IMPACTS OF LONGER-TERM CLIMATE CHANGE

This section describes how the incremental impacts of a changing climate affect human well-being, at an individual and community level. Though the slow-onset impacts of climate change are not as dramatic as acute events, and often garner less media or research attention, the implications for mental health are equally significant.

The Psychological Stressors Of Heat

Because of climate change, hot days are getting hotter and occurring more often; heat waves are longer, more frequent, and more intense; and record cold days are becoming less common. Extreme heat can be deadly; heat is responsible for more deaths in the United States than cold (National Weather Service, 2020).

Heat is a physiological and psychological stressor. Accumulating research evidence finds that increased temperatures are linked to troubling mental health outcomes (Obradovich et al., 2020), including mood and anxiety disorders, schizophrenia, and vascular dementia (Liu et al., 2021). Increases in mean temperature are also associated with greater use of emergency mental health services (Mullins & White, 2019; Thompson et al., 2018). This is observed not only in hot countries like Israel, Australia, and parts of the United States, but also in relatively cooler countries such as France and Canada (Vida et al., 2012). Higher temperatures have been linked to increased levels of suicide (Lee et al., 2006; Kim et al., 2019; Mullins & White, 2019; Thompson et al., 2018). It appears that higher temperatures are an additional source of stress that can overwhelm coping abilities for people who are already psychologically at risk.

Heat can have less obvious negative effects on mental health, as well. Heat is uncomfortable, and over time, this creates a low-level stress burden which may not manifest as a clinically diagnosable mental health problem. In a survey study of residents across the United States, people reported lower positive emotions, greater negative emotions, and feelings of fatigue when temperatures in their area exceeded 70 degrees Fahrenheit, and this effect was especially pronounced at temperatures over 90 degrees Fahrenheit (Noelke et al., 2016).

Interpersonal Aggression and Violence Exacerbated by Heat

The psychological impacts of warmer weather on aggression and violence have been extensively studied. Both lab-based experiments and field-based surveys have demonstrated a causal relationship between heat and interpersonal aggression (Anderson, 2001; Simister & Cooper, 2005; Stevens et al., 2019; Younan et al., 2018; Plante et al., 2017; Miles-Novelo & Anderson, 2019). In other words, as the temperature

goes up, people's behavior becomes more aggressive toward others. This has led aggression researcher Craig Anderson (2012) to predict a demonstrable increase in violence associated with increased average temperatures. The relationship between heat and violence may be due to impacts of heat on *arousal* and irritability, with subsequent decreases in attention and self-regulation, as well as to an increase in the availability of negative and hostile thoughts (Anderson, 2001; Anderson et al., 1995; Miles-Novelo & Anderson, 2019). Loss of sleep associated with higher temperatures also appears to lead to increased irritability (Obrodavich et al., 2017). In addition, heat can have a negative effect on cognitive function, which may reduce the ability to resolve a conflict without violence (Cedeño Laurent et al., 2018; Pilcher et al., 2002). It has been calculated by Ranson (2012) that between 2010 and 2099, climate change will cause an estimated additional 30,000 murders, 200,000 cases of rape, and 3.2 million burglaries due to increased average temperatures.

Drought & Desertification

Drought is strongly associated with psychological distress, including generalized anxiety and depression, particularly for farmers and farming communities (O'Brien et al., 2014; Stanke et al., 2013; Austin et al., 2018; Howard et al., 2020). Climate change is increasing extremely dry weather (drought) and decreasing soil fertility (desertification) in many parts of the world, including the United States (Overpeck & Udall, 2020). For farmers, drought is a multi-dimensional threat. Threats include increasing workload while reducing the likelihood of a good crop, raising the risk of financial hardship, and causing uncertainty about the future. It may also decrease the availability of food and water, create a sense of shame and humiliation, and degrade the land — and the farmer's connection to the land (Vins et al., 2015). Prolonged drought is increasingly linked to farmers' suicides around the world (Hanigan et al., 2012; Ellis & Albrecht, 2017; Santos et al., 2021).

Declining Air Quality

The factors that contribute to climate change, particularly the burning of fossil fuels, also contribute to air pollution and particularly, increased particulate matter. Air pollution can increase the risk of anxiety and other mental disorders as well as the utilization of mental health services (Lowe et al., 2021); it also impairs cognitive function and predicts lower ratings of happiness and life satisfaction (Lu, 2020). There is evidence as well that air pollution impairs cognitive development in children, even when encountered prenatally (Yorifuji et al., 2017). In addition, air pollution is linked to degraded social behavior, ranging from irritability to higher rates of criminal behavior (Lu, 2020).

Loss Of Personally Important Places

One way to characterize the chronic impacts of climate change is as a sense of loss (Tschakert et al., 2019; Cunsolo & Ellis, 2018). Loss of relationship to physical places is a substantial part of this. As climate change alters the areas where people live, many are likely to experience a feeling that they are losing a place that is important to them — a phenomenon called *solastalgia* (Albrecht, 2005; Albrecht et al., 2007). Solastalgia may arise gradually due to the slow onset of changes in one's local environment. However, there are times, such as in the aftermath of a natural disaster, when the local environment changes abruptly. Silver and Grek-Martin (2015) described the emotional pain and disorientation associated with changes to the physical environment that was expressed by residents of a town damaged by tornadoes, even by residents who had not experienced personal loss.

Loss of place is not a trivial experience. Many people form a strong attachment to the place where they live, finding it to provide a sense of stability, security, and personal identity. People who are strongly attached to their local communities report greater happiness, life satisfaction, and optimism (Brehm et al., 2004); whereas work performance, interpersonal relationships, and physical health can all be negatively

affected by disruption of place attachment (Fullilove, 2013). Grief may also be felt differently for Indigenous communities who have strong emotional connection to the land itself (Winerman, 2019). It can be difficult to isolate the effects of place loss from the other aspects of the experience of environmental damage, but Scannell and Gifford (2016) were able to experimentally show the beneficial impacts of place. They found that people who visualized a place to which they were attached showed improved self-esteem and sense of belonging relative to those who visualized a place to which they were not attached.

The chronic changes of warming climate will require many people to abandon their homes due to unlivable temperatures, drought, lower food yields, lack of access to water, and sea level rise. Whereas sudden disasters tend to result in involuntary, shorter-term, and shorter-distance displacements, some researchers suggest that the chronic impacts of climate change lead to migrations that are voluntary and permanent (Cattaneo et al., 2019). Sea level rise and coastal subsidence are also prompting the planned relocations of communities in danger of being engulfed by the sea. As with other types of displacement, planned relocations (also called managed retreat) result in a range of negative mental health impacts due to loss of place and community connections as well as loss of livelihood and associated financial hardship (Dannenberg et al., 2019).

Loss Of Personal And Occupational Identity

The loss of personal identity, which is tied to aspects of daily life, can be profound. Losing treasured objects when a home is damaged or destroyed is one way climate change can impair an individual's sense of self and identity. Personally significant objects help afford us a continuing sense of who we are, particularly those objects that represent important moments in life (e.g., journals), relationships (e.g., gifts or photographs), or personal/family history (e.g., family heirlooms) (Dittmar, 2011). A study by Carroll et al. (2009) indicated that flood victims were particularly troubled by the loss of personal possessions, including items

they had made themselves or had spent time and effort to procure or maintain.

Another group whose identity is often deeply connected to land and weather is farmers. The emotional well-being of farmers in a region of western Australia, which has undergone noticeable changes in local climate conditions, rises and falls with local weather conditions. Farmers there report spending much of their time following weather changes, assessing future weather possibilities, and even shutting themselves away to avoid seeing the impacts of weather on their farm (Ellis & Albrecht, 2017). Loss of identity has also been observed in farmers in Australia suffering from drought (Stain et al., 2008). This is likely due to the tight relationship between identity and place-based occupations like farming and fishing (Devine-Wright, 2013). When disasters significantly alter a place, they may threaten or destroy these place-bound occupations. Indeed, because severe storms and high temperatures disrupt economic activity (Hsiang, 2010), climate change may have an effect on occupational identity in general. Loss of occupation has been associated with increased risk of depression following natural disasters (Wasini et al., 2014).

Loss Of Autonomy And Control

Climate change has the potential to disrupt expectations and habits learned over years, as well as intensifying certain daily life inconveniences, which can have psychological impacts on individuals' sense of autonomy and control. The desire to be able to accomplish basic tasks independently is a core psychological need, central to human well-being (Deci & Ryan, 2011), and may be threatened for people who have difficulty leaving home due to dangerous conditions. For example, volatile weather and temperature swings in colder climates during the winter will lead to more frequent freeze-thaw cycles, leading to greater wear and tear on infrastructure such as roads, bridges, and sidewalks as well as icy streets and walkways (Seeley, 2012). This may make mobility a challenge — particularly for older adults and people

with disabilities. Climate change will impose other lifestyle changes for many, such as in typical recreation habits or food choices. Exposure to unwanted change in one's environment can also reduce an individual's sense of control over their life (Fresque-Baxter & Armitage, 2012; Silver & Grek-Martin, 2015), which may limit the ability to cope with daily stressors and lead to increases in anxiety and depression (Schönfeld et al., 2016).

Loss Of Culture

Increased stress from climate change has been particularly pronounced in cold climate Indigenous communities because of rapidly rising temperatures. Cunsolo Willox et al. (2013) and Middleton et al. (2020) have collaborated with members of the Nunatsiavut Inuit community in the subarctic region of Canada's Atlantic region to examine the impacts of climate change on their lives. Members of the community, who all reported a strong attachment to the land, said they had noticed changes in the local climate and that these changes have had negative effects in their community. As a result of altered interactions with the environment, community members reported *food insecurity*, sadness, anger, increased family stress, and a sense of diminished self-worth and community cohesion.

Inuit people see cold climate as part of who they are, something that has shaped their culture and their people. Warmer temperatures due to climate change prevent them from following cultural practices on the ice and land, including the cultivation and consumption of traditional food, and this has changed the way they relate to one another and to their traditions (Middleton et al., 2020). Elders expressed specific concern for loss of their traditional ecological knowledge (Cunsolo & Ellis, 2018) and the preservation of Inuit language and culture, which have impacts on mental well-being and social cohesion (Ostapchuk et al., 2015).

Intergroup Hostility And Aggression

Climate change may increase hostility and conflict through several mechanisms. An experimental study showed that people who were thinking about climate change became more hostile to individuals outside of

their social group and more likely to support the status quo and its accompanying social inequities (Fritsche et al., 2012). In a 2016 study, survey respondents displayed more negative attitudes toward policies to support minorities and immigrants when temperatures were high (Cohen & Krueger, 2016). Violence may increase when competition for scarce natural resources increases, or when *ecomigration* brings formerly separate communities into contact and they compete for resources like jobs and land. Converging evidence suggests that climatic changes may be a contributing factor to intergroup violence (e.g., political conflict and war) (Hsiang et al., 2013; Hsiang & Burke, 2014; Plante et al., 2017; Miles-Novelo & Anderson, 2019; Koubi, 2019).

In addition, restraints on crime weaken when existing social institutions are disrupted, thus increasing the likelihood of criminal behavior. For example, when government resources are devoted to damaged infrastructure from natural disasters, they may be diverted away from criminal justice systems, mental health agencies, and educational institutions, all of which tend to help mitigate crime (Agnew, 2012). Agnew (2012) further points out that the effects of climate change are likely to promote crime by, "increasing strain, reducing social control, [and] weakening social support."

Some research also suggests that climate-change-driven drought may increase circumstances that push people toward engaging in terrorism. When drought leads to a sudden loss of livelihood, security, and status, with little hope of regaining it through continued efforts, acts of terrorism may be, to some, a method of last resort to regain independence, control of one's life, and social status (Plante et al., 2017).

CLIMATE ANXIETY

Even among people who have not experienced direct impacts of climate change, simple awareness of the problem may be accompanied by negative emotions including fear, anger, feelings of powerlessness, or exhaustion (Moser, 2007). These negative emotions do not constitute mental illness, but watching the slow and seemingly irrevocable impacts of climate change unfold, and worrying about the future for oneself, children, and later generations, may be a source of stress and sadness (Searle & Gow, 2010; Hickman et al., 2021).

Albrecht (2011) and others have termed such reactions “ecoanxiety.” Because ecoanxiety can arise in response to other environmental problems, such as rapid loss of species and environmental pollution, the term “climate anxiety” is often used to describe reactions to climate change in particular (Clayton & Karazsia, 2020). However, Pihkala (2020) notes that while anxiety is a main focus of recent discussion, climate change can evoke other emotions, too, including fear, grief, and even guilt.

In general, levels of concern about environmental changes, and about climate change in particular, are high. The Yale Program on Climate Change Communication, which has tracked emotional responses to climate change for more than a decade, found in 2021 that 64% of Americans said they were at least “somewhat worried” about global warming and 25% said they were “very worried.” In a 2020 survey by the American Psychological Association (2020) about two-thirds of respondents said that they felt at least a little “eco-anxiety” (defined in their survey as anxiety or worry respondents feel about climate change and its effects), and about one-quarter of them said they felt a lot.

Some evidence suggests that climate anxiety is more prevalent among younger adults and that older populations are less affected, perhaps because they do not see themselves living in a future that has been substantially affected by climate change (American Psychological Association, 2018; Chen et al., 2020; Clayton & Karazsia, 2020; Searle & Gow, 2010). A national poll in the summer of 2019 found that 57% of United States teens said that climate change makes them feel afraid (Kaplan & Guskin, 2019). Another 2019 study found that college students with very little personal experience of disasters showed a spike in stress, depression, and anxiety through the awareness brought on by social media discussions of the impacts of an acute event (Lee & Lee, 2019).

Anxiety is not necessarily pathological. A feeling of anxiety is an emotional signal that warns us that we face a threat, and it can prompt attention to, and attempts to cope with, that threat (Ojala et al., 2021).

Climate change is indisputably a threat of which we need to be mindful. But when anxiety becomes too great in proportion to one's ability to deal with the problem, it can begin to affect mental health. Although climate anxiety does not always impair mental health, evidence suggests that it can. In a United States sample, "perceived ecological stress," defined as personal stress associated with environmental problems, predicted depressive symptoms (Helm et al., 2018). Clayton and Karazsia (2020) developed a measure designed to look for clinically significant impacts of climate change concerns such as impaired ability to work or sleep, or intrusive thoughts. They found that 5-9% of their United States samples described themselves as "often" or "almost always" experiencing such symptoms, and 17-27% said they experienced them at least "sometimes." Negative emotions about climate change have also been found to be negatively correlated with self-rated mental health in many countries (Ogunbode et al., 2021).

Climate anxiety and related mental health effects can emerge more strongly among people who have experienced, or anticipate experiencing, direct effects of climate change. For example, the very existence of low-lying islands is threatened, and there are reports of stress and climate anxiety among residents of such islands (Asugeni et al., 2015; Gibson et al., 2020). National surveys of Australians' responses to climate change, conducted by psychologist Joseph Reser and colleagues (Reser et al., 2012), found that 86% of their sample reported some concern, and 20% reported feeling "appreciable distress" associated with climate change. In a nationally representative 2018 survey (Minor et al., 2019), 38% of Greenlanders reported that they felt fear "moderately" or "very strongly," 19% reported moderate or strong sadness, and 18% reported moderate or strong hopelessness. In Tuvalu, a country at significant risk from climate change, 95% reported distress from climate change; it was described as impairing normal functionality in 87% of cases (Gibson et al., 2020).

Among Inuit people in Canada, climate change has been linked to increases in substance abuse and suicidal ideation (Cunsolo Willox et al., 2013).



A CLOSER LOOK — A Solution for Climate Anxiety: Spending More Time in Nature

Sarah Milligan-Toffler and Cathy Jordan, PhD, Children & Nature Network



There is substantive science behind what many intuitively understand: spending time in nature makes us feel better. The Children & Nature Network has long advocated for the mental health benefits of time outdoors, which include a sense of calm and restoration; measurable reductions in stress, anxiety, and depression; and enhanced mood, resilience, and ability to cope with adversity (Vanaken, 2018; Tillmann, 2018). But what do you do when the place that should offer respite is itself a source of anxiety?

We know that many young people are grappling with the impact that climate change will have on their lives. Low-income and Black, Indigenous, and other communities of color are often the most vulnerable to the worst impacts of climate change such as flooding, drought, fire, and extreme heat. However, studies also show that nature's benefits are relatively greater for those who are negatively impacted by economic disadvantage, systemic racism, trauma, opportunity gaps, and other challenges (Alderton, 2019; Islam, 2020).

Just being out in nature can mitigate some of children's anxiety about climate change. There is increasing evidence that regular connection to nature helps children — and all of us — feel calmer and less

stressed. When children become overloaded by adverse experiences, their stress response systems pump out cortisol, which in itself, without recovery, negatively impacts sleep, metabolism, and physical health overall. A stress response system in high gear decreases children's ability to focus and increases the likelihood of illness.

A 2020 review of peer-reviewed studies conducted by Meredith et al., found that spending as little as 10 to 20 minutes in nature daily may prevent stress and mental health strain for people between the ages of 18 and 22. Physiological markers of reduced stress included decreased heart rate and blood pressure; psychological markers included less depression, anxiety, and fatigue — and increased vigor, positive affect, and feelings of calm.

We know that hands-on engagement in the outdoors allows children to experience these benefits and develop a deep love of the natural world. Engaging children even in small actions can help them feel like they are part of the solution. Planting pollinator-friendly plants, picking up litter, or creating compost from food waste and using it in a garden are all climate-friendly ways for children to engage with the natural world. Even the very young can take positive actions for themselves, their communities, and the environment.

As a global community, we are realizing now more than ever how much we need nature in our daily lives. Now is the time to invest in ensuring that equitable access to healthy, outdoor green spaces exist in every community, to support health and well-being, and to build the resiliency of people and the planet.

III. HOW INEQUITY IS EXACERBATED BY CLIMATE CHANGE

POPULATIONS DISPROPORTIONATELY IMPACTED BY CLIMATE CHANGE

This section describes some of the populations made more vulnerable to the mental health impacts of climate change, particularly impacts arising from disasters and their aftermath. It is important to note that none of these groups are homogenous; the disproportionate impacts on individuals within these at-risk populations vary greatly depending on their exposure to multiple forms of discrimination and disparity. For example, the experiences of an Indigenous woman cannot be reduced to simply the experiences of women plus the experiences of an Indigenous person; the intersectional effects of these identities are likely more than additive.

While the destructive impacts of climate change will be felt by everyone in some way, the burdens of climate change will fall heavily on those oppressed by historic and present day social, economic, and political power dynamics. Climate change is a destabilizing force that exacerbates pre-existing socially determined vulnerabilities, making some populations more prone to mental health difficulties. The same groups also often have fewer resources or capacity to cope with the effects of climate change.

The Economically Disadvantaged

Disasters are harder on people with low incomes, or living in poverty, compared to those with higher incomes. Living in poverty is linked to an array of negative outcomes, such as poorer physical health, greater likelihood of being the victim of a crime or other form of violence, and higher risk of depression and anxiety (Ridley et al., 2020). Individuals with serious mental illness may be more likely to be unhoused and/or less likely to regulate their own behavior appropriately in response to environmental conditions (Lohmus, 2018; Schmeltz & Gamble, 2017).

All of these factors contribute to the higher risk of mental health issues experienced by poor people after a disaster (Benevolenza & DeRigne, 2019). The economically disadvantaged are more likely to experience high levels of stress, depression, and anxiety after a disaster because, first, they are more likely to be exposed, for poverty tends to push people to live in areas with higher disaster risk (Hallegatte et al., 2020). People living without shelter, the unhoused, are a particular population of concern due their extreme vulnerability to weather-related disasters. Second, a lack of monetary resources makes it difficult for people experiencing poverty to address potential risk factors in their home environment or to evacuate to safety as a disaster approaches. An analysis of damage severity data from homes in Puerto Rico directly impacted by Hurricane Maria in 2017 found that renters (compared to

homeowners) and lower income households (compared to other income levels) were at significantly greater risk of severe home damage, with low income renters at particularly high risk of their homes being completely destroyed by wind damage (Ma & Smith, 2020). Finally, those with lower wealth have little access to the material resources that help people cope in the aftermath of a disaster (Benevolenza & DeRigne, 2019).

Communities of Color

Discrimination and systemic racism in the United States expose racial and ethnic minority populations to a wide array of environmental risks while simultaneously denying them access to the financial and political resources that could help to buffer the impacts. The experience of discrimination is linked to mental health issues such as depression, anxiety, and psychological distress (Williams, 2018). Systemic racism, embedded in the social and economic fabric of society, also gives rise to stressors such as fewer economic and educational opportunities, financial limitations, housing insecurity, and higher risk of police violence, incarceration, and exposure to crime (Williams, 2018). All of these factors put a heavier mental health burden on Americans of color, making them more susceptible to the mental health effects of climate change.

Historical discriminatory housing policies, such as redlining and racially-restrictive covenants, mean that people of color are also significantly more likely to live in risk-prone areas. Formerly red-lined neighborhoods in the United States tend to have lower tree cover, less greenspace, and more concrete, making them significantly hotter than other areas. In fact, formerly red-lined neighborhoods experience, on average, about 2.6 degrees Celsius warmer temperatures than non-red-lined areas (Hoffman et al., 2020). Urban neighborhoods with greater concentrations of residents of color are also more likely to lack parks, natural areas, and other forms of greenspace (Rowland-Shea et al., 2020). This not only increases heat risk, but also deprives these communities of the

mental health buffer offered by urban greenspace (Hartig & Kahn, 2016). Furthermore, locations in which communities of color live have been disproportionately targeted for the siting of dangerous and polluting facilities such as toxic waste dumps, petrochemical plants, highways, and other sources of water and air pollution (Bullard, 2001), increasing their risk of neurological and other health complications from exposure to industrial pollution such as particulate matter (USEPA, 2019; Johnston & Cushing, 2020). The risks of exposure are increased during acute events like hurricanes (Flores et al., 2021).

The influences of race and ethnicity on the mental health impacts of climate change can be difficult to distinguish from the influences of economic disadvantage, given the interactions of race and ethnicity with economic status in the United States (Chen et al., 2021). However, race and ethnicity play an important role in economic disadvantage. Race, ethnicity, and origin-based discriminatory housing policies have systematically denied Black, Latinx, Indigenous, and other people of color the ability to accumulate wealth through homeownership. Disparities in wealth leave people of color with fewer choices of where to live and decreased ability to permanently move or temporarily evacuate in response to growing climate impacts. Members of marginalized groups are also less likely to have access to a public cooling center, or to own a working air conditioner or fan (Gronlund, 2014), and, if living in an area high in crime, they may be hesitant to open a window, further increasing risk from heat. Disinvestment in urban areas with high concentrations of people of color results in outdated infrastructure, such as a lack of extreme weather warning systems, inadequate storm surge preparedness, and clogged or deteriorating storm sewer systems, which places residents at greater risk for the physical impacts of climate change (Highfield et al., 2014; Hendricks & Van Zandt, 2021), and in turn, may increase their risk of mental health burdens.

Indigenous Peoples

Indigenous communities threatened by climate change are found around the world, including the United States. In Alaska, for example, some native communities have seen their villages literally vanish due to thawing permafrost, and others are facing that outcome in the near future (Chapin et al., 2014). Other Indigenous communities have already been displaced by eroding shorelines on the Gulf coast (Tu & Lin, 2021).

For Indigenous Peoples, climate change may threaten not only their physical home, but also their ways of life, including access to traditional food and culturally meaningful practices (Rigby et al., 2011; STACCWG, 2021). Because their personal and cultural identity is often directly tied to the land through history as well as lived experience, they may experience greater threats to mental health (Cochran et al., 2013; Cunsolo Willox et al., 2012; Durkalec et al., 2015; Middleton et al., 2020; Voggesser et al., 2013; STACCWG, 2021). Indeed, many Indigenous Peoples define health to include a connection to the local environment (Green & Minchin, 2014). In evocative language, Inuit community members interviewed by Durkalec et al. (2015) reported that an inability to go out on the sea ice — due to a changing climate — would make them feel like they “have no health,” “can’t breathe,” and would “be very sad,” “be lost,” or “go crazy.” In further work, a systematic review of the research literature on Indigenous populations (Middleton et al., 2020) found that suicide, depression, and anxiety were linked to both acute and chronic weather events and associated changes in place attachment, culture, food security, and cultural practices. Ford et al. (2010) reviewed case studies of several Inuit communities and reported weakening social networks, increased levels of conflict, and significant stress associated with relocation or even thinking about relocation.

Preserving well-being in Indigenous communities requires foregrounding local *worldviews*, values, and perspectives in climate resilience and solutions planning. Notably, Indigenous Peoples’ connections

to place often include long-term knowledge about the specific local climate and about how to adapt to changing environments, which can suggest ways other groups in the broader society can respond to the consequences of climate change (Lewis et al., 2020).

Children

Nearly half the world’s children (about one billion) currently live in countries that are at an extremely high-risk from the impacts of climate change, making them particularly vulnerable and exposing them to several mental health implications. This includes exposure to multiple climate and environmental shocks coupled with inadequate essential services, such as water and sanitation, healthcare, and education (UNICEF, 2021). Children worldwide are impacted by climate change, exposing them to the mental health implications that follow.

Climate impacts may have long-term or permanent effects, such as changing the developmental potential and trajectory of a child. Like physical experiences, traumatic mental experiences early in life can have lifelong effects. MacLean et al. (2016) found that experiencing an extreme weather event before age five resulted in higher levels of anxiety and depression among adults. The increase in climate change related disasters can be expected to affect children through direct exposure, associated stress and trauma, and interruption in schooling (Kousky, 2016). Food insecurity is exacerbated by climate change, and malnourishment or severe threats to health during the early years is associated with behavioral and motor problems, lower intelligence test scores, fewer years of schooling, and reduced economic activity as adults (Galler et al., 2021; Kousky, 2016). Studies have documented that high levels of stress during childhood, such as those associated with the experience of a natural disaster or displacement, can affect the development of neural pathways in ways that impair memory, executive function, and decision-making in later life (Shonkoff et al., 2012).

The impact on children starts even before birth. Fetuses are vulnerable to the climate-related disruptions

experienced by their mothers, with possible impacts including cognitive deficits and mood disorders along with physical health conditions (Pacheco, 2020). Additionally, some infections associated with climate change can have a major and permanent impact on neurological development, as can be seen in children exposed prenatally to the Zika virus (Mlakar et al., 2016).

Children may experience PTSD and depression following traumatic or stressful experiences to a greater degree than adults. Children may demonstrate more severe distress than adults following extreme weather events (Fritze et al., 2008). For example, high rates of PTSD were found in children two years following a flood (Fernandez et al., 2015). Children's mental health can also be affected not just by their own experiences of stressors such as natural disasters, extreme weather, and ecomigration, but also by their vicarious experiences of the mental health of their caregivers (Simpson et al., 2011).

Children are also at increased risk from disruptions to the educational system. Extreme weather events can damage or destroy schools, preschools, and daycare facilities or make them inaccessible to teachers and students. After Hurricane Katrina, for example, 196,000 public school students had to change schools, and many of them missed a month or more of schooling. In this case, because the hardest hit school districts were also some of the worst performing ones, some students benefited by transferring to better schools. Overall, however, the effects on school achievement were negative (Kousky, 2016). High temperatures also interfere with classroom learning as heat impacts memory, stamina, and cognitive performance which can all impact a student's ability to learn and retain information (Park et al., 2021). Further, school-based outdoor recreational opportunities associated with mental and physical well-being may be curtailed by extreme heat (Mygind et al., 2019).

Children face impacts from the disaster-related loss of social support networks. During adversity, people

need to draw upon all of their personal resources — material, social, and emotional. However, when disasters hit an area, individual and household resources become depleted and community resources may not go far, especially if one's social network is small or the community is poor (Hobfoll, 1989; Ungar & Leibenberg, 2013). Children are especially vulnerable, as they must rely on their social networks to accomplish what they, by virtue of their physical and legal status, are unable to do for themselves. A study of children impacted by Hurricane Katrina found that those who were hit hardest by the storm also experienced less social support, likely because people in their immediate support network were themselves suffering (Banks & Weems, 2014). In a review of studies, Lai et al. (2017) found that a lack of social support was associated with greater post-traumatic stress among children who had lived through a natural disaster.

Children are experiencing climate anxiety. Research does not yet show what proportion of children and young people may be experiencing climate anxiety as a stressor; however, there is growing evidence that children are worried (Burke et al., 2018; Strife, 2012); this itself can be a threat to mental health (Clayton, 2020). A survey of 10,000 young people aged 16-25 in ten countries around the world found high proportions expressing concern, negative emotions, and pessimism about the future; 84% were at least moderately worried, and 45% said their worries negatively affected their daily lives (Hickman et al., 2021). In addition to becoming aware of children's concerns, parents and researchers need to identify ways to help children to be resilient in the face of what is likely to be an increasing source of anxiety (Ojala, 2013).

Older Adults

Older people are particularly susceptible to climate impacts due to limits on mobility as well as vulnerability to heat. A study by Dominelli (2013) found that when transportation and other infrastructure broke down due to floods, heat waves, or freeze-thaw events (all potentially climate driven),

A CLOSER LOOK — Natural Connections: Collaboration with the Environment

Leah Prussia, DSW, LICSW, SEP, Associate Professor, The College of St. Scholastica



I have worked as a clinical social worker for over 20 years in Anishinaabe and rural communities throughout Minnesota, and I have seen firsthand the impacts of climate change on mental health.

I am not alone. In 2019, I worked with the Minnesota Department of Health on a survey examining mental health professionals' knowledge, attitudes, and practices associated with climate change. We found over 61% (n=500) of the respondents were seeing client symptoms associated with climate change. Unfortunately, only 10% felt adequately equipped to address the concerns. Thus, most of my work as a practitioner/educator has been focused on how to mend personal/planetary relationships that foster wellness.

Through Elders' teachings and varied experiences with Tribal, non-profit, state, and county entities, I have learned that health and community wellness must expand beyond the medical model and include relationships with all that lives: the rooted, four-legged, swimmers, crawlers, fliers, Aki-Earth, and Nibi-water. Interdisciplinary connections are a given in addressing health. What is often overlooked is collaboration with the natural world in the healing process.

Based on wisdom from Anishinaabe Elders and Western Ways of knowing, I mentor the next generation of mental health professionals on how to work with behavioral health responses associated with our changing planet. I train

students to remember who they are in relation to the land and how to access the natural world as an active partner in the healing process. Students learn to assess and regulate their own nervous systems in relationship with the natural world so they can remain actively engaged at micro (personal, family), mezzo (social, organizational), and macro (Tribal, federal) level systems work.

At the micro level, students learn somatic literacy skills to address primary and secondary trauma responses, which include observing, listening to, and trusting the innate rhythms of the body. Students also practice connecting with the natural world — the collective nervous system — through purposeful engagement and sensory awareness. Somatic literacy helps those incapacitated by solastalgia, eco-anxiety, or environmental grief, move from flight and freeze responses to healthy fight responses and social engagement. Ultimately, the goal is to practice assessment and intervention through the lens of planetary health, recognizing that human behavior impacts the world. By tending to personal dis-ease and restoring natural connections with the environment, we spark communal prosocial behaviors toward our planetary relatives. The hope is collaboration with the natural world will ripple to embodied personal and planetary healing.

access to formal care services for older people and others was often disrupted. Further, older people tend to have a reduced thermoregulatory capability, so that exposure to heat can have an especially great impact on their physical and mental health (Cianconi et al., 2020; Lee et al., 2018). Extreme temperatures or pollution can also make it more difficult for seniors to engage in regular outdoor activities, thus depriving them of the associated physical and mental benefits.

Women

The impacts of climate change are being shaped by gender and gender roles (Alston, 2013). Around the world, the experienced effects may vary due to local expectations and cultural norms. For example, increased suicides among farmers as temperatures rise and crops suffer are primarily observed in men (Carleton, 2017). But overall, women are expected to experience greater effects from climate change, including mental health impacts (Chen et al., 2020; Hrabok et al., 2020) Women typically have greater caregiving responsibilities, which can be an additional source of stress when those in their care, particularly infants and children, are threatened by direct climate change impacts or by consequences such as food insecurity or displacement (Evertsen & Van der Geest, 2019; Jost et al., 2016). Extreme weather events are associated with an increase in intimate partner violence against women (Wonders, 2018). Considering pregnant women in particular, high temperatures are associated with increased risk of adverse birth outcomes (Guidice, 2020), which can threaten women's mental health.

People with Disabilities

Disasters disproportionately affect people with disabilities due to structural impediments and disruption of services. Little research examines the challenges people with disabilities confront during an acute event (Smith et al., 2017), though a number of harrowing experiences were described in a Government Accountability Office (GAO) report to the Federal Emergency Management Agency after

Hurricanes Irma, Maria, and Harvey in 2017. In the report, the GAO catalogs a wide array of issues during and after the hurricanes, such as food and water delivered to locations that were inaccessible to those with mobility constraints, extended power outages endangering the lives of people on respirators, public disaster information being shared only via radio (inaccessible to people who cannot hear), and a lack of supplemental transportation services to help disabled people get to and from shelters (GAO, 2019). Hurricane Katrina and Hurricane Rita survivors with disabilities faced significant difficulties in evacuating as water levels rose because of a lack of wheelchair lifts on buses as well as a lack of shelters with disability accommodations (Davies & Hemmeter, 2009, cited in Benevolenza & DeRigne, 2019). Families of children with disabilities, forced to leave wheelchairs and other disability-related supplies behind when fleeing wildfires in California, reported a significant stress burden from the lack of disability support and services during their evacuation (Ducy & Stough, 2021). These experiences point to the need to include people with disabilities in community planning processes for disaster preparedness (Gaskin et al., 2017).

Individuals with Pre-Existing Mental Health Diagnoses

People with pre-existing mental health problems are at risk. Some of the medications used to treat mental illness make people more susceptible to the effects of heat (Martin-Latry et al., 2007; Layton et al., 2020). Those who need consistent care are also vulnerable to the disruption in health services following extreme weather events. People who are already struggling to cope with other stressors may find it particularly challenging to cope with the additional climate-related impacts.

Outdoor Workers

People in certain lines and fields of work are more directly exposed to the impacts of climate change. These include people who work outdoors, such as farmers, construction workers and utility workers, and those who respond to emergencies, including first responders

and healthcare workers. Health threats may arise directly through exposure to increased temperatures, air pollution, and extreme weather and indirectly through vector-borne diseases, increased use of pesticides, and other elements that may arise as a result of climate change (Centers for Disease Control and Prevention, 2016). As already noted in this report, all of these physical health impacts come with a greater risk of mental health problems.

Migrant farmworkers are a subgroup of outdoor workers who are at particularly high risk of heat and other climate-change-related stressors, including higher rates of mental health problems (Castillo et al., 2021). Farm work requires physical exertion in high temperatures, can lead to injury, and involves exposure to pesticides and other farm chemicals that are linked to cancer and other physical ailments (Dhananjayan & Ravichandran, 2018). For migrant farmworkers, approximately 75% of whom identify as Latinx, these dangers are magnified by a lack of economic, legal, and social power that prevents them from obtaining worker protections and healthier working conditions (Castillo et al., 2021).



A CLOSER LOOK

Lessons From COVID-19

The devastating effects of the COVID-19 pandemic are worth considering for what they can teach us about climate change and mental health. Here we briefly summarize the similarities and differences between COVID-19 and climate change with a focus on physical and mental health impacts, and the lessons we may use from COVID-19 for responding to climate change.

Similarities between COVID-19 and climate change include their global reach; their broad and significant impact on society; and the ways they illustrate interconnections among ecology (rising temperatures increase the likelihood of future pandemics), human health, and the economy (Mende & Misra, 2021). Further, their momentum can be difficult for people to understand, which makes it more likely that cognitive and behavioral biases will affect people's perceptions (Botzen et al., 2021).

COVID-19 and climate change both can have negative effects on mental health (Marazziti et al., 2021), and they both tend to increase global social inequality (Manzanedo & Manning, 2020). Economic disadvantages were magnified during the pandemic, as both within and across countries people with fewer resources were less able to protect themselves from the virus. Such disparities, already visible in the impacts of climate change, also threaten mental health as people cope with the stress of prejudice and long-standing disadvantage.

Some social dynamics related to COVID-19 and climate change are also similar. At least in the

United States, both issues are politically polarizing in ways that have impaired responses to the crises. Both also have faced significant challenges from disinformation campaigns (Beasy & Gonzalez, 2021; Geiger et al., 2021).

Key differences are that climate change proceeds more slowly than the pandemic, individuals may perceive that they are less able to protect themselves from its impacts (masks and social distancing will not help), and it is less amenable to a complete solution.

Finally, COVID-19 provides important lessons. One is the importance of clear messaging. People's responses to a crisis can be strongly affected by the messages they receive (Manzanedo & Manning, 2020). Another is about behavior change. Society was forced to make massive changes in response to COVID-19. The ways in which people altered their behaviors during the pandemic could have long lasting positive effects on mental health, such as increased interactions with nature and the natural world (Barouki et al., 2021) and talking more openly about mental health needs. At the same time, systemic gaps in the public health system, including for mental health services, have come into sharper view and are drawing greater attention from policymakers. Overall, COVID-19 highlighted the dramatic ways in which society can be disrupted, but also the opportunities for rapid, widespread, and large-scale changes in how society functions. Careful study of the pandemic experience may offer further lessons for coming to terms with the climate crisis.

IV. PROMOTING AND BUILDING RESILIENCE

RESILIENCE DEFINED

While the impacts of climate change on mental health are profound, solutions are abundant and accessible. The following sections offer guidance for caring for mental health and well-being in a changing climate, beginning with building resilience. This information can be used by individuals, families, practitioners, policymakers, community and human service organizations, and communicators to advance their own resilience and that of the people they serve.

Many local governments in the United States (as well as other places around the world) have created preparation/*adaptation* plans for shoring up physical infrastructure to withstand new weather and temperature extremes. These plans, while an important step, generally overlook the psychosocial impacts of a changing climate and do little to create or support the human infrastructure needed for community psychological well-being (Baussan, 2015).

Resilience can be defined as the ability of a person or a community to function in the face of adversity, to survive, and, perhaps, even to thrive (Hobfoll et al., 2015). Some describe resilience as a set of interlinked capacities that facilitate an ongoing and dynamic response to changing circumstances (Faulkner et al., 2018; Gubbay & McKendry, 2021). Examples of resilience can be found everywhere. Most people come through adversity with positive adjustment and without psychopathology (Bonanno, 2008; Hanbury & Indart, 2013). Some individuals may even experience what is called *post-traumatic growth* and come through a significant disruption with the feeling of having gained something positive, such as stronger social relationships or specific skills (Lowe et al., 2013; Ramsay & Manderson, 2011). Even so, much can be done to increase the resilience capacity of individuals and communities, particularly in response to climate change.

As described below, the factors that enhance resilience exist at multiple scales, ranging from individual behavior change and preparation to community programs, governmental policy, financing, and infrastructure. While individuals can take steps to prepare themselves, systems-level change (e.g., actions by governments) is imperative to enhance the physical and social infrastructure that undergird resilience for everyone.

A CLOSER LOOK — Arts, Parks, and Climate Resilient Communities

Sadiya Muqueeth, DrPH, MPH, Director of Community Health, The Trust for Public Land



According to NOAA, [this summer's temperatures exceeded that of the 1936 Dust Bowl](#) (2021). As temperatures continue to rise, we will continue to see the effects of extreme heat and disasters on community and individual health. Yet, in

developing solutions, community members are often left out of the conversation around climate change.

In Philadelphia, The Trust for Public Land (TPL) and their partners aim to change that with “Heat Response”. TPL, environmental artist Eve Mosher, and teams of local artists, are partnering to create public art that reflects local community voices in answering the question: “Why should we care about climate change and what can we do about it?” Together artists and community members are finding creative ways to capture narratives of climate change. They are proposing unique, arts-based-solutions in and around parks that speak to the urgency and gravity of the crisis. While exposure to nature is linked to improved mental health, arts and culture activities are linked to addressing collective trauma and reducing social isolation.

Heat Response has created dozens of fun and engaging activities for communities across Philadelphia. On June 16, the team unveiled the book, *Seedlings*, at a North Philadelphia neighborhood block party. *Seedlings* is narrated and illustrated to engage youth in conversations around climate change. Students have since participated in citywide clean-ups, painted art, and co-designed community art installations.

“Climate change impacts every aspect of residents’ and community members’ lives, from the air we breathe each day to the stress and trauma from extreme weather. Placing community voices at the center of the climate conversation and building awareness and ties between residents through the arts in green space builds more resilient communities”, says Owen Franklin, Pennsylvania State Director at TPL.

Connected communities are creating the grassroots movement toward climate resilience. In South Philly, organizers hosted virtual town halls where youth participants brainstormed heat interventions, leading to the co-design of a new vegetated awning that could provide shade along Philadelphia’s classic rowhomes.

Each Saturday morning in Lanier Park, community organizers host drop-in meetings where residents discuss potential heat interventions in the community. Children created drawings of magical cooling structures that served as a jumping-off point for future interventions including building a youth-designed shade structure, planting trees, and installing benches in Lanier Park.

Through the process and resultant outcomes envisioned by residents, communities can become ready to tackle the adaptive challenge of climate change and its effects on mental health and well-being.

You can find more information about how bringing the arts and public space together can support health equity at: https://bit.ly/toolkit_health_arts_parks_equity

GUIDANCE TO SUPPORT INDIVIDUAL RESILIENCE

Resilient people anticipate risks, take action to reduce their vulnerability to those risks, respond effectively when negative events occur, and recover more quickly (Ebi, 2011). There is no single factor that sets highly resilient individuals apart (Bonanno & Diminich, 2013). Instead, an individual's ability to recover from trauma, or to experience post-traumatic growth, depends on a complex and dynamic set of factors both internal and external. Notably, individual resilience in the face of extreme weather events is likely to require some different skills than resilience to loss of place, or to climate anxiety. Here, we provide tips for enhancing individuals' personal attributes and social support so that they can become more resilient. These tips can be used by individuals for themselves as well as by the practitioners, social service providers, policymakers, and communicators who aim to support them.

1. Build belief in one's own resilience. People who feel positive about their ability to overcome a source of stress and trauma do better than people with lower self-efficacy. Belief in one's own resilience and efficacy has been correlated with fewer symptoms of PTSD and depression, and fewer negative emotions after disasters (Ogunbode et al., 2019; Shenese & Langhinrichsen-Rohling, 2015). Such enhanced efficacy may result from taking action to mitigate climate risks, so getting involved in pro-environmental actions can also have benefits for individual mental health (Doherty, 2018; Palinkas et al., 2020).

2. Foster optimism and hope. People who are able to reframe and find something positive in their circumstances tend to do better than people who are less able to regulate their thinking, emotions, and actions (Iacoviello & Charney, 2014; Prince-Embury, 2013; Bonanno & Diminich, 2013; Hanbury & Indart, 2013; Petrusek Macdonald et al., 2013; Harper & Pergament, 2015). Positively reappraising one's circumstances helps move one forward rather than becoming stuck in a cycle of negative emotions. Additionally, optimism likely contributes to a person's ability to feel positive emotions during a hard time, which may help people better recover and cope (Terpstra, 2011). In a study of low-income mothers who survived Hurricane Katrina, Lowe et al. (2013) found that optimism helped the mothers adjust and grow after a disaster.

Perhaps even more important than optimism is hope. The two are closely linked, but while optimism is a sense that things will probably turn out alright, hope is more about possibilities — maintaining a belief that a positive outcome is possible even when it may be unlikely. Work by Ojala (2012) has described the importance of hope for children and young people, which allows them to find meaning in addressing the

problem of climate change while still acknowledging the danger it presents.

3. Cultivate active coping and self-regulation.

Another strength is active coping, which involves both cognitive dimensions, such as maintaining an awareness of one's own thoughts and feelings, and behavioral dimensions, such as consistently seeking solutions and support (Iacoviello & Charney, 2014). Self-regulation, or the ability to control one's immediate impulses in favor of a more considered, long-term strategy, is another characteristic of resilient individuals (National Scientific Council on the Developing Child, 2015).

4. Bolster interpersonal sources of support.

Individuals' personal capacity to withstand trauma is increased when they are connected to robust social networks. Resilience studies frequently note the importance of cultivating and maintaining strong social connections (Iacoviello & Charney, 2014; Kaniasty, 2020). Connectedness to others is a core psychological need and an essential foundation for well-being (Deci & Ryan, 2011). During difficult times, people turn to those they are close to, such as family, friends, and neighbors, for emotional support, critical information, and material help (e.g., money, food, or a temporary place to stay) (Kaniasty & Norris, 2009). Researchers note that social support is a critical protective resource during adversity (Bonanno et al., 2010; Kaniasty & Norris, 2009; Kaniasty, 2012; Kaniasty, 2020), and higher levels of social support during and in the aftermath of a disaster are associated with lower rates of psychological distress (Mason et al., 2018; Greene et al., 2015; Self-Brown et al., 2013). The positive mental health impact of a strong social support system, or the negative impacts of lower social support, can persist for years after a disaster such as a hurricane (Banks & Weems, 2014).

5. Encourage connection and care for children.

The support of family and close connections are particularly important for children. Parents are likely the most central source of support for children during trauma and adversity, and children are at higher risk of long term physiological and mental health stress

burdens when parents themselves suffer under acute levels of distress (Simpson et al., 2011; Weine et al., 2014). The National Scientific Council on the Developing Child found that children and youth are better off during adversity if they also have the help of non-caregiver role models, such as teachers or coaches.

6. Find a source of personal meaning. People who feel a sense of meaning in their life are more likely to be resilient to a negative event, and even to experience personal growth following such an event (Weber et al., 2020). One source of meaning is involvement in a faith community, which has been cited as a protective factor for mental health in several different interview studies with people experiencing trauma (e.g., Cline et al., 2015; Fernando, 2012; Weine et al., 2014; Harper & Pargament, 2015). For many, faith gives a sense of peace during difficulty (Marks et al., 2015), and studies find that having a religious or spiritual practice tends to boost an individual's well-being and can be an important coping resource. In addition to the social support that is often provided by a faith community, having a spiritual practice can help people manage and find meaning in suffering during significant adversity (Ramsay and Manderson, 2011). *Mindfulness* is another type of practice that can help people find purpose and meaning (Garland et al., 2015; Wamsler, 2018). In Ojala's (2012) work, young people were able to find meaning in the idea of people coming together to take collective action against a problem, fostering a sense of trust in others and social connections.

7. Boost personal preparedness. Mental health can be incorporated into existing disaster preparation efforts. Disaster or emergency kit guidance often includes things like food, water, supplies, and medication. Yet items that can preserve and strengthen mental health are also equally important to include (Missouri Department of Mental Health, 2006). These items might include comfort items such as spiritual or religious items, pictures, blankets and toys for small children, favorite foods or "treats" to supplement shelf-stable food, recreational items such as books

and games, and paper and pens to journal and record important information. A needs assessment is also a key component of preparedness: individuals and households should understand their own risks and identify the information and equipment they will need to respond effectively if those risks come to pass. Taking steps to improve the capacity of one's home to withstand a disaster may also enhance psychological resilience. People in a flood prone area who had made tangible changes to their home after experiencing a flood (e.g., raising the ground floor) had a higher sense of well-being because they felt prepared should another flood event occur (Hudson & Poussin, 2019).

8. When health and safety allow, uphold connection to place. Place attachment is a key ingredient of resilience, for shared care for one's home community is one of the things that draws people together for action (Faulkner et al., 2018). Research in communities affected by climate change indicates that people often do not wish to leave their homes, despite the changes or dangers they may experience (e.g., Cunsolo Willox et al., 2012; Woodhall-Melnik & Weissman, 2021). Aside from enabling social supports to be maintained, staying in a place to which one feels connected can increase resilience because one is then more apt to take adaptive actions, such as preparing for flooding (Adger et al., 2013).

Resources For Individuals or to Support Individual Resilience

- [Coping With Climate Change Distress](#) from Australian Conservation Foundation, The Climate Reality Project Australia, Australian Psychological Society, and Psychology for a Safe Climate
- [Climate Resilience Network](#)
- [Project Inside Out](#)
- [Good Grief Network](#) (a 10 step program for resilience building)
- [Facing It: A podcast about love, loss, and the natural world](#) from Jennifer W. Atkinson, PhD



GUIDANCE FOR STRENGTHENING COMMUNITY RESILIENCE

Building resilience for acute events and to confront longer-term climate change will help communities alleviate adverse health outcomes. Researchers note that individual efforts alone, while important, are insufficient (Berry et al., 2018). Individuals' capacities to mitigate disaster risk are shaped by policies and decisions made by those in power at the community, state, and federal levels.

A strong community can be a source of stability and safety for residents. All humans fare better when they perceive the world around them as orderly, predictable, and benevolent (e.g., Hanbury & Indart, 2013; Kaniasty, 2012). To help restore people's equilibrium and their optimism that there is good in the world, here are some tips to consider when building resilient communities.

1. Expand disaster response and resiliency plans. Mental health professionals should be invited to add to or strengthen plans for mental health care and support as components of local and regional disaster response and resiliency plans. Ensure that plans include longer-term climate change and mental health considerations — and that impacted community members themselves are involved in the planning (The Praxis Project, 2021). Disaster management in the United States is most often described as a cyclical process with phases including prevention or mitigation, preparedness, response, and recovery. Mental health considerations are essential in all stages.

2. Increase social cohesion. Resilient communities have strong networks of individuals and local organizations willing and able to work together, and a sense of trust among community members. This social cohesion arises from three types of social capital: bonding social capital is the close relationships among members of the same group, such as neighbors or church members; bridging social capital is the connections that occur among people from different social groups; and linking social capital is the relationships that bring groups into contact with other groups that hold economic, political, or other forms of power and influence (Pfefferbaum et al., 2017).

Individual mental health is better in communities with stronger social fabric (Friedli, 2009). In a study of German flood victims, perceptions of collective-level forms of social support, such as a strong sense of community belonging, were more strongly linked to positive mental health outcomes than personal social support (Masson et al., 2019). And, older adults in communities with stronger social cohesion fared better after Hurricane Sandy (Heid et al., 2017).

Community-wide social bonds are also more prevalent when social infrastructure exists that supports casual, daily interactions between residents. This includes parks and other green spaces, libraries, schools, recreation centers, public transportation, retail spaces, and cafes — shared spaces that allow community members to come into friendly contact with one another (Klinenberg, 2018). This was borne out during the 1996 Chicago heat wave. People living in Chicago’s Auburn Gresham neighborhood fared much better than those in the adjacent and demographically similar (poor and largely Black) Englewood neighborhood which suffered three times more heat wave-related deaths. Analysis showed that people in Auburn Gresham were more likely to check in on one another. Their high social cohesion was facilitated through an urban landscape of shops, public spaces, and community organizations (Klinenberg, 2013).

3. Address disparities. Unfortunately, the buffering effect of social support and social networks does not provide complete protection from the negative impacts of living in a marginalized and under-resourced community (Wickes et al., 2015).

High levels of inequality in society obviously disadvantage those at the lowest levels of social and economic status, and can harm others as well. It is linked to greater population-wide levels of mental illness (Friedli & WHO, 2009; Pickett & Wilkinson, 2010), including depression (Patel et al., 2018). Rising inequality not only leads to larger numbers of disadvantaged people, but also to decreased social trust and cohesion (Friedli & WHO, 2009; Pickett & Wilkinson, 2010). Countries with greater inequality have been shown to be more susceptible to impacts from natural disasters (Cappelli et al., 2021). Within the United States, income disparity at the local level has been linked to higher community-wide vulnerability to climate risks (Lim et al., 2017; Kim et al., 2019).

Communities cope better with an acute event when economic disparity is reduced and the needs of the economically vulnerable are attended to (Iacoviello & Charney, 2014; Norris et al., 2008).

A first step in addressing disparities at a community level is a *vulnerability assessment*: an analysis of the community’s physical and social aspects that create higher or lower susceptibility of some groups to the impacts of a disaster. Vulnerability assessments typically include surveys of physical infrastructure like levees, dams, stormwater systems, and common structural characteristics of local homes and other buildings (Highfield et al., 2014). They also examine the social foundations of vulnerability that influence how exposed different groups or individuals are to climate impacts, their sensitivity or susceptibility to those impacts, and their resources and capacity to respond. Indicators and measurements of mental health outcomes have not generally, to date, been included in vulnerability assessments. Scholars point out that, given the growing impacts of climate change on mental well-being, these indicators provide an important knowledge foundation for communities as well as for larger resilience building efforts (Hayes & Poland, 2018). Using the results of the vulnerability assessment, local governments, including public health agencies, can design strategies that address sources of climate change vulnerability (Ebi et al., 2021), reduce the sources of exposure for vulnerable groups, and shore up the resources available for resilience building.

4. Preserve cultural connections. The mental health of new immigrant and refugee communities is strengthened when those groups maintain a connection to their cultures, especially during adversity. Weine et al. (2014) interviewed Burundian and Liberian refugees, many of whom were adolescents who had recently moved to the United States. The authors noted family cohesion, participation in religious traditions, and cultural connectedness as resources that protected individuals’ mental health during difficult times.

Indigenous communities in the United States are also likely to benefit from a continued connection to culture and traditions. Studies suggest that people from Inuit communities, who are witnessing extreme loss of sea ice, experience better mental health and are more

resilient in the face of environmental impacts when they maintain a strong connection to their culture (Ford et al., 2020). This is particularly true for Inuit youth (Petrasek MacDonald et al., 2013; Petrasek MacDonald et al., 2015). Focus group research with Wabanaki peoples in Maine and the Canadian Maritime provinces suggests that the storytelling traditions of their culture give them a resilience advantage by helping them process and make sense of the many alterations in their environment wrought by climate change (Daigle et al., 2019). In addition, for many tribal communities, traditional culture and knowledge enable practical and emotional resilience by giving tribal communities a source of sustenance through hunting, fishing, and gathering, which can be vital after an extreme storm has cut off electricity supplies or made it difficult to reach a grocery store (STACCWG, 2021).

5. Involve the community. Because every community has unique characteristics and needs, adaptation and resilience efforts are more likely to succeed when community members are involved (Cox, 2012; Norris et al., 2008; Moser & Boykoff, 2013; Moser & Pike, 2015; Gislason et al., 2021). Top-down disaster planning decisions can be effective in providing basic infrastructure such as emergency responder training, shelters, food, water, and energy. However, given the unpredictability and unevenness of climate change impacts, and the many contextual differences between communities, there is no one-size-fits-all solution. Not engaging with a broad spectrum of community members risks creating a response with negative unintended consequences (Hayes et al., 2020).

Involvement can help combat the denial and passivity that undermine effective responses (Ojala, 2012; van Zomeren et al., 2010) and decrease the skepticism that some communities feel toward help from outsiders, especially government or local agency officials (Phadke et al., 2015). Community members are also more likely to participate if someone from their social network is already involved in efforts and reaches out to them personally (Phadke et al., 2015).

Ensure participation of people who have experienced inequality to assure that safety and resilience for all will be the outcome of planning and governance processes (Adger et al., 2019). Those who navigate the world of inequality and discrimination, such as people of color, indigenous communities and people with disabilities, know what will materially improve their own and others' quality of life. As researcher Lichtveld (2018, pp. 28) points out, "Protecting the most vulnerable is the proven strategy to protect all." For example, a gender non-binary youth participant in a community-engaged research project pointed out that public cooling centers, storm shelters, and other community resources may not feel safe for other non-binary or transgender community members without some form of anti-bias training for those working in the facilities (Phadke et al., 2015). It is particularly important for young people to be involved in planning as it provides a greater sense of ownership, which likely increases their sense of efficacy (Gislason et al., 2021).

Create opportunities for community-oriented action. It is a well-known finding in psychology that one's own well-being increases through helping others (Hui et al., 2020). For example, individuals impacted by Hurricane Harvey who communicated with others about how to assist with disaster recovery experienced more post-traumatic growth, without symptoms of post-traumatic stress, compared to those who did not (Spialek et al., 2019). When people see first-hand that many others are participating in resilience-building efforts, they become more confident not only in the *collective efficacy* of the community, but also that help will be available when they themselves need it (Kaniasty & Norris, 2009; Kaniasty, 2012). Coping communally also appears to build a stronger bond among community members as well as to their place (Richardson & Maninger, 2016; Woodhall-Melnik & Grogan, 2019).

6. Strengthen mental health services. To protect community well-being, mental health services should be assessed and strengthened, with particular attention to the needs of populations who have been systematically disadvantaged by power and wealth

disparities. As part of addressing this, public health agencies and other organizations can engage in education and outreach to reduce stigma associated with seeking treatment while also reducing cost and increasing access for treatment (e.g., through Federally Qualified Health Centers and mobile and virtual healthcare). Increased insurance and Medicare and Medicaid reimbursement for mental health care treatment will also increase access to care.

When assessing community mental health services, here are some specific questions to consider:

1. Does the community have a plan to serve people in need after a shock/disaster?
2. Does the community have the capacity to serve the potential increased needs of people as climate impacts grow?
3. Currently, can all community members access the mental health care they need?
4. What are the gaps, and what areas of service may need to be augmented?

Dominelli (2013) suggests that part of the assessment of mental health infrastructure should include questions about who may be available on an informal basis to provide help, care, medicine, and comfort when formal services break down. For example, neighbors and community members are often the most available and quickest to help people in their proximity (Dominelli, 2013). Public health agencies are one channel through which adaptation and preparation expansion of infrastructure can be encouraged and guided.

7. Update infrastructure.

Physical infrastructure. Physical infrastructure, such as roads, bridges, sidewalks, parks, housing, water and sewer systems, energy, telecommunications, and public transportation plays an enormous role in shaping the vulnerability of communities to the effects of climate change, including psychological impacts. A community with older or poorly maintained infrastructure is more susceptible to the impacts of disasters and

heat, which in turn create trauma and negative psychological outcomes. Updating infrastructure can have both positive health and environmental benefits. For example, permeable paving on roads or sidewalks helps control flood water while allowing the restoration of the natural water cycle. Community solar gardens increase urban residents' energy resilience while also lowering carbon emissions and the many health impacts associated with pollution.

Healthy access to nature and protection of natural assets. Increasingly, urban planners are focused on buffering the effects of climate change, which may include increased tree planting and greater access to green space, especially for disadvantaged communities (Hayes et al., 2019; Liu et al., 2020). Expanding greenspace and tree cover in cities lowers the urban heat island effect and offers residents the mental health and restorative benefits of natural spaces while also creating habitat for other species and sequestering carbon. Green space has also been shown to reduce crime rates (Shepley et al., 2019).

8. Develop a trusted and effective warning and communication system. An effective, reliable, and accessible warning and communication system for severe weather events can save lives, reduce property damage, and potentially reduce trauma. In several studies of severe flooding events in Europe, those who had received a warning before evacuating were less susceptible to later PTSD and other mental health issues (Munro et al., 2017; Foudi et al., 2017; Cruz et al., 2020). Many of those impacted by a flood in Canada noted the absence of an effective early warning (Hayes et al., 2020). Unfortunately, warning systems do not always function as effectively as they could. This is due in part to limitations and uncertainties inherent in forecasting technologies, or due to language barriers or other accessibility issues. Additionally, some individuals ignore or downplay warnings.

Research suggests a number of factors that influence the likelihood people will take warnings seriously and take protective action. People with little personal prior

experience with a disaster or who don't understand the severity of possible impacts appear to be less motivated to take the warning seriously or to seek further information (Knocke & Kolivras, 2007; Lee et al., 2009). Or when warning systems are perceived as unreliable, they are less likely to evoke a response (for a discussion, see Barnes et al., 2007). Communities should deepen relationships with the breadth of community constituencies and consider testing their warning and communication systems regularly. This effort should include ensuring that warnings are translated into community spoken languages and are accessible to the Deaf community and to those with vision loss.

9. Train the people who will serve the community during a disaster. When people are in the throes of extreme distress and high emotion typical in the immediate aftermath of a disaster (e.g., fear, anger, terror, helplessness, shock, grief), it is crucial that the services available to them be sensitive and interactive (Raphael, 2007). Hobfoll (2007) offers five evidence-based principles to guide intervention in the aftermath of a disaster or acute event. Communities that institute these principles, through training of first responders and rescue workers, can limit the long-term negative psychological consequences of acute events (Morgan et al., 2018). Hobfoll's principles include promoting:

1. A sense of safety
2. Calmness
3. A positive sense of self and a sense of collective efficacy
4. Connectedness
5. Hope

Training should also cover the ways in which signs of mental health distress may vary across cultural communities and stages of life.

Psychological First Aid (PFA) (McCabe et al., 2014) is an intervention strategy based on the five principles listed above. It provides immediate support, sense of

safety, and stress relief to those impacted by an acute event, and it can be learned and used by workers without a mental health background. By alleviating acute traumatic stress in the early stages of a disaster, more serious, long-term mental health outcomes may be prevented (Birkhead & Vermeulen, 2018; Madrid & Grant, 2008). Not everyone experiences psychological distress after a disaster, however, and some may be worse off if coerced into participating in an unnecessary intervention (Bonanno, 2008). PFA training can help first responders and others recognize those who need immediate mental health assistance and those who do not.

10. Prepare post-disaster recovery resources.

Climate change has advanced to the point where its impacts are now unavoidable. Communities must also be ready to respond to disasters and other climate impacts and engage in long-term recovery. Strategies include:

Mobilize support quickly. Communities need support as rapidly as possible. Many psychological stress symptoms stem from the early phases of a disaster (Simpson et al., 2011), and a sense that aid is non-existent, slow in coming, or distributed unfairly can contribute to people viewing their community or leaders as uncaring and unavailable (Kaniasty, 2012). Those living in the community itself, and organizations located there, can often come to others' aid most quickly (Baussan, 2015), which underscores the importance of community engagement in climate resilience planning.

Help community members locate separated family and friends, and assist them to reunite. Separation, and the uncertainty about the well-being of loved ones, is a source of stress. It is particularly dangerous for children, who are put at higher risk of PTSD and other negative impacts from extended separation from parents and other family members after a disaster (Bryant et al., 2017). Some post-disaster stress and uncertainty can be alleviated with mechanisms for community members to receive updates on family, friends and neighbors and be reunited.

Provide extra resources for the displaced. Displacement from one's home, particularly if it occurs on short notice with little warning or preparation time, heightens the risk of negative mental health outcomes after a disaster. Displaced people benefit from increased access to mental health support services, especially those displaced to shelters (Taioli et al., 2018). In addition, communities should have plans in place in advance for the return of evacuated residents.

Extend support and resources beyond the immediate disaster response. In the immediate aftermath of a disaster, affected community members often experience an outpouring of social and material support. As time goes on, however, offers of help subside, though the need for support may continue to be substantial. Many disaster survivors have reported that this time is difficult, often involving feelings of isolation (Kaniasty, 2020).

Create long-term sources of mental health and other support. Longer term access to support may also be critical. California wildfire survivors, among other disaster survivors, struggle to find permanent housing and steady employment even as much as a year after the event, and they express a need for psychosocial health services (Rosenthal et al., 2021).

Assist affected communities with insurance processes and other paperwork. A frequent experience of people who have survived a disaster is the frustration of filling out paperwork and dealing with insurance companies once the recovery and rebuilding process has begun. Foudi et al. (2017) call for simpler and faster insurance protocols as key to reducing psychological distress in the aftermath of an extreme event.

Resources to Build Community Resilience

- [Centers for Disease Control and Prevention BRACE Program](#)
- [Community Emergency Response Teams \(CERTs\)](#) from FEMA
- [Public Health Adaptation Strategies for Climate Change](#) from EPA
- [U.S. Climate Resilience Toolkit](#)
- [The Climate and Traditional Knowledges Workgroup \(CTKW\)](#)
- [Community Resilience Learning Collaborative and Research Network](#)
- [Disaster Preparedness Planning Guide for Free and Charitable Clinics](#) from AmeriCares
- [Americares Safety Net Center](#)
- [International Transformational Resilience Coalition \(ITRC\) Workshop](#) from the Resource Innovation Group

A CLOSER LOOK — Community Hubs

Gary Belkin, MD, PhD, MPH, Visiting Scientist, Harvard T.H. Chan School of Public Health, Founder and President, Billion Minds Institute



Climate change will yield enormous emotional damage, which translates to widespread suffering, impaired health, frayed social fabric, mutual support, and collective purpose. We have to figure out how to approach

mental health needs in ways that strengthen communities as sources of wellbeing and sources of empowered, connected civic action to solve problems — like responding and adapting to climate change. What’s needed to equip communities to be mental health engines?

Merge two things we know about: First, a “home-base” that can network, recruit, and support a range of community-based organizations and trusted anchor institutions, especially those addressing intersectional drivers such as precarious housing, racism, economic unfairness, and environmental vulnerability. [Community hubs](#), where public goods can be clustered under a shared, accessible, neighborhood-familiar place, fit that description. This model has been widely applied. For example, [community schools](#) are neighborhood connectors for a range of services, and they support high-adversity facing students and families.

Second, a [global, growing, evidence base](#) of skills for non-specialists to perform a wide range of the mental health work these hubs adopt. Clinicians can step up to coach their skills, serve as back-

up for further care, and support overall quality. [REACH NOLA](#), where outreach workers identified and counseled neighbors with depression in New Orleans after Hurricane Katrina as part of community-led recovery efforts, reflects this approach. But as the New York City initiative, [ThriveNYC](#), showed, a much wider menu of proven skills, including promoting and strengthening mental health and wellbeing, can reach massive scale in an array of people’s hands, across dozens of approaches, at the same time.

Combined, hubs and dispersed skills, are a flexible template for the needed reach, scale, and scope of action for neighborhoods to safeguard and rely on collective strength and wellbeing in the face of escalating environmental challenges.

This core idea is getting traction along many paths, whether adopting a preventive [trauma-resilience paradigm](#), care and [symptoms focus](#), comprehensive menu of prevention/promotion [building blocks for nurturant communities](#), or [community-wide emotional strength-building](#). But intentional policies, political will, and funding streams are urgently needed for growing the infrastructure that can support all the above, and more.

Community hub docking stations can do that: align local groups around priority population-wide aims, and connect them with “anchor” partners for support. COVID-19 underscores what happens without robust civic-led participation to face our biggest problems. But the pandemic is just a mild warm-up and a warning for the massive demands climate change will have on the social fabric.

V. ACCELERATING CLIMATE SOLUTIONS TO SUPPORT MENTAL HEALTH

THE URGENT NEED FOR CLIMATE POLICY AND INVESTMENT IN THE UNITED STATES

While resilience efforts are necessary to protect the physical and mental health of people and communities in the face of climate change, they fall short of addressing the problem at its root.

Rapid transitions to clean energy, clean transportation, sustainable infrastructure, and sustainable agricultural practices are critical. The Intergovernmental Panel on Climate Change (IPCC) [Summary for Policymakers](#) (2018) report offers information and guidance on the climate solutions required to maintain a habitable planet with less than 1.5°Celsius warming (2018) above pre-industrial levels. As the report conveys, the scale and speed necessary for these transitions cannot be achieved by individual action alone. The report calls for national and international governance, policy instruments, institutional capacity, and investment for technological and social transformation to ensure a stable climate and a more just and equitable human society.

Between 2016 and 2035, the projected annual average investment needed globally is nearly 2.5 trillion United States dollars (IPCC, 2018). The financial risk of inaction is enormous: in the United States it is estimated that costs arising from disasters and population displacement could grow to hundreds of billions of dollars annually by the end of the century (USGCRP, 2018). Investing in climate solutions now will not only save lives, support physical and mental health, and protect communities, but will save money in the longer term (Pigato, 2019).

The United States possesses the competency and wherewithal for a transition at this scale. Success will depend on the commitments of policy makers, innovative companies, resourced non profit organizations, visible leaders, and active citizens.

CLIMATE SOLUTIONS TO PROTECT MENTAL HEALTH

Meaningful local climate solutions are within reach and can address climate change and its mental health impacts. The Path to Positive Moving Forward Guide (Perkowitz et al., 2018) offers the following guidance and additional resources to help elected and appointed leaders to further local and state-level climate solutions

1. Make a climate commitment. Inspire change by making a public commitment that highlights the practice changes, public policies, and investments you are making, and signal others to get involved. A meaningful public declaration on solutions — featured on a website, social media, and in public comments — will inspire support. Focus on the benefits and cost savings that people in the community will realize with the shift to positive solutions like clean energy and greater efficiency, and how investing today will make the community stronger tomorrow (Perkowitz et al., 2018).

2. Take stock and aim for quick successes. Local communities have taken thousands of concrete steps to reduce energy use and waste, promote conservation and savings, and provide healthier air and water. Take stock of what is already in progress, catalog options for action, and increase momentum with easily achievable and affordable steps that can be put in place quickly. Borrow successful ideas from other communities.

3. Establish priorities and make informed plans. A good plan need not be complicated or difficult, but it is required. Plans are an effective way to motivate progress by revealing current solutions and setting specific goals and priorities. Consider goals for energy efficiency and conservation, purchasing or producing renewable energy, electric and active transportation and mass transit, waste reduction, sustainable purchasing, and natural infrastructure like tree canopy, green spaces, sustainable agriculture, and stormwater capture and reuse.

4. Engage and communicate with the community. Leaders in important sectors like business, higher education, health, mental health, and faith are already making commitments to lead towards climate solutions in ways that are non-politicized. Local governments can leverage this growing awareness and action by working with these and other bipartisan leaders, including representatives from a diversity of constituencies, to broaden and deepen action by engaging them in defining and supporting solutions. In public communications and speeches, talk about climate change solutions and the benefits they bring, including to mental health. Communications guidance can be found in ecoAmerica's Let's Talk Climate research (ecoAmerica et al., 2015).

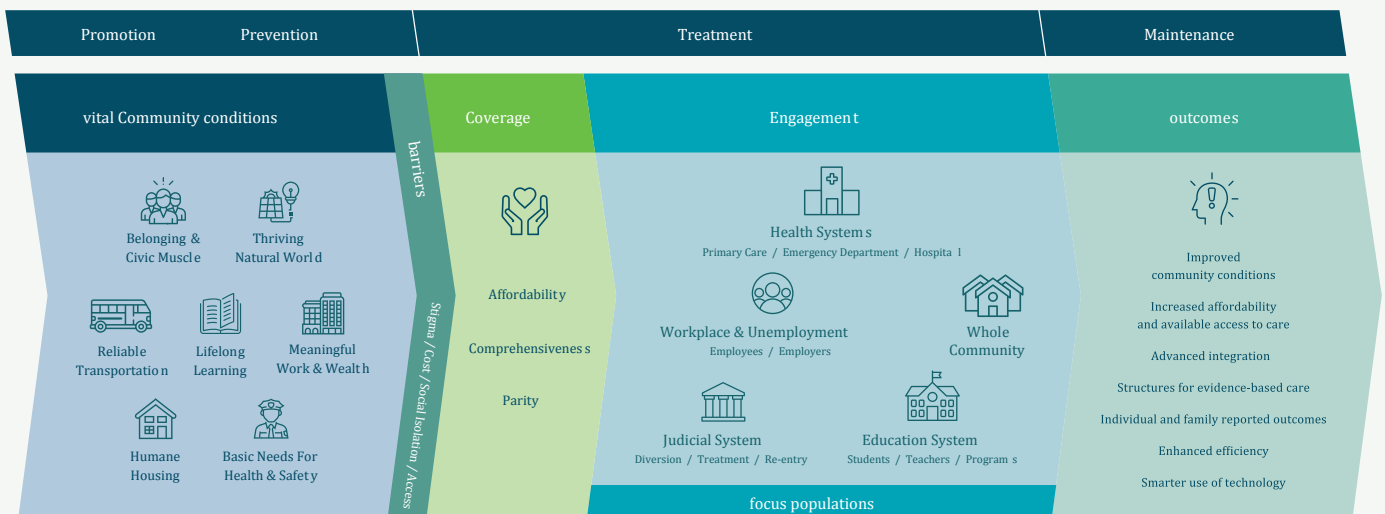
5. Embed solutions and recycle the savings.

Climate and sustainability solutions should be embedded into the ongoing business of local governance — not be a separate project. Initial savings from reducing energy and water use, sustainable purchasing and waste reduction can be used to support next steps. Set up a revolving fund to track savings and strategically reinvest them in additional efficiencies.

6. Build from success, and keep going. A good climate solutions plan will be adjustable, scalable, and easy to improve upon in order to take advantage of new needs and opportunities. Update plans as new technologies, policies, and opportunities arise.

Framework for Excellence in Mental Health and Well-Being

The framework for excellence in mental health is a guide for changemakers at every level of society who seek to improve mental health outcomes and promote well-being for millions of Americans.



Source:  WELL BEING TRUST

WHAT INDIVIDUALS CAN DO

People can take tangible actions at home and in the community to help mitigate climate change and prepare for its impacts. These actions, in turn, can provide a greater sense of security and self-efficacy. Here are examples of meaningful steps that individuals can take.

Actions At Home

1. Have an emergency plan. For example, emergency-preparedness organizations, such as the Federal Emergency Management Agency (FEMA), the Centers for Disease Control and Prevention, and the American Red Cross, suggest having a household emergency plan that everyone is aware of and has practiced. Awareness of your work or school's emergency plans is also critical to ensure a comprehensive plan. Having a plan helps to alleviate anxiety or worry, and instills a sense of control and security.

2. Create an emergency kit. Supplies, such as a flashlight, food and water, first aid supplies, and other things one might need during or after a disaster. Additional items to include in an emergency kit, such as a book, religious literature or other spiritual items, journal, toys, or treats, can support mental health resilience. There may also be opportunities to donate items for emergency kits or to local mutual aid efforts.

3. Understand one's own medical needs. Medications can have various side effects, which may arise or be intensified under certain changes in environment. For example, psychotropic medications can impact body temperature regulation or water retention. In extreme heat, this could lead to overheating and dehydration. Certain medications may also be damaged by a disaster (e.g., if left unrefrigerated). Ask your pharmacist to explain and provide documentation on the side effects of your and your family's medications, proper storage instructions, and include a listing of this information in your emergency kit.

4. Learn new skills to build personal resilience. Various intervention programs are offered to help people approach adversity with active engagement and hope. For example, a capacity-building intervention developed by Seligman and Peterson (2003) aims to bolster people's coping skills through a learned optimism framework. The intervention helps people develop a stronger sense of self-efficacy and feelings of control and encourages them to practice adaptive strategies rather than disengaging from difficulty.

5. Stay physically active. Researchers have demonstrated the importance of staying physically active (Iacoviello & Charney, 2014; Killgore et al., 2020). Physical activity helps regulate mood and boosts confidence, which can be useful if one must endure through trauma.

Share concerns with others. Seventy-eight percent of Americans are concerned about climate change, including 48% who are very concerned, however only half as many think others around them are concerned (Buttel et al., 2020; Speiser & Hill, 2021). Sharing climate concern alleviates anxiety, gives permission to others to recognize their own concerns, and builds belonging (Marx et al., 2014). Seeking support from a mental health professional can further build resilience.

Reduce climate impact. Similar to creating an emergency plan and kit, taking active steps to address the problem of climate change can reduce anxiety or worry and build a sense of control and security. Steps that individuals can take at home and in their everyday lives include conserving energy, installing insulation, weatherizing, shifting to renewable energy, switching to an electric car, using public transit, and planting native species. One area for change that is often overlooked is food consumption: eating less meat and reducing food waste can both make a significant difference in household climate footprint.

Actions In The Community

1. Develop and maintain social connections.

Because of the tremendous benefits of social support, it is essential that people nurture their connections to family, friends, neighbors, and other important social ties, such as people from their faith community (Killgore et al., 2020).

2. Discuss the benefits to our climate and to our health

of clean energy with friends and neighbors. This spreads the knowledge and facilitates change from the ground up. This proactive approach provides a way of expressing one's concerns about climate change

and can lead to a sense of accomplishment in helping others and the environment, which have benefits for psychological well-being.

3. Support solutions to reduce and prevent further climate change. One way is to campaign and vote for ballot initiatives that help to reduce climate impact. Another way is through encouraging public awareness of clean energy or other approaches to mitigate climate change.

4. Take the lead in organizing something that brings people together, such as a community event devoted to designing or implementing a local climate solution. This helps increase community social cohesion. As already noted, participating in community-level action has multiple benefits for the individual and the community.

5. Start a community resilience project.

Building community resilience pays dividends in the aftermath of a disaster event. Although these efforts traditionally have been initiated by government agencies, community members can also organize and spearhead resilience projects. Gather a diverse and inclusive team of stakeholders to create a shared vision, catalog local resources, identify gaps in services, and create a manageable plan. More guidance is offered in the resources listed below.

6. Join an existing group working on climate solutions.

Getting involved with a group or organization already working on climate change, whether it is a non-profit, a professional association, a faith group, or another entity, not only adds further energy to their efforts, but it also enhances individual and community resilience through enhanced social networks.

WHAT MENTAL HEALTH PROFESSIONALS CAN DO

Health and mental health practitioners have a unique and powerful role in influencing patients, professional communities, the public, and policymakers on health and climate. Visible leadership, education, awareness, communication, and involvement are key components in motivating engagement and action on climate solutions. This final section highlights opportunities for mental health leaders to elevate their climate leadership.

Become A Climate-Literate Professional

The first step in climate leadership starts with literacy. Start by learning how climate change impacts mental health and the ways to protect it.

- Use this report to increase knowledge about the mental health impacts of climate change, and what you can do.
- Review the report's reference material as needed to dive deeper into available data and resources.
- Assess for climate-related stress, anxiety, and depression, and explore the best therapeutic approach for such issues. For example, some have suggested that active involvement in environmental conservation efforts may help reduce climate anxiety, although this has not yet been tested in controlled trials (Doherty, 2018; Palinkas et al., 2020). An initial measure of climate change anxiety has been developed by Clayton and Karazsia (2020).
- Stay abreast of climate information, news, and the breadth of solutions.
- Increase your capacity and skills to communicate effectively on climate change and mental health.

Engage Other Mental Health Professionals

Climate leadership can extend to fellow mental health colleagues, many of whom are just as concerned, and who would appreciate being invited to engage on the issue. To help inspire and empower their leadership:

- Share successes, ideas, and best practices with your professional associations and colleagues, and encourage them to join in taking a stand on climate.
- Facilitate a presentation or workshop at a regional or national conference, and collaborate with peers to increase the power of your message. Colleagues will be more effective at making the connection between climate and mental health when they are given the education, tools, and ability to connect with and inspire their peers.

- Find an existing group, or start your own, of health professionals working to bring attention to climate change.

The good news is that many professional mental health organizations have public statements, policies and established committees on climate change, including the American Psychological Association, American Psychiatric Association, the Society for Psychological Studies of Social Issues, and others. Engage with these associations to strengthen statements, commitments, programs, education, and advocacy.

Be Visible And Vocal Leaders Within Your Communities

Individuals in the mental health community have a respected platform to influence and mobilize climate change discussions. Their knowledge and network can influence the dialogue, bring awareness to the interdependent relation of climate change and mental health, and help guide our communities toward clean, healthy climate solutions.

- Educate local leaders on the mental health impacts of climate change and the mental health benefits of solutions.
- Encourage the broader community to protect and preserve personal, family, and community health and mental health through climate preparedness and prevention solutions, being mindful to engage a diversity of constituencies including the most vulnerable.
- Have dialogues that enable common ground, in person and/or online.
- Collaborate with fellow leaders and a diversity of community constituents to create community mental health preparedness plans for climate-related disasters and impacts.
- Help create or support just and equitable climate and mental health programs and policies locally and regionally.
- To illustrate commitment and authenticity, institute programs and practices within your

own organization to reduce your climate impact, such as energy saving programs, disaster preparedness training, and incentives to use public transportation.

- Coordinate communications efforts and messages within your professional community and at all levels of government.

Support National And International Solutions

Health and climate experts are trusted professionals who have the power to influence policy makers at all levels of government. Through communications, involvement, and advocacy, they can inform policy and promote and support climate solutions.

- Submit articles, letters to the editor, op-eds, and white papers on the topic to newspapers, magazines, radio, social media, blogs, and TV outlets.
- Offer to be a media spokesperson on climate and mental health.
- Write a climate column for your organization's blog, do a podcast or webinar, and/or share up-to-date news on social media.
- Share your expertise on climate and mental health through briefings with key leaders and policymakers.
- Collaborate with colleagues, community, and climate advocates to influence policy design and outcomes.

Resources for Cities, Counties, and States

1. [Path to Positive Moving Forward Guide](#)
2. [Let's Talk Climate](#) from ecoAmerica
3. [The Fourth National Climate Assessment from the US Global Change Research Program](#)
4. [EPA Smart Growth and Climate Change](#)
5. [Addressing the Impacts of Climate Change on Mental Health and Well-Being from the American Public Health Association](#)

9. [Climate Psychiatry Alliance](#)

10. [Climate Psychology Alliance North America](#)

Resources For Individuals

6. [Build Your Emergency Preparedness Kit](#) from Ready.gov
7. [How to Build a Kit for Emergencies](#) from FEMA
8. [Extreme Weather & Emergency Preparedness and Response Infographics](#) from CDC
9. [Make an Emergency Kit Now](#) from Red Cross
10. [Climate Solutions for Your Home and Neighborhood](#) and [Climate Solutions for Your Community](#) from Climate for Health
11. [Building Thriving, Resilient Communities](#) from Resilience and Post Carbon Institute

Resources For Mental Health Professionals

1. [Climate Solutions for Your Workplace](#) from Climate for Health
2. [Climate Solutions: Advocacy with Policy Makers](#) from Climate for Health
3. [Climate for Health Ambassadors Training](#)
4. [Americares Learning Portal](#)
5. [Hope, Health & Climate Change | Howard Frumkin, DrPH, MPH, MD, Presents and UNC School of Medicine](#)
6. [The World Health Organization's Psychological first aid: Guide for field workers](#)
7. [Disaster Mental Health Information](#) from American Psychological Association
8. [Addressing Climate Change Concerns in Practice](#) from American Psychological Association

GLOSSARY

Adaptation: Modification to fit a changed environment or adjust to cultural surroundings.

Agency: The feeling of being the agent exerting power over a given action.

Anxiety: A negative emotional state including nervousness, fear, apprehension, and worry. In excess, it can indicate or contribute to a mental disorder.

Arousal: Heightened physiological activity.

Collective efficacy: Collective self-efficacy represents a group's shared belief in its ability to organize and execute courses of action to accomplish shared goals.

Ecoanxiety: A chronic fear of environmental doom.

Ecomigration: The migration of populations for ecological reasons, such as due to the loss or degradation of land.

Environmental refugees: People who have been forced to permanently or temporarily leave their traditional habitat because of a natural or triggered environmental disturbance that seriously jeopardizes their quality of life or existence.

Food insecurity: Being without reliable access to food that is sufficient in quantity and quality.

Food safety: Food safety refers to the conditions and practices that preserve the quality of food to prevent contamination and food-borne illnesses (US Department of Agriculture, 2019).

Intergroup: Taking place or being between groups.

Mental health: Mental health refers to the cognitive and emotional well-being and effective functioning of individuals. More than the absence of a mental disorder; it is the ability to think and learn, and understand and regulate one's emotions.

Mental health services: Any interventions — assessment, diagnosis, treatment, or counseling — offered in private, public, inpatient, or outpatient settings for the maintenance or enhancement of mental health or the treatment of mental or behavioral disorders in individual and group contexts (American Psychological Association, 2020).

Meta-analysis: A statistical technique that looks for

significant patterns of results across multiple scientific studies.

Mindfulness: A mental state achieved by focusing one's awareness on the present moment, while calmly acknowledging and accepting one's feelings, thoughts, and bodily sensations, used as a therapeutic technique.

Motivated cognition: A psychological phenomenon in which incoming information is selectively interpreted and used to reach specific, preferred conclusions rather than ones based on an unbiased assessment of the evidence.

Pluralistic Ignorance: Pluralistic ignorance occurs when people outwardly adhere to what they assume is a group norm or consensus, when in reality, they and most of those around them disagree with the apparent norm.

Post-traumatic growth: Positive psychological change experienced as a result of a challenge or adversity in order to increase functioning.

Psychological distance: The extent to which an individual thinks about an event, person, or idea as abstract and separate from their current reality, instead of being concrete and directly experienced.

Psychopathology: Behaviors, thoughts or experiences that indicate a mental disorder, such as amoral and antisocial behavior; an inability to establish meaningful personal relationships, and in general difficulty with maintaining normal functioning.

Resilient communities: Communities that continue to function despite experiencing adversity.

Risky behavior: A lifestyle activity that places a person at increased risk of suffering physical harm.

Resilience: The ability of a person (or a community) to function in the face of adversity, to survive, and, perhaps, even to thrive (Hobfoll, et al., 2015). The capacity to recover quickly from adversity or difficulties.

Self-efficacy: People's belief in their own ability to succeed in a situation or to accomplish a task.

Self-regulation: A person's ability to direct and control his or her behavior and impulses.

Sense of self: An individual's perception of his or herself, or self-image.

Social capital: The aggregate of social resources or networks of relationships that enable a community to function effectively.

Social cohesion: The willingness of members of a society to cooperate with each other in order to survive and prosper.

Social infrastructure: The organizational arrangements and community facilities and networks that promote social wellbeing and facilitate the provision of social services.

Solastalgia: Feelings of sadness or loss associated with the perception of negative changes to a valued environment.

Suicidal ideation: Suicidal thoughts, or thoughts about how to kill oneself, which can range from a detailed plan to a fleeting consideration that does not include the final act of killing oneself.

Vulnerability assessment: The process of identifying and quantifying or prioritizing the vulnerabilities in a system. With regard to community vulnerability, it is an analysis of the physical and social aspects that create higher or lower susceptibility for that community to experience trauma from a disaster.

Worldviews: Sets of deeply held beliefs and attitudes about how the world works and how people should relate to one another.

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