

**Transforming Behavioral Medicine to Address the Climate Crisis:  
A Call for Strategic Research and Advocacy**

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***Call To Action statement:***

***The climate crisis is an accelerating threat to physical and mental health and the planet's degradation and requires an essential paradigm shift within behavioral medicine. The Behavioral Medicine Research Council calls for the field to engage in transformative change to promote human and planetary health by conducting strategic research with relevance to policy change, implementation of interventions, and actively driving education and advocacy initiatives. We urge the field to prioritize collective action together in these three areas of practice to address climate relevant targets to facilitate the rapid changes needed to match the level of urgency of the climate crisis.***

**Abstract**

The climate crisis poses the largest threat to human health and survival and is now a public health emergency. It is causing physical and mental health harm and amplifying existing health inequities. We highlight the relevance of the behavioral medicine community in addressing the health impacts of climate change. We then identify mitigation and adaptation climate health behaviors (CHBs) and social changes needed that underlie the three essential objectives to address climate change and its associated health consequences: 1) rapid decarbonization; 2) drawdown of atmospheric heat-trapping gases (sequestration); and 3) adaptation. To target advancing the behavioral and systemic changes necessary to protect human and planetary health, we propose the use of a 1-2-3 Transformational Model as a call to action in which (1) the field of behavioral medicine promotes (2) both human and planetary health by targeting CHBs across (3) major professional areas of foundational research, implementation, and especially education and advocacy which will more directly impact public and political will. We urge the adoption of the social quantum change paradigm where systemic change is viewed as local to global, and the individual has an influential role in systemic change. These shifts in view, priorities, and methods will bolster hope, collective efficacy, and action to support the next generation of scientists. Together, we can position the behavioral medicine community to have more of an immediate and meaningful impact to respond to the urgency of the climate crisis and its associated health consequences.

**Key words:** climate crisis, climate distress, planetary health, co-benefits, strategic research, collective efficacy, advocacy, behavioral medicine, environmental justice, social quantum change

**SUMMARY BOX: CALL TO ACTION SUMMARY of the Behavioral Medicine Research Council for climate change foundational research, implementation, and education/advocacy.**

## **FOUNDATIONAL RESEARCH**

**Research Models:** The BMRC strongly recommends adopting “**Strategic Research**” **methods**, focusing on mechanisms of individual to social change, for understanding and facilitating change in Climate Health Behaviors (CHBs), with the long-term goal of policy change on decarbonization, sequestration, and adaptation. This includes engaging change-makers and stakeholders/community members from design to implementation and dissemination. Researchers should consider adding a focus on 1) co-benefits of planetary and human health to invoke personal relevance; and 2) attitudes and advocacy on both green energy and on addressing the economic systems that promote the carbon economy, to more directly affect policy change, local and federal.

**Research Processes:** The BMRC urges the adoption of **new research processes** to meet the urgent needs of the climate crisis, including speed of funding, regulatory approvals, and publishing on climate, partnering with professionals in media and policy on widespread dissemination, and using COVID research as a model of pervasive and rapid change.

**Research Team:** The BMRC supports a more diverse **collaborative research team**, including centering community leaders, and interdisciplinary diversity such as the inclusion of climate scientists but also cross-sector collaborations (e.g., energy sector) for a holistic systems approach to change. Consider citizen science advocacy and community participatory research models for local change projects, using mechanisms such as the NIH-led Community Engagement Alliance.

## **INTERVENTION & IMPLEMENTATION**

**Creating social change models:** The BMRC urges researchers to apply and tailor broad-ranging **psychological and social theories of change, such as capitalizing on social norms and social capital, to interventions that** build climate-resilient communities and institutions, reduce fossil fuel use, and increase uptake and demand for a plant-based diet and food industry change. Research and evaluation of implementation efforts including mechanisms of change will provide proof of concept models for widespread adoption. We recommend testing interventions and policies as natural experiments with pre/post evaluations or quasi-experimental designs.

**Behavioral Medicine Practitioners:** The BMRC recommends the use of “**climate-aware clinical practice,**” and psychoeducation to help individuals and groups adapt to climate change, adopt behaviors that have human and planetary health co-benefits, and cope with the health impacts of climate change as well as trauma from climate events.

## **EDUCATION AND ADVOCACY**

**Education:** The BRMC recommends the **development of an educational curriculum** on climate change and health for the field and for trainees to create a pathway for new climate-informed behavioral medicine researchers, and continuing education for experienced professionals interested in incorporating climate into their research and teaching.

**Advocacy:** The BMRC encourages behavioral medicine experts to **participate in advocacy roles** including working with policymakers to promote science-informed climate and

environmental policy and policy briefs, speaking to empower youth, the public, health professionals, and business leaders in increasing collective efficacy for change, facilitating climate-aware systemic changes within professional institutions and organizations and considering running for local, state, or federal office to promote climate health equity.

Lastly, the BMRC recognizes the **challenges in transforming our practices**, and encourages our institutions, each leader of research, educational, and clinical training endeavors, to create support, such as pilot grants, breaks from teaching or service, stipends for time/effort to prevent burnout, and credit during academic reviews, for adding climate change to their respective programs and initiatives. Lastly, to examine ways to decarbonize university and society activities such as in-person meetings and divesting from corporations/funds that are heavy contributors to carbon burning.

### Overview Statement

The climate crisis has created the largest global public health emergency and is exacerbating longstanding health inequities that are rooted in structural racism and systems of oppression (Nogueira et al., 2022). There is an urgent need for a rapid, global response to limit current and future health harms from further climate change—especially the catastrophic irreversible harms that would be sustained for many generations (Maibach et al., 2020, 2021; Maibach et al., 2019). The most recent Intergovernmental Panel on Climate Change report (Pörtner et al., 2022) identified human behaviors that drive colonialism, fossil fuel profiteering, and extreme capitalism as key contributors to climate change of the industrial era and its associated widespread human and planetary health consequences. Therefore, the behavioral medicine community has an opportunity and an ethical responsibility to apply the field’s unique expertise to identify and implement effective solutions.

The urgency and magnitude of this challenge require collective action from the field of behavioral medicine that transcends the usual individually focused, siloed, and fragmented approaches that often characterize our field. Rather than focusing on individual behavior change only, approaches that emphasize multilevel research engaging cross-disciplinary researchers and the individuals and communities most affected by climate change must be prioritized. This issue has become a high priority for the *Behavioral Medicine Research Council*. The Council represents the four major behavioral medicine organizations (Academy of Behavioral Medicine Research, American Psychosomatic Society, Health Psychology, and Society of Behavioral Medicine) and has developed road maps that identify and prioritize the field’s collective efforts on the most important and pressing health issues. As experts in the science of health behavior change, pioneering models such as the Science of Behavior Change, The NIH Stage Model, and the ORBIT model of intervention development (Czajkowski et al., 2015; National Institute of Health, 2021), the Behavioral Medicine Research Council aims to galvanize the field into taking meaningful, rapid action to create, implement, and advance climate and health solutions. **To that end, this paper is a call to action to the behavioral medicine community to transform its approach to become directly, immediately, and effectively involved in efforts to address both climate change and the physical and mental health consequences of the climate crisis.** The aim of this BMRC statement is to provide clear guidance on how the field of behavioral medicine can leverage its unique expertise to facilitate the necessary transformative changes to protect planetary and human health.

### Relevance of Behavioral Medicine to Addressing Climate Change Objectives

#### *Climate Change Has Created a Public Health Emergency*

In June 2019, more than 150 U.S. health organizations endorsed a 10-point Policy Action Agenda on Climate, Health, and Equity based on the following premise: “*Climate change is one of the greatest threats to health America has ever faced—it is a true public health emergency.*” In 2021, over 200 health and medical journals took the unprecedented step of issuing a joint editorial urging the world’s leaders to act now to prevent “catastrophic harm (Wise, 2021).”

For the behavioral medicine community, this call and similar calls that followed represent a significant opportunity to transform our field to help reshape the social and ecological determinants of health. The movement has already started in behavioral medicine, with climate becoming a top issue in surveys of behavioral medicine experts, societies creating special interest groups in climate change, and the Society of Behavioral Medicine leading the way with a special

issue on climate in the journal *Translational Behavioral Research* (Diefenbach et al., 2022) covering multilevel research, social equity, and communication.

A stable climate—and the biodiversity that undergirds it—supports the health of humans and all living beings, whereas climate change harms health, directly and indirectly. As shown in Figure 1, the unstable climate is creating more frequent and severe climate disasters, such as increasingly extreme weather events including hurricanes, heat waves, droughts, wildfires, sea level rise, and disease vectors. These in turn produce indirect health harms, including increasingly contaminated water and food, reduced food production, decreased access to nutritious foods, and damaged and destroyed housing and farmlands. The impact of changes in climate and health harms leads to a myriad of health outcomes including cardiac and respiratory diseases, poor birth outcomes, increasing vector-borne and zoonotic diseases and potential pandemics, and pervasive mental health impacts (USGCRP, 2016; Watts et al., 2015).

Even without direct exposure to events, the growing awareness of the seriousness of the problem is contributing to alarming levels of eco-anxiety, hopelessness, and depression. For example, a survey of 10,000 youth across 10 countries found that 56% endorsed the belief that “humanity is doomed” (Hickman et al., 2021). Direct exposure is increasing rapidly: By 2050, it is estimated there will be more than 200 million climate refugees (Clement et al., 2021). Common mass exposures to climate disasters and forced migrations can lead to post-traumatic stress disorder (PTSD) and mental health crises. In Australia, significant mental health problems persisted for two or more years after wildfire exposure (Zhang et al., 2022). In addition to heat-related illnesses and injuries, hotter temperatures are related to increases in anxiety, conflict and aggressive behavior, and psychiatric emergencies (Ebi et al., 2021).

Over the past several decades, the health community has also come to understand the fundamental importance of social determinants of health (Farley & Cohen, 2006; Little, 2018). Climate instability has become one of the most fundamental determinants of global health in that it both worsens conditions associated with social determinants of health and impairs health directly (Maibach et al., 2019).

### ***Climate Change Amplifies Existing Health Inequities***

The physical and mental health consequences of climate change are distributed inequitably across groups. In addition to the outsized harms of climate change on people targeted for marginalization, it also disproportionately harms people with a range of chronic illnesses, children, pregnant people, babies in utero, older adults, and people in low-income communities (USGCRP, 2016, 2018). Communities targeted for marginalization are disproportionately exposed to more environmental risks (Brulle & Pellow, 2006; Fleischman & Franklin, 2017). Additionally, white communities pollute more than Communities of Color, yet Communities of Color experience a greater burden of exposure to pollution relative to their consumption (Tessum et al., 2019) and wealthy communities contribute substantially more greenhouse gas (GHG) emissions via energy consumption than economically disadvantaged communities (Hickel & Slamersak, 2022).

The health impacts of climate change and air pollution are worsening and exacerbating the existing health disparities that are due to inequitable policies and systemic racism (Crews et al., 2019; Rudolph et al., 2018; Swinburn et al., 2019). Additionally, on top of chronic exposures, acute environmental disasters have a more severe impact on communities targeted for marginalization, which also further widens gaps in health equity (Shultz et al., 2020). To incorporate equitable interventions and policies, it is essential to center multicultural and indigenous leaders and perspectives in decision-making, which will promote more tailored

policies and biodiversity (Pörtner, 2022) and will widen the adaptive resilience of targeted communities (Pearson et al., 2023).

### ***Climate-Health Behaviors as Targets for Change***

In the following section, we discuss the three major priorities for reducing the health consequences of climate change and recommend how the behavioral medicine community can transform itself to become more immediately impactful and match the urgency that will be required to effectively address the climate crisis and its associated health consequences.

Limiting global warming—and protecting human health to the greatest extent possible—will require achieving three objectives—(Maibach et al., 2019; Ramanathan et al., 2020). As shown in Figure 1, the first two of these objectives focus on primary prevention or *mitigation* (limiting climate change) and include (1) decarbonization and (2) sequestration of carbon, while the third objective (3) is a form of secondary prevention and focuses on adaptation (3) (reducing the harm associated with current and future climate damage). **Decarbonizing** energy supplies include eliminating carbon production and transitioning to renewable and sustainable forms of energy, thereby stopping emissions of heat-trapping pollution. **Sequestration** involves capturing and removing much of the heat-trapping pollution that has been emitted into the atmosphere over the past century. **Adaptation** involves communities worldwide taking action to prepare themselves for the unavoidable health harms of climate change that will occur with greater frequency and severity over the next years and decades. Ideally, adaptation efforts are integrated with community activism toward mitigation efforts.

Achieving these three objectives will require behavior change by policymakers, corporations, and the public—to build public will, political will, and ultimately implement transformative policy. Many of the needed behavior changes needed have both planetary and human health benefits (“co-benefits”) and include behaviors that behavioral medicine professionals are already familiar with as targets for change; we call these behaviors “climate health behaviors” (CHBs). For example, **decarbonization** CHBs include the use of active transportation (e.g., bike commuting and walking), switching to green energy, and adopting dietary habits that support sustainable agriculture and food production systems at individual and social levels. **Sequestration** CHBs include supporting changes in land use (i.e., stopping deforestation and increasing forestation, and the greening of urban areas). **Adaptation** CHBs include preparing for and minimizing risk to individual health (e.g., assisting patients in adapting care plans to prepare for heatwaves and wildfires) and communities (e.g., creating heat warnings and safety standards for communities of workers who are at risk of heat-related illness due to excessive heat exposure). The current state of the climate crisis requires both mitigation and adaptation both of which are prime targets for focus within the field of behavioral medicine. The most promising solutions integrate and address both mitigation and adaptation simultaneously such as remodeling cities to be powered by clean energy, designed around active transportation and green infrastructure, and planned to meet the needs of the most disproportionately impacted communities when climate disasters strike including by building social capital.

#### **Decarbonization CHBs.**

**Food Systems.** Food production, access, choices, and waste, all have significant impacts on human and planetary health. Industrial farming (including mono-cropping and concentrated animal feeding operations (CAFOs)) is fossil-fuel intensive by design and produces large amounts of heat-trapping pollution, a total of 34% of GGE (Crippa et al., 2021) food manufacturers continue to promote a junk food diet worldwide—to use the products of industrial



farming--this source of pollution is expected to rise by 80% by 2050 (Gao et al., 2018). Moreover, 30 to 40% of the US food supply is wasted each year (USDA), requiring additional food production and contributing to emissions as food decays. Modification of food production systems and reductions in food waste will reduce emissions of GHG pollution and improve food security (Munesue et al., 2015; Myers et al., 2017; Swinburn et al., 2019).

A systematic review demonstrated that adopting a healthy diet at a scale not only can yield significant reductions in carbon emissions, land use, and water use but also is related to an improvement in overall mortality risk (Aleksandrowicz et al., 2016). It is critically important to limit the consumption of commercially produced animal products, particularly red meat, which will have a high impact on reducing GHG emissions as well as morbidity and mortality (Aleksandrowicz et al., 2016; Tilman & Clark, 2014). The Lancet-EAT commission quantifies the dramatic shifts needed to reach a sustainable healthy diet by 2050 (The Great Food Transformation) –a 50% reduction in global consumption of unhealthy foods, such as red meat and sugar, and a greater than 100% increase in consumption of healthy foods (fruits, vegetables, and legumes) (Willett et al., 2019). This needs to be achieved by both creating the demand for a plant-based diet as well as changing the supply.

**Active Transportation.** Bike commuting and walking, examples of active transportation, are associated with lower risk of cardiovascular disease, cancer, and overall mortality (Celis-Morales et al., 2017). Fortunately, the health benefits of active transportation do not appear to be negated by an increased risk of exposure to air pollution and traffic incidents (Cepeda et al., 2017; Mueller et al., 2015). Furthermore, active transportation and active commuting have planetary benefits by reducing air pollution and GHG emissions immediately, allowing people to experience improved air quality during times of mass pauses of driving such as “spare the air” day in the Bay Area when residents are asked to reduce their driving, or during the pandemic (Johansson et al., 2017; Lindsay et al., 2011; Maizlish et al., 2013; Woodcock et al., 2009).

Given the established literature demonstrating the clear human and planetary health benefits of active transportation, behavioral scientists can further contribute to this body of knowledge by prioritizing research and interventions that improve adoption. Such research could include identifying obstacles and improving motivation, implementation, and maintenance of active transportation, as well as research on the behaviors of policy advocacy and adoption. This requires collaboration with the appropriate institutions (schools, workplaces, and governments). There is also a high potential for behavioral medicine to promote co-benefit solutions by working with policymakers to invest in infrastructure that fosters and promotes active transportation. Indeed, built environments enabling exercise, such as green space, lead to co-benefits of greater physical activity and sustainability (Sallis, 2019; Sallis et al., 2012).

### **Sequestration CHBs**

Relevant sequestration behaviors that have health co-benefits focus on increasing greenery, including participating in activities that preserve and protect vegetation, urban greenery, and natural habitats while also promoting physical and mental health. Preventing the destruction of forests, wetlands, and grasslands, and to a lesser degree, planting more trees, are the most important methods for promoting carbon removal. Trees are nature’s “technology” for sequestering carbon and, so far, work better than human-made solutions. In the US alone, trees absorb 15% of the CO<sub>2</sub> emissions, which also removes pollutants and decreases asthma and other health problems related to air pollution (US EPA, 2020). Regenerative forms of agriculture also offer considerable promise as means of both mitigation and sequestration.

There is a wide body of literature that demonstrates the physiological and psychological health benefits of spending time in pleasant natural environments. Exposure to natural environments has been shown to reduce physiological arousal to stress and promote physiological recovery from stress (Berto, 2014; Brown et al., 2013). Trees and other greenery contribute to an aesthetically pleasing environment that is associated with greater physical activity (Sallis et al., 2012). Urban gardens can have a variety of health benefits including lowering Hb<sub>A1c</sub> for people with diabetes, decreasing the impact of stress among urban populations that have been targeted for marginalization, increasing fruit and vegetable consumption, and offering many potential benefits for older people, especially those with chronic illness, who are unable to access traditional psychotherapy modalities (e.g., see (Detweiler et al., 2012) for a review) (Barnidge et al., 2013; Detweiler et al., 2012; Thompson et al., 2014; Ward Thompson et al., 2012; Weltin & Lavin, 2012). Additionally, there are a number of environmental health benefits to community gardening, such as decreased GHG emissions, increased pollinator populations, and the opportunity to teach about sustainable and locally grown produce (Hall et al., 2017; Kulak et al., 2013).

Nature exposure has a reciprocal benefit for planetary health. Connectedness to nature and beliefs about its restorative effects are associated with more pro-environmental behaviors (Whitburn et al., 2018; Hartig et al., 2016). This is an exemplary co-benefit-- contact with nature has the potential to motivate a community to engage in climate-friendly behaviors while also promoting physical and mental health.

The field of behavioral medicine can play a role in promoting motivation and activism in both reforestation and especially in preventing deforestation. Preventing deforestation is most critical because older, larger trees provide the most substantial sequestration, and new trees take much time to grow.

#### **Adaptation CHBs.**

There is a wide and growing range of adaptation behaviors that behavioral medicine can encourage: creating individual heat mitigation plans for those who are at risk of heat-related illness; teaching safety and preparedness during poor air quality events; greening the communities most disproportionately impacted by climate change; installing community cooling stations, and improving vector control, and flood control. Individuals and communities can adjust their health behaviors to be more climate-safe (e.g., staying indoors on days with dangerous air quality, proper hydration and staying cool during heat waves, draining standing water on the property to reduce mosquitos, and creating a safety plan for environmental disasters) (Anderson et al., 2017). Behavioral medicine experts can also be “at the table” to design programs that will better serve mental health needs and build supportive communities and focus on prevention and psycho-education rather than emergency plans made during disaster responses. In addition, behavioral medicine scientists can help prepare for climate refugee absorption, by working with community gatekeepers.

High-risk groups—including frontline communities that are already burdened by large, pre-existing health disparities—have the greatest need for targeted adaptation efforts. The harmful health effects of poor air quality, extreme heat, and other dangerous extreme weather events are especially serious for people with a range of physical and mental health conditions, and disabilities (Clayton et al., 2017; Haines & Ebi, 2019; Hayes et al., 2018). For example, people with diabetes are at greater risk for heat-related illness during heat waves and physical activity-related consequences due to an impaired capacity to sweat and dissipate heat, which in turn can impair cardiovascular regulation and glycemic control (Kenny et al., 2016). Air

pollution exacerbates cardiovascular and respiratory morbidity (Liu et al., 2019) and has a range of harmful neurodevelopment and neurological effects. Certain medications can increase the risk for adverse effects of climate change and environmental events; for example, antidepressants, antipsychotics, and anti-hypertensives can increase the risk of heat-related illnesses through impaired thermoregulation and dehydration (Westaway et al., 2015). The COVID-19 pandemic further highlighted the adverse impacts of environmental exposures, as COVID-19 mortality rates were higher in areas with higher levels of long-term air pollution (Wu et al., 2020). Thus, implementing adaptation behaviors to reduce potential harm from climate and environmental hazards for at-risk individuals and communities is an important focus.

***Resilient Communities.*** Another important focus for behavioral medicine is partnering with psychologists and mental health professionals to address community resilience. Traditionally, psychologists have had an important role in adaptation and recovery after natural disasters. The area of disaster mental health preparedness, led by mental health professionals, for climate events such as flooding and wildfires, will need to be further integrated into planning for resilient cities. During COVID, while medical systems had written plans for medical management during disasters, few systems had plans for mental health disaster preparedness (Mangurian et al., 2022). Clearly, disaster preparedness needs to incorporate prevention to a greater degree, including mental health resilience training. The International Transformational Resilience program ([Intl. Transformational Resilience Coalition, 2020](#)), is an exemplar of a program that could be disseminated widely. It focuses on the prevention of mental health and psychosocial problems through building the social infrastructure in communities and increasing social capital; quite simply, it fosters leadership from within communities to plan and implement actions that foster and support mental wellness and resilience skills for adults and youth locally.

Promoting prosocial behavior at all levels—from individuals to safety net policies—is critical for creating resilient communities. During the pandemic, prosocial behaviors, such as volunteerism, altruism, and feelings of community trust, were associated with better compliance to COVID safety behaviors such as vaccination and masking, and have the potential to promote climate-sparing behaviors as well (Campos-Mercade et al., 2021). In fact, during the COVID-19 pandemic, many studies identified trust (both in leaders, and as part of social capital) as a factor explaining differences in infection rates and vaccination rates (Bollyky et al., 2022), which are thought to in part explain the better COVID-19 control in Bhutan and New Zealand.

Communities with social resilience have more prosocial attributes, such as positive relationships, trust, shared purpose, and good communication. Community resilience is a critical factor to survive crises. A classic example of this community resilience is from a heatwave in the US city of Chicago (Browning et al., 2006). There were 10 times more deaths in a neighborhood low on social cohesion than one with high social cohesion, despite equal levels of poverty. In the high cohesion neighborhood, people were outside more and checked on neighbors who might need air conditioning. Social cohesion is likened to the effect of a first responder emergency system. The behavioral medicine community has the expertise in understanding and motivating attitude change, decision-making, and sustained behavior change in individuals and groups. These are the types of expertise that are necessary to translate climate solutions into effective practice.

### **The 1-2-3 Transformational Model**

Climate change is a global problem that requires solutions at all levels (communities, states, nations, and global) and requires ambitious, science-based global goals, national and corporate commitments to these goals, and timely and effective implementation through policies

and practices. While this hasn't been part of behavioral medicine's historical focus, we have an opportunity to apply our science of behavior change to make a significant contribution toward social change and multi-level solutions for addressing the climate crisis.

**Change at all levels.** While our scientific models of behavior change tend to be based on linear and causal models, the scope of climate change encompasses systems change, over long periods of time, making it challenging to measure our impact on climate outcomes, which can lead individuals to feel hopeless about their impact. The technical and behavioral changes that are needed are shaped by systems and structures in the political sphere, social norms, and policies, which are shaped by individual and shared beliefs, values, and worldviews (Capstick et al., 2014). Karen O'Brien, a climate scientist who has been part of the Intergovernmental Panel on Climate Change (IPCC the United Nation's body for assessing the science related to climate change), describes with data and theory how change at each of these levels can mutually influence each other, which fits a model of quantum social change (O'Brien, 2016). Our actions add up in ways we simply cannot quantify, contributing to larger system changes. In quantum social change, social tipping points for change result from small, interrelated influences adding up, and historically can occur when around 10% of a population demands and leads the change-making. Social tipping interventions within the health community have also been identified as promising solutions for creating widespread, collective change within the healthcare sector to promote human and planetary health (Howard et al., 2023). Understanding this model of change can be empowering and inspiring to individuals, building collective efficacy.

The field of behavioral medicine is well-positioned for promoting the large-scale behavioral changes that will be required to minimize the current and future health impacts of climate change. This includes a deep inquiry into which activities will make the biggest difference and, relatedly, how a group of committed people can work at the highest level of system change and contribute to the tipping point of social change. As shown in Figure 2, behavioral research can have influence across many levels, from the individual to group, institution, and macro and political levels. We can base our interventions on the key psychosocial mechanisms of behavior change, which we are well experienced in (See [Epel et al., in prep.](#)). Our interventions can target values, attitudes, and CHBs across multiple levels as well (e.g., individual, group, institutions, macro level, and social sphere). Within groups, we can use concepts such as social norms and emotion contagion to prevent hopelessness and develop collective efficacy and social empowerment. By working at the institutional level, such as community organizations, corporations, and local governments, we can test larger interventions, using multi-level interventions when appropriate. In Figure 2, the arrow from policy to individual is wider, representing the larger impact that macro-level changes have on carbon pollution and decarbonization.

### **Call to Action.**

Our call to action is for the field of behavioral medicine to transform its approach by applying the 1-2-3 Transformational Model described above to address the climate crisis. In this model, we suggest the field of behavioral medicine (1) uses its expertise (working in interdisciplinary groups) to promote (2) interconnected forms of human and planetary health across (3) professional domains (research/scholarship, intervention, advocacy, and education). Of note, we adopt the *One Health* perspective of viewing planetary health as consisting of the interconnection among humans, animals, plants, and the shared environment and their common welfare. ([CDC, 2023](#); [WHO, 2017](#)).

We anticipate that many in the field of behavioral medicine will have questions about the call to action, including: “*What impact can I have on climate?*” We offer some guiding questions for this initial inquiry, to help identify areas of engagement for this work, such as advocacy, education, intervention, or research, in Box 1. “*How can I incorporate climate issues into my ongoing work?*” is also an important question. Box 2 shows ways to incorporate measures of climate-related exposures or behaviors into ongoing research. While having the resources to design an ideal study is an important future goal, we often have the ability to incorporate climate issues immediately without changing areas and requiring large amounts of funding. This is an important immediate step as it allows an opportunity for a research/intervention team including students to learn more about and raise awareness of climate-related health concerns that are relevant to behavioral medicine. Further, when social problems are enormous, as in this case, small wins from controllable opportunities are still important as they boost morale and hope, and are more easily incorporated into policy since they are less threatening than major study findings (Weick, 1984) and serve as models of change. For more specific research questions, we refer the reader to the special issue on climate change in *Translational Behavioral Medicine* special issue (2022), and we point to strategic research methods as a guide, detailed below, that has the goal of influencing policy (Brownell & Roberto, 2015).

By embracing our contribution to systems change, behavioral medicine experts can help inform strategies for influencing policymakers, business leaders, and the public to adopt behaviors that support decarbonization, sequestration, and adaptation. Next, we describe the ways in which behavioral medicine research can accomplish higher and more immediate levels of impact summarized in the Call To Action Box at the beginning of this article,

**Recommendation #1 Research Processes. Conduct strategic research that has policy implications and/or emphasizes the health co-benefits of decarbonization, sequestration, and adaptation CHBs.**

***Strategic Foundational Research.*** Translational methods are well-equipped to pivot into strategic research on addressing climate change and its health harms. Strategic research (Brownell & Roberto, 2015) has a primary goal of solving problems by stimulating and informing policy change, not solely advancing science, though it will likely do both.

A roadmap for the strategic research process is provided in Figure 3. It challenges the traditional model of attempting to engage key change agents at the end of the research process, which often fails to ask essential questions that are necessary to influence the adoption of practices or policies. The strategic approach to research involves flipping the model by asking up front who are the people or institutions in a position to create real change. These can be elected officials, but regulatory authorities, legal actors, NGOs, the media, and in some cases, even industry, can help define questions of strategic importance. Communication with these change agents can occur early and help establish research questions that address policy-relevant information gaps and will matter most in the adoption decision (e.g., behavior, costs savings, carbon output reductions). Communicating research results back to the change agents can then create a virtuous cycle of information sharing and impact. Strategic studies can sometimes be done quickly and at a low cost. Also known as solutions-oriented, action research, or use-inspired research (Wall et al., 2017), with the similar engagement of key collaborators as community-based research (Israel et al., 2010) this process involves engagement with the intended users of the research products, understanding the social and cultural contexts, and how the research will inform decision making and behavior.

Reducing the gap between research and policy requires building trust with change agents before the study is designed. This allows the team to develop the research question and design that will impact policy and encourages policy-makers, who may encounter strong opposition to their proposed climate policies, to stand on the foundation of relevant evidence. Factors that facilitate strategic research include: encouraging researchers to connect with change agents; recognizing that information flows from change agents to researchers is as least as important as the reverse; rapid dissemination of results through the peer review process; and funding priorities and academic criteria for hiring and promotion that value strategic impact. We suggest several research processes to meet the needs and urgency of climate change (**See Call To Action box**).

One example of how strategic research can be applied to CHBs includes targeting institutions for high-impact food-related interventions such as reducing or eliminating sales of foods that are worst for human health and also have a high carbon footprint. A study that eliminated sugar-sweetened beverage (SSB) sales from hospitals demonstrated health improvements, cost savings, and a 2% reduction in GHG emissions due to less plastic bottle purchasing (Cleveland et al., 2020; Epel et al., 2019) and has extended findings to a larger hospital system with a randomized trial (Schmidt et al., 2023). Moreover, the intervention targeted health disparities, in that those with lower education and service jobs were initially consuming the highest quantities of SSBs and thus showed the greatest benefits of the strategic intervention. This is an example of demonstrating co-benefits, in that it promoted both the health of the individual and the environment. The intervention also tested the addition of a motivational interviewing brief intervention, demonstrating the benefit of a multi-level intervention with additional support for those with excessive drinking (Mason et al., 2021). The interdisciplinary team included health psychologists, a physician, the university wellness director, and a health policy expert who developed a guide to disseminating the intervention, including how to engage partners (UCSF, 2022). Many large hospital systems have since adopted the sales ban. This small change in a specific CHB has implications for the potential health co-benefits of more widespread changes.

*Natural and Quasi-Experimental Methods with climate policy relevance.* As part of our innovations in intervention research, we can capitalize on natural experiments to evaluate the real-world effects of various policy changes. Evaluation of policy can also determine which policies are most effective in changing behavior. This is a new area ripe with the opportunity to overcome methodological challenges and develop effective solutions that prioritize CHBs. There have been many quasi-experimental studies of policy changes in nutrition and obesity, a new focus at NIH (Bennett et al., 2018). Typically, these studies are limited to comparing exposed and unexposed groups post-intervention. These quasi-experimental examples show the power of evaluating naturalistic changes and point to ways we can improve methods. Behavioral medicine scholars can help increase understanding of causal inference and outcomes associated with policy implementation related to promoting the adoption of CHBs (Bennett et al., 2018).

Policies for controlling air pollution have been effective in improving air quality, and it is possible to demonstrate improved health effects as well, across generations, as well as effects on social mobility. Burning of fossil fuels creates pollution, which in turn is related to poorer health in children -- asthma, smaller brain size, as well as neurocognitive and behavioral challenges in offspring (Garcia et al., 2021; Perera, 2018; Perera, 2017). An example of a naturalistic study of policy impact is one in which the authors examined pollution exposure before and after the 1970 Clean Air Act Amendments that enforced air quality standards. By examining 150 million parent/child dyads, the authors found that the grandchildren of the women who became pregnant

after the policy was enacted and were thus exposed to lower levels of small particle pollution, were more likely to go to college, and this effect was mediated by the greater education and wealth of their parents (Colmer & Voorheis, 2020).

We can use a reverse engineering approach to determine if a CHB-relevant policy is implemented in a way that includes active ingredients (mechanisms) of behavior change. Incorporating behavioral medicine scholars from the beginning, i.e., before implementation of a new intervention or policy that has human and planetary health implications, can help ensure that the mechanisms of action are effectively targeted and evaluated. While clinical trials provide knowledge for evidence-based practices, the natural experiment of policies provides practice-based evidence, a unique and important way to determine how to invest in public health interventions that have co-benefit implications (Ogilvie et al., 2020).

Multiple reviews of “natural experiments” and prospective studies demonstrate such changes can be effective in increasing active transportation (Kärmeniemi et al., 2018; Stappers et al., 2018). Cities worldwide, like Paris, are changing policies and investments to support active transport and discourage automobile use, and restricted cars in lieu of space for walking and bicycling (Laker, 2020; Sallis et al., 2016). For example, a quasi-experimental study in the UK found that infrastructure changes to make walking and cycling more feasible led to a significant increase (an additional 15 minutes a day) in walking and cycling among residents who lived near the newly installed amenities, compared to those who lived farther away (Goodman et al., 2014). Given the established literature demonstrating the clear human and planetary health benefits of active transportation, behavioral medicine can further contribute to this body of knowledge by prioritizing research and interventions that improve adoption. Such research could include identifying obstacles and improving motivation, implementation, and adherence to active transportation. This requires collaboration with the appropriate institutions and governments as important key collaborators. It also requires identifying and addressing systemic inequities that lead to disparities in access to active transportation including inequitable distribution of infrastructure and biased law enforcement practices.

***Science of Behavior Change for mechanistic insights.*** Behavioral scientists at NIH have led the Science of Behavior Change movement, which is based on the experimental medicine model ([National Institute of Health, 2021](#)). This movement has promoted the development of effective behavior change interventions, which can accelerate the translation of discoveries from the basic science of psychology and other disciplines into innovative strategies (Bennett et al., 2018). Many mechanisms for behavioral and social change have been informed by behavior change theories and identified from climate-relevant research (Epel et al., in prep). These include individual-level mechanisms such as influencing climate change risk perceptions while also increasing self-efficacy and perceived adaptive capacity in addressing barriers to CHBs. Other effective mechanisms can be implemented across group, community, and structural levels, including communication strategies and public campaigns that promote or demonstrate changes in social norms and collective efficacy. Mindfulness-based skills can help both with reducing maladaptive climate distress and denial, as well as contribute to constructive and creative problem solving and policy making (Wamsler & Bristow, 2022). We describe the psychosocial mechanisms underlying change in a separate paper (Epel et al, in prep).

Additional mechanistic research is also needed beyond applying the basic scientific principles of behavior change because attitude interventions can backfire, leading to “boomerang” effects. For example, presenting factual and dire information to people with

skepticism about climate change can strengthen skeptical views, in part because it violates deeply held beliefs such as the just-world belief (Feinberg & Willer, 2011).

**Recommendation #2 Interventions and Implementation: Prioritize interventions that promote health co-benefits through decarbonization, sequestration, and adaptation CHBs.**

Here we focus on implementing individual or social interventions – by applying foundational research on mechanisms and strategic research on what will have an impact on stakeholders and policymakers. There are many ways in which local actions add up to a broader impact. We start with the home for many behavioral medicine scientists – the university. Universities can have large environmental footprints. For example, in one university system, multiple climate and health groups formed, which led to the formation of a system-wide climate center across campuses (Seritan et al., 2022). This system-wide center led to increased communication, social cohesion, and collective efficacy which can more easily promote new climate and health-relevant research, educational change, and advocacy. Additionally, case studies of universities and hospital systems adopting green initiatives and comprehensive programs have demonstrated utility in improving institutional environmental footprints (Geng et al., 2013; Kim et al., 2018).

Institutional-level change is a high-priority target because it offers a greater ability for environmental control, social pressure, and a higher impact of change. For example, the healthcare sector contributes up to 15% of GHG emissions as well as pollution and waste generation (Sampath et al., 2022). Behavioral medicine professionals can have a significant influence on addressing climate change and environmental sustainability by working to intervene at the institutional level (Crosbie et al., 2019; Gagliardi et al., 2016; Wall et al., 2017). The National Academy of Medicine (NAM) Climate Grand Challenge is focusing on decarbonizing healthcare systems and will need effective examples to support the success of this initiative. Additionally, NAM is starting with a focus on models of transformative social change (NAM, 2023). Multi-level interventions ideally can create healthier conditions while also offering or tailoring an individual-level intervention for those who are at the most risk and need more support. It is important to examine our own university and professional society's indirect use of carbon, both in meetings and in our financial investments. APS, with the support of the BMRC, has initiated efforts to create a cross-society task force to issue recommendations on this.

***Supporting Individual to group change.*** Behavioral medicine practitioners can also work directly with patients to adopt co-benefit CHBs and plan for climate events. There is an increase in demand for climate-aware clinical practice, and this will be an important area of competency for future generations. Behavioral medicine practitioners can also support the communities most impacted by climate change in their efforts to adapt to climate change (see examples in the Adaptation section, above, and (Edmondson et al., 2022)). Prevention and preparation for frequent climate crises and environmental adversity will require building individual and community resilience. Building resilient communities requires collaboration across different sectors and can benefit from behavioral medicine expertise. Placing community voices and needs at the center of interventions and including them in all stages of the process is an essential component of effectively reducing the harms of climate-related racial inequities on members of these communities. When health equity and social justice are at the center of efforts, it helps ensure solutions do not perpetuate the very disparities that are targeted for elimination. Lastly,



given the increasing scope and severity of climate disasters on populations, there will be a need to shift from a clinical model to a public health model for mental health care and prevention.

**Recommendation #3: Moving Toward Policy Change. Engage in educational, policy, and advocacy activities that prioritize co-benefit solutions across institutions and local governments.**

Transformative change requires an honest look at the political, economic, and social structures and ideologies that perpetuate carbon use and limit technical and behavioral change. Additionally, given the exacerbating effects of climate change on existing health inequities, behavioral medicine activities that support equity-centered climate mitigation and adaptation solutions are essential for promoting social justice and improving health equity. Therefore, addressing the health impacts of climate change and air pollution should prioritize addressing oppressive systems that perpetuate inequities in health outcomes and environmental impacts (Rudolph et al., 2018).

Increasing public awareness of strategic research findings can, in turn, build public support for implementing the relevant policies and practices, which can provide an important step to bridging the research-policy gap. Individuals together can help create demand for the necessary government, corporate, and institutional policies and practices that can contribute more toward achieving the goals.

We know that public attitudes shape political will, but policy change also shapes public attitudes, and possibly to a larger extent. For example, before seat belt laws, only 11% of Americans wore seat belts, and most felt the choice about whether to wear one was personal freedom. After the laws were passed, over 90% wore seat belts and attitudes changed to fit their behavior (CDC, 2023). Similarly, with same-sex marriage, attitudes became more favorable after the law changed, in terms of seeing it as a social norm. People often rationalize the new status quo by adjusting their attitudes (Tankard & Paluck, 2017). Therefore, the opportunities to change laws, even at the local level, can have powerful effects. Deterministic policies (vs. incremental policies) can change attitudes through rationalization, and this has implications for climate co-benefit policies (Kitayama, 2022; Laurin, 2018).

It is also helpful to remember that while policymakers influence the rules that govern the social system (e.g., through legislation that influences climate change), they are individuals, open to influence from trusted sources and their social context. While academic culture normalizes the separation between political activity and our work, this separation limits the effectiveness of our work, implicitly and quietly implying public health is divorced from political contexts. Going forward, explicit naming of these strong macro-forces in our scholarship and including them as targets of change will be essential if we are looking for real and enduring transformations, rather than incremental change. This is possible by using the process of strategic research to work with stakeholders such as policymakers, community members, and industry leaders. Further, there may be cases where activism and advocacy are appropriate. For example, psychologists are bound to ethical codes and when current laws or practices violate moral and ethical codes, such as racism, professionals have been part of peaceful civil disobedience as an effective tool for social change issues (O'Flynn, 2021). Over 120 years, historical records show that the most effective methods for successful civil resistance against repressive governments have been non-violent protests, when at least 3.5% of the population join the efforts (Chenoweth, 2021). Behavioral medicine professionals have the opportunity to leverage their expertise to identify and explore the most effective advocacy methods for changing climate policy, although they will need support in both specific skills and group support. There is a movement toward helping

scientists engage in advocacy, such as the Society of Behavioral Medicine’s Policy Ambassador Program, which guides groups of researchers in how to develop relationships with their representatives and senators.

***Engaging Policy Makers and Business Leaders.*** One opportunity for behavioral medicine to advocate for change is to engage with individuals who have broad influence such as policymakers, government and regulatory officials, and others in a position to change the policies that affect vast numbers of people. Applying behavioral medicine principles to facilitate support of pro-community environmental policy among these influential individuals could be a powerful means of accelerating progress. Behavioral medicine experts can engage policymakers toward change by using the same principles we use when working with individual health behavior changes. For example, framing climate messages to appeal to ideological values has been shown to increase acceptance of climate change among ideological conservatives – specifically emphasizing the health impacts of climate change was helpful (Dixon et al., 2017; Kotcher et al., 2018; Petrovic et al., 2014). Further, demonstrating to influential decision-makers that our interventions can change CHBs and have co-benefits on health and healthcare costs provides evidence that can influence policy.

***Engaging the Public as Advocates.*** Decision-makers are influenced by public opinion and input from constituents. Thus, community advocacy can become a target behavior with health and climate benefits. The collaborative approach of strategic research and community-based participatory research can be applied to citizen advocacy to encourage citizens to advocate alongside and elevate the voices of marginalized communities, as further described in (Mendoza-Vasquez et al., 2022). Efforts to create thousands of effective advocates for policy changes with both health and climate benefits could be an important component of broader policy change initiatives.

***Engaging Communities of Practice.*** Communities of practice are an effective vehicle to transmit information, build new knowledge, and influence within a professional or civic community. This type of influence has recently been applied to activate TV weathercasters, a group of professionals who tend to be the only scientists in most newsrooms. As trusted educators, they can increase public understanding of the local relevance of global climate change, and thereby increase its perceived personal relevance. Maibach and colleagues have worked with weathercasters for the past decade to build knowledge, enhance efficacy, highlight role models, and create a sense of professional purpose around climate education. Impact evaluations locally and nationally have shown the approach to be effective in changing both weathercaster’s reporting practices and public engagement (Maibach et al., 2022).

Healthcare practitioners are another community of practice that are potential targets as agents of change. While relatively few Americans can identify any ways in which climate change harms health, or who is most likely to have their health harmed by climate change (Maibach et al., 2015), most Americans, especially conservatives, consider their doctors to be among their most trusted sources of information about climate change (Leiserowitz, 2022). Thus, there is a significant opportunity for behavioral medicine practitioners to support communities of practice in the health field as they increasingly come to engage with the climate crisis—in their institutions, and their communities, states, and nations (Howard et al., 2023).

Another way in which behavioral medicine can improve systems is to encourage the adoption of green healthcare practices. There are many proposed pathways for reducing the carbon footprint of hospitals, and some modalities for providing care have shown promise of having an environmental benefit (Tomson, 2015). For example, telemedicine services have been

shown to reduce GHG emissions (even after taking into account emissions generated by communication technology) (Masino et al., 2010). (Geng et al., 2013; Kim et al., 2018)

***Education within behavioral medicine.*** It is essential to support training and educational pathways for behavioral medicine professionals who are committed to addressing climate change. This shift will require a critical mass of educators as well as embedding curricula on climate change and health within behavioral medicine training programs. There are excellent examples of well-developed climate and health curricula in medical schools that can be modeled and utilized (American Psychological Association, 2022). Educational graduate and CME programs that are training the future generation of behavioral medicine practitioners and health psychologists must incorporate climate-aware clinical practices into their teaching curriculum. Finally, behavioral medicine professionals should be trained—through formal education and/or continuing education—on effective methods for engaging with decision-makers and other partners in real-world settings (Western, 2019). Societies such as the American Psychological Association and the Society for Research in Child Development, among others, sponsor visiting scholars working in the government. This will position the current and future generations of behavioral medicine experts to become more relevant in efforts to address the climate crisis and its associated health consequences by advancing rapid and meaningful change.

### **Conclusion**

The solutions for addressing climate change through decarbonization, sequestration, and adaptation are clear, but implementing the massive systemic changes needed will take transformational social and behavioral change. The Behavioral Medicine Research Council releases this call to action to the field to begin to transform to face the biggest challenge of our time. We must adapt our research priorities and methods rapidly to give precedence to strategic research, implementation of interventions, and advocacy that can translate to policy changes for the CHBs that will help prevent the most catastrophic outcomes. In our new future, combining our strategic science by collaborating with climate policy experts and stakeholders is more important than ever. This is our field's call to action, our opportunity to build our collective efficacy, so we can leverage our unique expertise to contribute to effective solutions in the greatest transformational change of our era.

**BOX 1: Questions for the climate interested behavioral medicine professional****1. *How can I best apply my expertise to the climate crisis?***

*Might this be through education or advocacy (students, colleagues, public) or research? Is it to influence psychosocial-cultural attitudes, values, and norms, or target a-CHB? Is basic behavioral or applied intervention research most needed in this area at this time? What do I feel passionate about? What local environmental justice organizations have already been doing this work, and how can I offer my expertise to support them?*

**2. *How can I engage in Strategic Research relevant to the climate crisis?***

*How will this work have an impact or Policy Relevance? Does the research evidence already merit a policy brief and direct political advocacy?*

*If it is early stage, who is the targeted audience? Who are the stakeholders in this work that I could talk to? How can I use the strategic research model to work with stakeholders, community members, or policymakers, at the outset? This might involve conversations with policymakers to determine what data would best help inform their ability to influence policy. This also involves conversations with community members about what their needs are and how you can use my expertise to support them.*

**3. *For interventions, what is a fitting model of change, and what are the mechanisms?***

*Is there basic work to be done on engaging the mechanism before moving to a larger intervention? Is there a small part of this challenge that I could address? Is there a proof-of-concept intervention that can be disseminated if successful? Is this ready for the implementation science framework?*

*What is needed to get to larger scale social change?-Do we need to start with individuals to understand how change works in this area? Is there already enough research to suggest that mass changes in a particular CHB will make a difference? If yes, what are the obstacles to the change needed? What would mass changes require? Are there partnerships to build now that could help make the change large-scale?*

***BOX 2: Examples of Potential Research Additions:*****1. Add relevant measures to observational studies.**

- a. **Mental health impact of climate change:** *For example, what is the impact of climate change on mental health in this group over time?* This may include measures of climate concern and worry, maladaptive distress, well-being, hope, and climate actions. Sharing local data on climate concerns and attitudes can influence politicians and policymakers.
- b. **Effect of climate exposures** in ongoing cohorts: *For example, what are the effects of extreme or slow climate events on mental and physical health and health behaviors?* Add measures of exposures, frequency, duration, traumatic impact, disruption, self-report, or objective measures, e.g., geographic exposure, air quality.
- c. **Assess differential impacts:** Document effects by individual and group factors -- age, sociodemographics, and geography.

**2. Add relevant measures to ongoing behavioral interventions involving a climate-related behavior (such as eating less red meat).**

- a. *Does this intervention improve CHBs?*

Examples of interventions that can impact climate change include altering food or beverage purchasing, increasing active transportation, increasing green exposure or reforestation, increasing climate awareness/activism, and advocating for climate attitudes or change policy.

- b. *What is the mechanism?* For developing and testing novel climate-related interventions, leverage known mechanisms (e.g., collective efficacy, hope, time perspective, legacy) at different levels (individual, community, institutional, and attitudinal).
- c. *Add climate-relevant outcomes.* Quantify economic cost savings, carbon savings in terms of GHG emissions, air quality, or other relevant climate outcomes that can be quantified or modeled.

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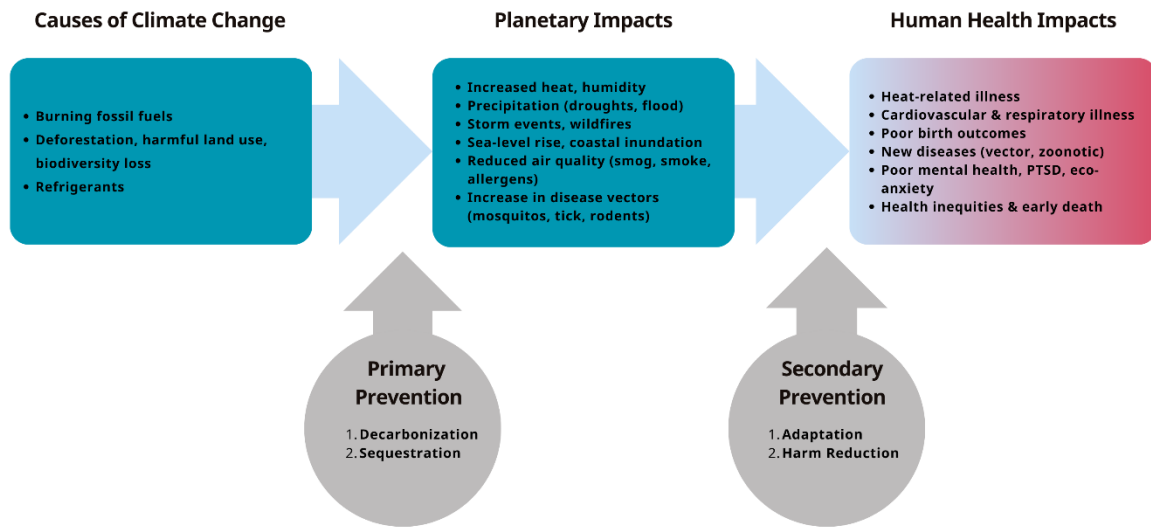
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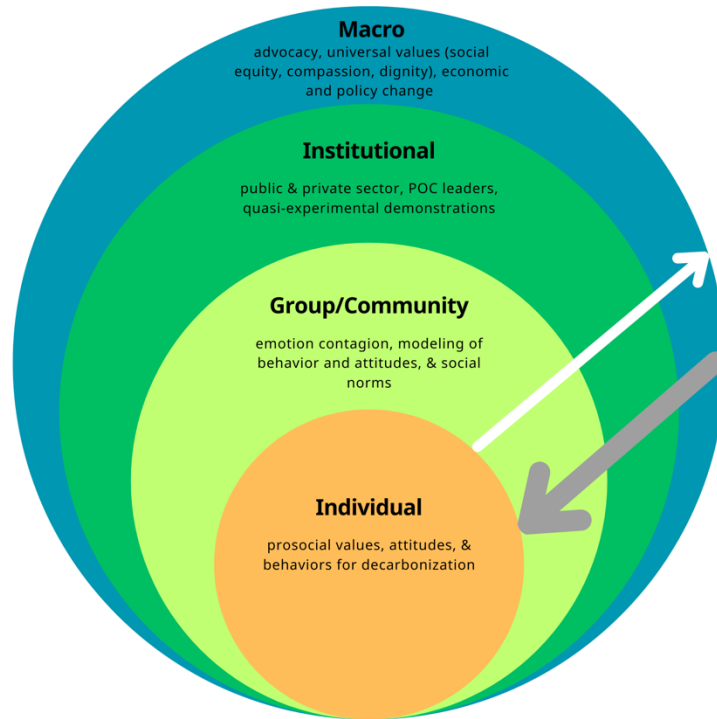
**Figure 1: Climate change, disasters, and human health**



**Figure 1 Legend:** Human contributions to climate change due to the burning of fossil fuels and agricultural practices have increased carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, and chlorofluorocarbons (CFCs) dramatically during the Anthropocene (NASA, 2021). This has led to climate changes (rising temperatures, humidity, extreme weather, fires, rising sea levels, poor air quality, and increased disease vectors). Each of these has different health impacts and illnesses, including mental health disorders such as acute stress disorders. Primary prevention focuses on the causes of climate change (decarbonization and sequestration of carbon), and secondary prevention focuses on helping humans and animals prepare and adapt to the crises to prevent further health impacts.

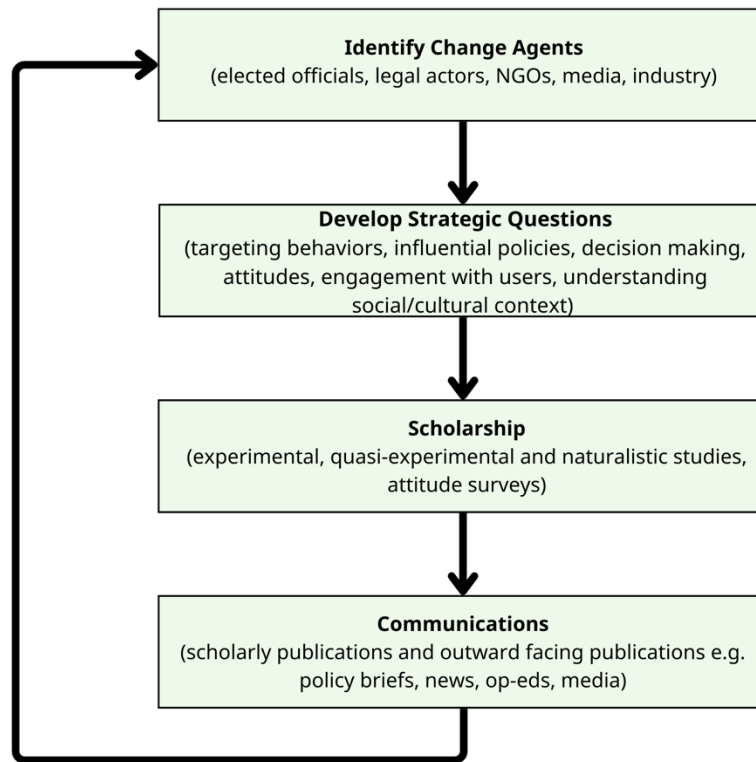


**Figure 2: Influence of behavioral research across sectors.**



**Figure 2 Legend:** Behavioral research can influence many levels, from the individual to group, institution, and macro/political level. The arrow from policy to individual is wider, representing the larger impact that macro-level changes have on carbon pollution and decarbonization. This figure is adapted from Bronfenbrenner’s ecological model (Pearson et al., 2016) and explained in more detail in Epel et al, this issue.

**Figure 3: Strategic Science Applied to Behavioral Research for Climate Change Mitigation and Adaptation**



**Figure 3 Legend:** Strategic research ideally starts with starting conversations and developing relationships with change agents, which could include influencers in the community, business sector, or governments. This can lead to clear questions where the answers have a strong chance of positively influencing policy. This could include experiments, surveys, or real-world interventions. The interdisciplinary team then shares the results directly with the change agents, as well as through the most effective means given the question (e.g., public media, policy briefs) in addition to the traditional academic publications to speak to our colleagues. The figure is modified from a figure published in Brownell & Roberto, 2015, printed with permission from Elsevier.