Health Psychology and Climate Change

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Document Version
Final published version

Published in:
Health Psychology Review

DOI:
10.1080/17437199.2024.2309242

Publication date:
2024

Routledge
Taylor & Francis Group

Health Psychology Review

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rhpr20

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To cite this article: Esther K. Papies, Kristian Steensen Nielsen & Vera Araújo Soares (06 Feb 2024): Health psychology and climate change: time to address humanity's most existential crisis, Health Psychology Review, DOI: 10.1080/17437199.2024.2309242

To link to this article: https://doi.org/10.1080/17437199.2024.2309242

Published online: 06 Feb 2024.

HEALTH PSYCHOLOGY REVIEW
https://doi.org/10.1080/17437199.2024.2309242

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Health psychology and climate change: time to address humanity's most existential crisis

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ABSTRACT

Climate change is an ongoing and escalating health emergency. It threatens the health and wellbeing of billions of people, through extreme weather events, displacement, food insecurity, pathogenic diseases, societal destabilisation, and armed conflict. Climate change dwarfs all other challenges studied by health psychologists. The greenhouse gas emissions driving climate change disproportionately originate from the actions of wealthy populations in the Global North and are tied to excessive energy use and overconsumption driven by the pursuit of economic growth. Addressing this crisis requires significant societal transformations and individual behaviour change. Most of these changes will benefit not only the stability of the climate but will yield significant public health co-benefits. Because of their unique expertise and skills, health psychologists are urgently needed in crafting climate change mitigation responses. We propose specific ways in which health psychologists at all career stages can contribute, within the spheres of research, teaching, and policy making, and within organisations and as private citizens. As health psychologists, we cannot sit back and leave climate change to climate scientists. Climate change is a health emergency that results from human behaviour; hence it is in our power and responsibility to address it.

ARTICLE HISTORY
Received 21 March 2023
Accepted 18 January 2024

KEYWORDS
Climate change; Planetary health; Mitigation; Intervention; Behaviour change; Systems science

Introduction

> The cumulative scientific evidence is unequivocal: Climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all. (IPCC, 2022a, p. 33).

This conclusion of the Intergovernmental Panel on Climate Change (IPCC) could not be clearer: we will have to work very hard and very quickly to secure a liveable future for all (IPCC, 2022b, 2022a). Indeed, the 2023 update on the state of the climate (Ripple et al., 2023) describes how humanity is entering uncharted territory, with measures on earth's vital signs (e.g., sea ice, surface temperature, ocean temperature) exceeding past extremes by enormous margins. At the same time, there is 'minimal progress by humanity in combating climate change' (p. 1), causing the authors to warn of a 'potential collapse of natural and socioeconomic systems in a world where we face unbearable heat, frequent extreme weather events, food and fresh water shortages, rising seas, more emerging diseases, and increased social unrest and geopolitical conflict' (p. 8).

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A liveable future within stable earth systems underlies everything that health psychologists study and care about. Therefore, this is a clarion call to action for health psychologists to collectively bring their expertise to this brief window of opportunity for effective climate change mitigation and adaptation (see also Bernard, 2019; Chevance et al., 2022; Chevance & Bernard, 2023; Dablander, 2023; Inauen et al., 2021). In this article, we will provide the necessary background, and we will present gaps, opportunities, and specific actions, to make it easier for health psychologists to get involved in climate change research and to make every working opportunity count.

Overview

This article focuses mainly on climate change mitigation and ways to limit further climate change. This delimitation does not take away the importance of climate change adaptation through building resilience to the present and future impacts of climate change. Indeed, as shown by the IPCC, many of the transformations needed to mitigate climate change also promote adaptation through increased resilience, such as renewable energy generation, sustainable local food systems, and community-oriented and nature-based adaptation of urban areas (IPCC, 2022a). We will point to these overlaps where appropriate. While this article focuses mostly on climate change, we recognise that this crisis is closely linked with other ecosystems and biodiversity crises (IPBES, 2019; Ripple et al., 2023). Again, many of the societal transformations to mitigate climate change, such as food systems transformations, would help address other crises as well, and we will point this out as appropriate. Finally, a variety of terms are currently used to reflect that climate change is a critical emergency, such as climate crisis, climate breakdown, climate catastrophe, and climate emergency. Here, we use the term climate change in accordance with most of the scientific literature, while emphasising that climate change is now a systemic, existential global threat.

Structure

The article is structured as follows. We first provide a brief background on how climate change affects human health and amplifies health inequalities. We then describe the role of greenhouse gas (GHG) emissions from fossil fuels and the food system in causing climate change and place these in the wider context of emission inequalities and the role of economic growth in producing climate change and environmental degradation. Next, we address how phasing out fossil fuels and transforming the food system is essential to limiting climate change, and we detail their significant, direct health co-benefits. We address that meeting human needs within planetary boundaries is possible, and that reaching that goal will require a clear focus on high-impact behaviours in high-impact groups, i.e., energy overconsumption in high-income nations. Throughout the article, we refer to both climate change mitigation *measures* (e.g., governmental and organisational policies, context-specific interventions, individual behaviour changes) and larger-scale *transformations* of societal systems or sectors (e.g., the food system) that may result from a concerted application of such measures.

The key transformations to limit further climate change require both systemic and individual-level change, whose realisation health psychologists are well placed to inform (Sniehotta et al., 2017). Specifically, we show that health psychologists have key expertise, skills, and spheres of influence to enact the required changes. We end by providing examples of how health psychologists can address the climate crisis in research, teaching, advocacy for policy making, within organisations, and in private life.

Two key takeaways

Throughout the article, we emphasise two key points. First, climate change mitigation measures have significant health co-benefits. Hence, these measures not only contribute to a liveable planet for current and future generations, but they also benefit human health immediately by addressing long-standing public health problems such as air pollution, lack of physical activity,

unhealthy diets, and poverty (Balakrishnan et al., 2019; Hadley et al., 2018; Romanello et al., 2022). Second, to address climate change most effectively, it is critical to focus on the industries, institutions, and individuals most responsible for GHG emissions (see also Chevance et al., 2022). At the individual level, this means focusing on people with high levels of wealth, income, and education, predominantly centred in the Global North, who are disproportionately responsible for GHG emissions and have greater social, political, financial, and organisational leverage to influence the speed and nature of climate change mitigation (Chancel, 2022; Dietz & Whitley, 2018; Nielsen, Nicholas, et al., 2021c). We note that we, the authors, and many of you, our readers, will fall into this group. Given that time and resources to prevent further climate change are extremely limited, collective efforts must be directed where they can have the most impact on GHG emissions.

Climate change is a health emergency

Climate change has consequences for all aspects of human health. Many of these are evident already, while others are likely to manifest within the next 20 years and beyond (IPCC, 2022a; Quiggin et al., 2021; Romanello et al., 2022). Changes in rainfall patterns and drought will create water scarcity and will affect agriculture through pests and diseases, crop failures, and resulting food crises and social unrest. Nutrient change and the breakdown of soil systems will cause food insecurity and malnutrition for potentially billions of people (e.g., Scheelbeek et al., 2018). Extreme heat will cause death and make large areas uninhabitable or unworkable, which will lead to loss of livelihoods, economic disruption, and social unrest (Hsiang & Burke, 2014; Mora et al., 2018; Romanello et al., 2022). Extreme weather events like storms, wildfires, and flooding will increasingly destroy critical infrastructure that our societies rely on for food, healthcare, and other needs. Coupled with food shortages, water scarcity, and market destabilisation, millions of people migrating to escape unliveable conditions may increasingly cause social unrest, a rise in populism, and armed conflicts. Aggravation and wider spread of pathogenic diseases will put new strains on already challenged healthcare systems (Mora et al., 2022).

Climate change also negatively affects mental health, with detrimental impacts already being observed on outcomes such as anxiety, depression, acute traumatic stress, PTSD, suicide, substance abuse, and sleep problems (IPCC, 2022a; Minor et al., 2022). Negative effects on mental health from climatic events such as extreme heat, storms, or wildfires are exacerbated by existing vulnerabilities, such as socio-economic inequities, gender, and age with low-income households, women, and younger people being disproportionately affected (Crandon et al., 2022). The societal destabilisation resulting from climatic hazards will likely further exacerbate these mental health effects and the inequities in vulnerabilities. The 2023 report of the Lancet Countdown on health and climate change highlights the need for a health-centred response to climate change, putting health at the centre of climate action (Romanello et al., 2023).

Significant health impacts of climate change and the resulting extreme weather events are already being observed across the globe at 1.2°C of warming compared to pre-industrial levels (IPCC, 2022a). Some analyses predict that the threshold of 1.5° warming will likely be reached in the early 2030s (Lee et al., 2021; Matthews & Wynes, 2022). In addition to intensifying extreme weather, rising temperatures cause earth systems destabilisation that can lead to tipping points being reached. One of these tipping points is the collapse of the Greenland and West Antarctic ice sheets, which would lead to significant sea level rise; another is widespread thawing of permafrost, which would release large amounts of stored methane (a potent short-lived greenhouse gas) into the atmosphere, further amplifying climate change (Armstrong McKay et al., 2022). Given that earth systems do not behave in a linear manner, but as complex systems with delays and positive and negative reinforcing feedback loops, the exact impacts of reaching these tipping points are hard to predict. However, further significant destabilisation from 'complex, compound and cascading risks' is likely (Armstrong McKay et al., 2022; IPCC, 2022a).

Climate change affects already disadvantaged groups most strongly: people in the Global South, people of colour, communities that are deprived or have little material wealth, women, children, and people yet to be born (for more details, see Chevance et al., 2022). As a result, climate change exacerbates existing social and health inequalities that health psychologists are working to reduce. Different levels of vulnerability across the globe result from ongoing and historical injustices, such as colonialism (IPCC, 2022a). Communities that have seen their natural resources exploited and squandered by colonisers in the past are further disadvantaged (Hickel, 2021). These communities often already grapple with resource, infrastructure and energy poverty. But tragically, despite having contributed minimally to causing climate change, these communities are simultaneously more likely to suffer from the impacts of climate change (e.g., from extreme weather) due to their geographical location and their lower resilience (IPCC, 2022a).

Addressing the current crises presents opportunities for improving planetary health – 'the health of human civilisation and the state of the natural systems on which it depends' (Whitmee et al., 2015). Indeed, proponents of the concept of planetary health have called for those involved in public health to collectively address three linked threats, namely threats to human health and well-being, to the sustainability of human civilisation, and to the natural and human-made systems that support us (Horton et al., 2014). In line with this, radically reducing overconsumption and excessive resource use in many industrialised nations would allow the global population to live within planetary boundaries and hence improve the living standards of billions of people whose basic needs are not currently being met (Millward-Hopkins et al., 2020). Within industrialised nations, most effective mitigation measures that focus on demand for goods and services (e.g., shifting to active and shared mobility, improving building efficiency, shifting to plant-based diets) also have positive effects on human wellbeing (e.g., by improving air quality, reducing energy poverty, improving physical health; Creutzig, Niamir, et al., 2022). In short, the societal and economic transformations required to limit further climate change and biodiversity loss also help address many existing public health challenges, including the health emergency of global inequality.

Understanding the causes of climate change

In this section, we will first briefly describe the key contributions of GHG emissions from the extraction and use of fossil fuels and from the food system to climate change. Then, we will discuss how GHG emissions are predominantly caused by high-income nations and individuals. These inequalities reflect the root causes of climate change, namely the current economic and political systems that favour economic growth over wellbeing, and mostly serve wealth accumulation among a privileged elite (Hickel, 2021). This discussion will provide the context for the societal transformations that are needed to mitigate climate change and improve planetary health, which will be addressed in the subsequent section.

Extraction and use of fossil fuels

Most GHG emissions result from the extraction, use, and burning of fossil fuels, particularly in the sectors of buildings and transport. Coal, oil and gas are used to generate electricity, to construct and temperature-regulate buildings, to manufacture goods, to produce food, and to fuel the transport of people and goods, among others. Oil and gas are also the main resources in the production of plastic and synthetic fibres (e.g., polyester in clothing) (Geyer et al., 2017; Lau et al., 2020). Hence, the use of fossil fuels is deeply entrenched in all facets of daily life in industrialised countries. In addition to emitting CO2, these uses of fossil fuels lead to other negative health impacts, such as air pollution from power plants, from combustion-engine vehicles, and from incinerating single-use plastics. They also cause the contamination of oceans, freshwater, and soils, which severely degrade the ecosystems that human and non-human species depend on (IPBES, 2019). For example, plastic pollution can lead to synthetic fibres and microplastics entering the human body through food and air (De-

la-Torre, 2020; Wang et al., 2021). Indeed, microplastics have been found in the human placenta (Ragusa et al., 2021), and carbon particles from air pollution have been found in the lung and brain tissue of unborn babies (Bongaerts et al., 2022).

The food system

Climate change is also tied to food production, which is the largest cause of global environmental change (Willett et al., 2019). The food system has been estimated to account for 34% of all GHG emissions globally, mostly caused by animal agriculture and land use change (Crippa et al., 2021), although fossil fuel-based fertilisers also play a large role (Ramírez & Worrell, 2006). Extensive research documents that omnivorous diets are associated with much higher GHG emissions than pescetarian, vegetarian, and vegan diets (Poore & Nemecek, 2018; Stylianou, Fulgoni, & Jolliet, 2021; Willett et al., 2019; Xu et al., 2021). Particularly, the climate impact of red meat greatly exceeds that of white meat, fish, and plant-based foods (Clark et al., 2022; Poore & Nemecek, 2018) (see Figure 1).

Agriculture is also the main source of deforestation and forest degradation. Deforestation and forest degradation especially occur in the tropics, leading to massive losses of biodiversity, and turning carbon sinks into carbon emitting areas (Gatti et al., 2021; Tilman et al., 2017). Most tropical deforestation happens to provide land for cattle and for growing soy for animal feed and biofuels (Pendrill et al., 2019). In other words, the million-years old Amazon rainforest is increasingly destroyed to produce meat. Globally, the vast majority of agricultural land is used for pasture and for growing animal feed; cutting out beef and mutton from global diets would more than halve the land used for agriculture (Poore & Nemecek, 2018). In addition, agriculture, aquaculture and fishing threaten land and marine ecosystems, for example through eutrophication from fertiliser overuse. Current and predicted changes in atmospheric CO_2 will also lead to a decrease in

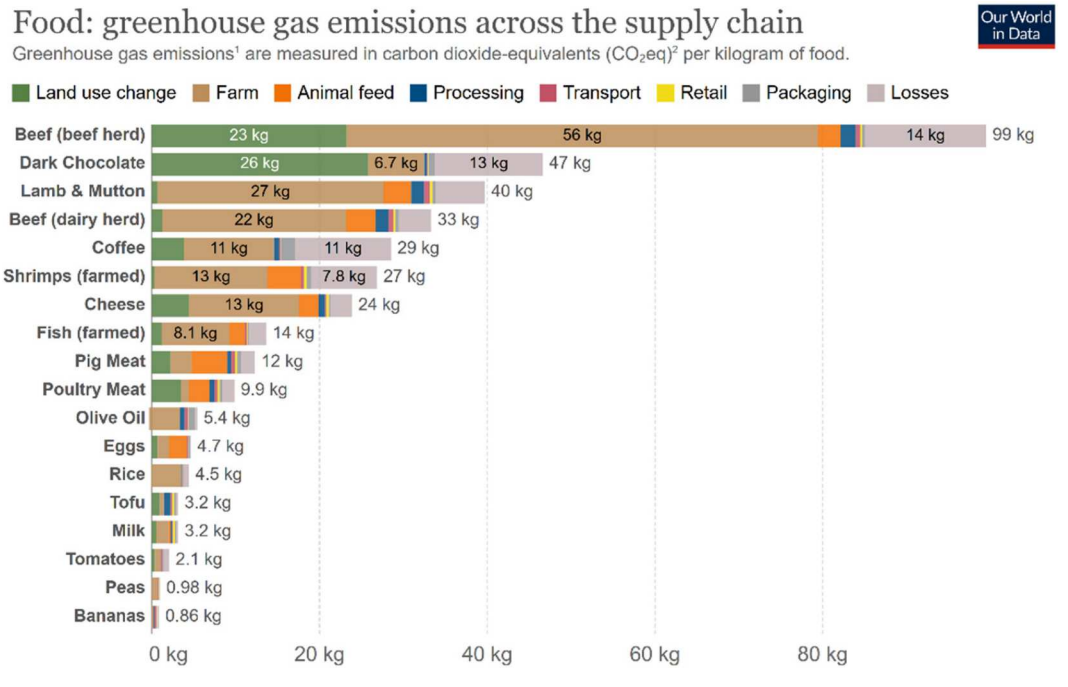

Figure 1. Greenhouse gas emissions across the supply chain for a variety of foods, based on data by Poore and Nemecek (2018), graph by Ritchie (2020).

protein and vitamin content in staple foods such as rice due to an imbalance between atmospheric carbon and soil-based nutrients, and this can further increase undernutrition in the poorest rice-dependent countries (Zhu et al., 2018). Given the concurrent challenges of obesity and undernutrition, concerted efforts to transform the food system are needed to provide healthy and sustainable diets to a growing global population (Swinburn et al., 2019; Willett et al., 2019). The European Farm to Fork strategy (Reinforcing Europe's Resilience, 2020) represents an effort in that direction, though as a strategy it lacks in depth and needs further development in key implementation features (König & Araújo-Soares, 2021).

Emission inequalities and climate justice

The responsibility for causing climate change is not evenly distributed across the world and across social groups. Most GHGs are emitted in countries that have so far been the least affected by climate change. The concept of climate justice refers to addressing these inequalities. Analyses of global cumulative emissions since 1750 show that 33% of these originate from Europe and 29% from North America, even when not accounting for emissions embedded in trade (i.e., emissions from imported products and services). In contrast, Africa has contributed only 3% of global emissions, India 3%, and China 12.7% (Andrew & Peters, 2021). Hence, climate change is overwhelmingly caused by industrialised societies in the so-called Global North.

However, the responsibility for GHG emissions is not only unequally distributed between countries but also within them (Chancel, 2022). Individual carbon footprints generally highly correlate with income and wealth. For example, in the United States, the average carbon footprint is 21.1 tCO2e per capita when also accounting for private investments. While this average is unusually high globally, the average carbon footprint of Americans within the bottom 50% of income and those in the top 10% of income varies by a factor of seven (10.1 versus 70.3 tCO2e per capita; Chancel, 2022). Within Europe, the top 10% of households with the highest carbon footprints are responsible for 27% of Europe's emissions, more than the bottom 50%; air travel contributes most to these inequalities (Ivanova & Wood, 2020). Overall, the distribution of emissions reflects energy poverty at one extreme of the scale and excessive overconsumption at the other end. In addition, socioeconomic inequality itself increases GHG emissions, for example through increasing energy-intensive consumption and production, increasing opposition to climate policies that may affect one's economic position, and decreasing the trust needed for effective climate policy and collective action (Green & Healy, 2022).

Recent global analyses show that it is possible to satisfy human needs and provide decent living standards for human wellbeing at considerably lower levels of energy use, compatible with avoiding climate breakdown. However, this would require radical societal and economic transformations (Millward-Hopkins et al., 2020; Vogel et al., 2021) – in other words, a transition to 'high well-being, low carbon-demand societies' (Creutzig, Roy, et al., 2022). This is what Green New Deal policies are designed to achieve, by focusing not only on reducing carbon emissions, but also on socioeconomic inequalities that are closely linked to excess emissions (Green & Healy, 2022), as we will discuss next.

Considering political and economic root causes of climate change

Fully addressing the climate crisis and its health and social justice implications will require unprecedented societal changes. It is unlikely that we can achieve these without understanding and reconsidering the political and economic systems that constitute the root causes of the current crisis (Stoddard et al., 2021). Specifically, the changes in resource consumption and distribution patterns that are required to sustainably meet the needs of the global population are unprecedented – it will not suffice for industrialised nations to 'only' switch to renewable energy or add new, unproven and unscalable technologies to remove carbon from the atmosphere, while continuing with business as

usual and pursuing economic growth (so-called 'green growth') and associated patterns of overconsumption (Millward-Hopkins et al., 2020; Ripple et al., 2023; Vogel et al., 2021).

Climate change and ecological breakdown are heavily driven by the constant pursuit of economic growth and the resulting resource use and overconsumption in industrialised countries (e.g., Hickel, Kallis, et al., 2022; Klein, 2014). Economic growth is widely accepted as the main goal or even imperative of the economy (Kallis, 2011), and gross domestic product (GDP) is seen as a measure of human progress, without referencing human needs or wellbeing, ecological or resource constraints, or planetary health (Whitmee et al., 2015). As a result of this reliance on growth, economies in industrialised countries produce unnecessary goods and services at high environmental cost, generating profit for private individuals while not furthering collective human wellbeing (Benatar et al., 2018; Brand-Correa et al., 2020). Indeed, in analyses of 120 countries over a 10-year period, neither health nor happiness have been found to increase with GDP growth or with per capita carbon footprint (Fanning & O'Neill, 2019). Narratives of 'green growth' suggest that 'decoupling' of economic growth and greenhouse gas emissions through technological innovation will allow growth to continue without further environmental harm; however, there is no empirical evidence that this decoupling can happen at a sufficient scale and pace to prevent catastrophic climate change and further environmental degradation (Hensher & Zywert, 2020; Hickel & Kallis, 2020; Le Quéré et al., 2019; Vogel & Hickel, 2023).

Technological solutions to 'green growth' also do not address the significant social injustices resulting from the focus on economic growth. The neoliberal capitalist economies of the past 40 years have benefited the living conditions of only a minority of the global population, while simultaneously depleting and degrading critical resources (e.g., fresh water, soils, forests, oceans), causing 'interconnected crises of economy, ecology and social development' (Benatar et al., 2018). Much of the wealth of the Global North has been built on the exploitation of cheap labour and natural resources of marginalised, exploited communities within the Global North and especially outside it (i.e., in the so-called Global South) (Hickel, Dorninger, et al., 2022; Klein, 2014; Stoddard et al., 2021), reflecting the injustices of colonialism and imperialism. This is underpinned by culturally shared values of individualism, and of dominance over nature and other beings, rather than embracing humans' interdependence within complex ecological and social systems (Benatar et al., 2018; Hickel, 2021; Nicholas, 2021; Raworth, 2017).

Different models are possible: many nations have achieved high well-being (i.e., life expectancy) at relatively modest levels of carbon emissions, for example Costa Rica, Vietnam, Brazil, and Albania (Roberts et al., 2020). However, considering a wider set of indicators of need satisfaction and wellbeing, no country currently manages to achieve these sustainably (Fanning et al., 2021). Hence, achieving high wellbeing while remaining within planetary boundaries remains a significant challenge (Büchs & Koch, 2019; Millward-Hopkins et al., 2020; Vogel et al., 2021). Industrialised nations with high emissions will have to radically reduce their emissions, while simultaneously maintaining or improving wellbeing. This will likely require changing the goal of the system, such that need satisfaction and wellbeing are prioritised over GDP growth per se (Meadows, 1999; Roberts et al., 2020). The notion of degrowth represents a framework for re-organising political, economic and social institutions to make this possible, and to sustainably downscale material production and consumption (Kallis, 2011). However, re-orienting economic systems away from growth is likely to be met with resistance from powerful groups with vested interests that are deeply embedded in the power structures of industrialised nations (Hickel, Kallis, et al., 2022; Stoddard et al., 2021).

Many of us, authors and readers, have likely grown up with the notion that capitalism, economic growth, or even market-based neoliberalism, is a necessity for progress and wellbeing (see Benatar et al., 2018; Büchs & Koch, 2019). Hence, questioning this notion may be uncomfortable at first. We may also lack practice in imagining plausible and desirable futures not dominated by high energy use, or 'social imaginaries' of how we might live (Stoddard et al., 2021). However, this should not keep us from engaging with these key questions. In other words, we can no longer leave the economy solely to economists. Considering the goal of an economic system from the perspective

of a health psychologist may arguably make it obvious that health and wellbeing should be the core goals of societal systems. In the middle of a life-threatening climate emergency, ongoing biodiversity collapse, and a global pandemic, it seems irrational at best to rely on economic models that fail to consider the biophysical reality in which humans operate (I.e., the nonhuman world, ecosystems, natural resources, pollutants) – as is the case with mainstream economics (Raworth, 2017; Stoddard et al., 2021). Given current and future threats to the health, wellbeing and survival of billions of people, there is a moral imperative to interrogate and challenge our current economic assumptions from a social and environmental justice perspective, and to advocate for economic and social systems that can improve planetary health. We discuss some promising approaches to these transformations below.

Societal transformations to rapidly reduce greenhouse gas emissions

To avoid catastrophic climate change, both system-level and individual-level changes are urgently needed for rapid and deep emission reductions in all sectors, especially in high-income nations. In addition to addressing greenhouse gas emissions from fossil fuels and the food systems (a carbon-centric approach; Green & Healy, 2022), these changes can be crafted to create the conditions for living well within planetary boundaries, and hence constitute climate change mitigation measures with significant social and health co-benefits.

Phasing out fossil fuels

As most GHG emissions result from fossil fuels, their use must be urgently phased out to mitigate climate change (IPCC, 2022b). There is no evidence that carbon capture methods can be scaled up to allow for the continued use and expansion of fossil fuels (Ripple et al., 2023). Clearly, new investments in fossil fuel infrastructure need to stop because they lock in fossil-fuel use for decades to come (Seto et al., 2016). Yet, despite warnings from the International Energy Agency that new fossil-fuel investments will drive global warming beyond 1.5°C (IEA, 2021), such investments are still happening across the world, and subsidies for fossil fuels are increasing (Ripple et al., 2023). Existing uses of fossil fuels must also be phased out. Given the reliance on fossil fuels for all aspects of industrialised societies, including for household energy supply, industry, and transport, how can phasing out of fossil fuels be practically achieved? In brief, energy use in high-income nations will have to be reduced, especially in public and private organisations and among the wealthiest households in society, and energy production will have to move away from fossil fuels toward renewable sources. The IPCC provides detailed answers and scenarios, including transitioning to renewable energy sources, reducing demand, and improving efficiency (IPCC, 2022b).

Phasing out fossil fuels requires the engagement of actors across societal levels, including policy makers, industry stakeholders, health professionals, researchers, and members of the public. It will rely on comprehensive policy packages with economic and regulatory instruments to reduce the use of fossil fuels and energy demand more generally. First and foremost, this includes stopping fossil fuel subsidies and re-directing funds toward renewable energy.

Urgent action is also needed to improve the material and energy efficiency of buildings, and to transform transport infrastructure. For example, in the domain of transport, a shift is required toward car-free mobility, relying on active travel and shared electrified public transport (Chen et al., 2022; Creutzig et al., 2015). In many Western countries, this necessitates a substantial redesign of infrastructure that typically favours cars (Mattioli et al., 2020). Reducing car use can be achieved through combinations of push and pull-measures, including restricting or increasing the cost of car use and providing high quality, accessible and equitable public transport and infrastructure for safe active mobility (e.g., walking and cycling; Kuss & Nicholas, 2022), which can also be supported by changing social norms around mobility (Semenescu et al., 2020; see also Teran-Escobar et al., 2022).

Urgent and concerted investment and policy on national, regional and local levels will be needed to transition to fossil-free transport. High energy users will likely resist such changes (Cass et al., 2023; Duncan et al., 2023), which will necessitate careful citizen and other stakeholder engagement. The feasibility of investment and policy shifts toward active and public transport will greatly increase if policy makers perceive strong demand or support for such initiatives among the general public and key stakeholders. Hence, individuals can engage in collective action to show this support, and to demand bolder action and ending investments in fossil fuel infrastructure, in line with IEA recommendations. In addition, for these structural changes to be effective in reducing emissions from travel, individual-level behaviour change is also required, such that citizens shift from using private cars to active and public transport. As environmental psychology has shown, such behaviour changes are more likely when people perceive policies as appealing, fair, and socially acceptable, which in turn depends on effective policy, design, and communication (Mitev et al., 2023). Hence, the shift toward more sustainable travel systems rests on complex and dynamic interactions between top-down and bottom-up actions. Thus, interventions to achieve this require a nuanced understanding of complex systems (see also Sniehotta et al., 2017).

Transforming the food system

Food is a key challenge in climate change and health. The current food system fuels climate change, obesity and malnutrition, while climate change increases food insecurity and malnutrition through effects on food production, supply chains, and access to food (Romanello et al., 2022). Hence, urgent food system transformations are needed to limit further climate change and improve food security and health outcomes. The food system contributes approximately one third of GHG emissions, with most of these emissions stemming from animal agriculture (Crippa et al., 2021). A shift to predominantly plant-based diets is a highly effective strategy to reduce emissions and would also improve diet-related health outcomes, reduce demand for land and water, and reduce the risk of agriculture-related zoonotic diseases (Carlson et al., 2022; Creutzig, Roy, et al., 2022; Gibb et al., 2020; Romanello et al., 2022).

To feed an estimated global population of 10 billion by 2050, agricultural productivity will have to increase, so that more food can be produced while using less land (Garnett et al., 2013; Searchinger et al., 2019). In addition, changes in demand are essential, through shifting toward predominantly plant-based diets and reducing the consumption of animal-based foods (Willett et al., 2019). In the UK, for example, 85% of agricultural land is used for livestock, either for grazing or to produce animal feed (Dimbleby, 2021). To make better use of the available land, agricultural priorities will need to shift toward producing high-quality, healthy food for human consumption (Willett et al., 2019), and otherwise towardecosystem restoration. These challenges will become even more pressing as escalating climate change affects agriculture through changing rainfall patterns, droughts, and heat that makes it dangerous to work outside (IPCC, 2022a; Quiggin et al., 2021).

In many industrialised societies, the shift toward predominantly plant-based diets is hampered by a variety of behavioural, socio-cultural, business, and institutional factors, such as social norms around meat consumption, low awareness of the negative health and environmental consequences of meat consumption, liking and taste expectations, and agricultural subsidies that support animal agriculture (Bryant, 2019; Davis & Papies, 2022; Dimbleby, 2021; Godfray et al., 2018; Piazza et al., 2015). Together with limited availability of appealing plant-based foods in food service settings, there is often little normative and practical appeal of shifting to plant-based diets for consumers (Wehbe et al., 2022). Indeed, food-based dietary guidelines globally overwhelmingly fail to suggest reductions in meat and dairy intake for sustainability reasons (James-Martin et al., 2022; Sinclair et al., 2023). A concerted set of measures to transform the food system is needed, including measures such as making plant-based foods the default, supporting farmers in using low-yield agricultural land for nature restoration, moving subsidies away from animal-based food production, shifting public and private procurement to plant-based foods, updating dietary guidelines, and

increasing public awareness of the impact of meat consumption to support the shift of consumer demand away from animal-based foods (Caleffi et al., 2023; Dimbleby, 2021; Papies et al., 2023). Similar shifts of awareness and behaviour, along with supportive policy levers, will be required to reduce the amount of food waste (Caleffi et al., 2023), which is a significant source of methane emissions from the food system in industrialised countries (Crippa et al., 2021).

Orienting societal transformations to living well within planetary boundaries

Analyses of the 'safe and just space for humanity' (Raworth, 2017) have shown that it is possible to meet human physical and social needs of the global population without transgressing planetary boundaries (e.g., boundaries of climate change, freshwater use, etc.; O'Neill et al., 2018). However, this requires substantial economic restructuring, including a focus on 'sufficiency' in resource consumption instead of overconsumption, as well as improvements in physical and social provisioning systems (e.g., moving to renewable energy, reducing waste, reducing income inequality; O'Neill et al., 2018). Fundamentally, the goal of global economies would need to shift from a focus on growth to a focus on creating sustainable and equitable human well-being, as proposed by approaches such as 'doughnut economics', wellbeing economy, or degrowth.

Raworth's popular concept of 'doughnut economics' is one approach to re-orienting economic systems from a growth focus to reaching the 'safe and just space for humanity', and it suggests a systems re-design to be more redistributive and regenerative, and focused on thriving rather than growth (Raworth, 2017). Creating a socially just economy within planetary boundaries is also the goal of a wellbeing economy (e.g., McCartney et al., 2023). Similarly, the degrowth framework proposes a shift in focus from growth to well-being (Hickel, Kallis, et al., 2022; Kallis, 2011) and proposes numerous policy proposals to move societies into a 'safe and just space'. Such policy proposals include reducing non-essential production, reduction of working hours, universal basic income, redistributive taxation, strengthening of local economies, limits on resource (over)use and pollution, and significant investments in public goods such as education, healthcare, food systems, and community spaces (Hickel, Kallis, et al., 2022; Kallis, 2011; Knight et al., 2013; Raworth, 2017). Many of these measures have already been shown to be associated with increases in health and wellbeing, hence they align with many of the goals that health psychologists strive for, and they are likely to be popular (Lepinteur, 2019). Indeed, many existing public health problems are the result of overconsumption, including of food, alcohol, or tobacco. This might be remedied by transitioning away from a focus on economic growth, which fuels this overconsumption (Hensher & Zywert, 2020). There is substantial public support for sufficiency policies (Lage et al., 2023) and for post-growth approaches more generally among the public and scientists (e.g., King et al., 2023; Paulson & Büchs, 2022). In sum, there are feasible opportunities for popular, fundamental societal transformations that address key challenges of social justice, climate change, and health – it is now time to act on these opportunities.

Health and social co-benefits of climate change mitigation measures

In addition to the social and economic transformations described above, most specific climate change mitigation measures also have significant health and social co-benefits (Chevance et al., 2021). This includes benefits of adapting travel infrastructure and behaviour such as reduced air pollution (Cepeda et al., 2017) and improved physical and mental health from increased physical activity (Mueller et al., 2015; Zukowska et al., 2022) and the creation of more liveable and sociable cities that are less dominated by car traffic (Hematian & Ranjbar, 2022). Reducing meat and dairy intake, and moving to plant-rich diets, such as the Mediterranean diet, has health co-benefits in terms of reducing rates of overweight, various cancers, and inflammation associated with (processed) meat consumption (Romanello et al., 2022; Willett et al., 2019; see Venegas Hargous et al., 2023 for examples of successful food system interventions with effects on both health and climate outcomes). More generally, effective mitigation and adaptation can also, if properly designed, increase social justice

by reducing social and health inequalities, although some mitigation policies may also reinforce inequities if designed without attention to their potential distributional effects (Owen & Barrett, 2020). Critically, communicating societal co-benefits of climate mitigation measures can increase motivation and support for such measures (Bain et al., 2016), and may provide a key leverage point especially for health psychologists.

The importance of focusing on high-impact behaviours and high-impact groups

The urgency of climate change mitigation and the unequal distribution of GHG emissions call for a focus on high-impact behaviours and high-impact groups (see also Chevance & Bernard, 2023). The sources of global and national GHG emissions are well-documented (IPCC, 2022b), including which individual behaviours are most responsible for GHG emissions and how these may vary across contexts (Ivanova & Wood, 2020; Oswald et al., 2020; Wynes & Nicholas, 2017). Researchers, practitioners, and policymakers should generally focus on changing the behaviours with the largest associated GHG emissions, which typically fall within the transport, food, or housing domain. However, the selection of target behaviours for intervention should equally be informed by evidence of behavioural plasticity – that is, the extent to which a behaviour can be changed (Dietz et al., 2009; Nielsen, Clayton, et al., 2021a) – to identify the most promising levers for reducing emissions. For example, some high-impact behaviours, such as meat consumption, motor vehicle use, or air travel, may be highly resistant to change in certain contexts (e.g., due to cultural significance, perverse incentives, or limited behavioural alternatives), meaning that, at least in the near-term, targeting other high-impact behaviours may hold greater mitigation potential. While calculating the GHG emissions associated with different behaviours largely falls outside the scope of health psychology, health psychologists are ideally positioned to gather, synthesise, and communicate evidence of behavioural plasticity and how it varies across behaviours, contexts, and people. Such nuanced evidence will help policy makers, practitioners, and other change agents make better decisions around individual behaviour change.

As highlighted above, there is profound inequality in individuals' contributions to climate change. But inequality also exists in who can influence the type and speed of mitigation. The influence on mitigation strongly increases with socioeconomic status, not only because high-status individuals have larger carbon footprints and consequently greater potential to and responsibility for reducing GHG emissions, but also because they can disproportionately influence the decisions and carbon footprints of other people, organisations and policy makers (Dietz & Whitley, 2018; Mayer, 2017; Nielsen, Nicholas, et al., 2021c). For example, wealthier and well-educated individuals, on average, are more likely to have financial resources to invest (e.g., in stocks, bonds, or real estate), to be in positions of power (e.g., in organisational leadership positions), to have access to policy makers and other decision-makers, and to be role models for people within their social network or those outside it that aspire to their status (e.g., showcased via traditional or social media presence). Recent research suggests that high SES individuals in the UK experience little agency in such non-consumer roles to engage in climate change mitigation, for example in their professional roles (Duncan et al., 2023). Indeed, high-status individuals have mostly used their influence to undermine climate change mitigation (e.g., by promoting carbon-intensive behaviours, lobbying against climate policies, and investing in unsustainable companies and industries). However, their spheres of influence can, in principle, equally be used to promote ambitious climate action, particularly if put under public and political scrutiny (Figure 2).

Health psychologists have key expertise and skills to drive the needed transformations

The individual and systems changes needed for climate change mitigation largely mirror those needed to improve public health. Therefore, health psychologists are uniquely placed to bring their core expertise and skills to addressing climate change. The theories, methodologies, skills,

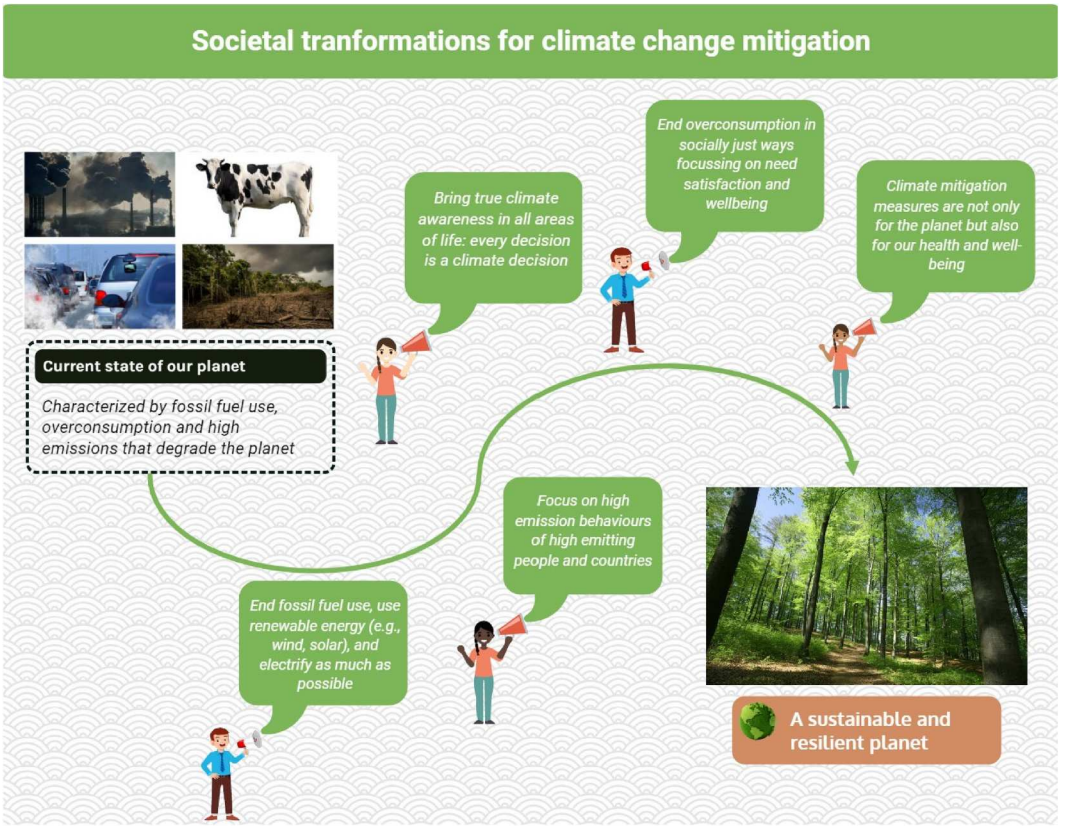

Figure 2. Overview of key transformations needed to address climate change, and which will benefit public health (i.e., have health co-benefits).

psychological constructs that serve them in their efforts to improve public health are needed in the domain of climate change mitigation as well.

Climate change mitigation has similar challenges as public health

Behaviours in complex contexts

In both domains, environmental factors facilitate behaviours at the individual level that conflict with public and planetary health goals and messaging. As an example, consider the obesogenic food environment: this exposes consumers to ultra-processed foods at low cost, although the consumption of these foods conflicts with public health advice. Similarly, the current food environments afford the consumption of meat-rich diets, despite planetary health concerns around high meat consumption. Under those circumstances, the consumption of a healthier or more sustainable diet requires extensive knowledge, costs, and effort. A similar conflict plays out in the domain of transport, where urban design often favours individual car use, despite public and planetary health benefits of active travel. The challenge for public health and for climate change mitigation is to restructure environments such that they favour healthy as well as sustainable individual behaviours (Marteau, Chater, et al., 2021a). Developing such interventions in a complex system of organisational and individual actors demands a sophisticated understanding of how individual behaviour interacts with the social, cultural and built environments, how various stakeholders influence each other, and how complex systems can behave in nonlinear ways (Skivington et al., 2021). Hampton and

Whitmarsh (2023) provide a useful analysis of these processes for key domains of climate change mitigation.

Public awareness

Public health is often undermined by the fact that citizens are not sufficiently aware of health threats or the health implications of their own behaviour. The same is true in the domain of climate change (Leiserowitz et al., 2021; Matthews & Wynes, 2022). Here, environmental psychologists have shown that citizens, and even many behavioural scientists, also often have a limited or inaccurate understanding of which behaviour changes can effectively reduce emissions (Attari, 2021; Camilleri et al., 2019; Wynes & Nicholas, 2017) and the public's support for climate policies (Sparkman et al., 2022). Clearly, knowledge about a health threat is not enough to motivate actions to address it, as decades of health psychology research have shown. However, knowing about the imminent and significant threats from climate change to citizens' own and their families' health may motivate significant behaviour change, may lead to much-needed public pressure on corporate and political decision makers to act, and may further increase public support for ambitious mitigation and adaptation (Marteau, 2017). While climate concern among the public is increasing (e.g., Steentjes et al., 2021), the connection between climate change and health is still made relatively infrequently both among citizens and in the media (Romanello et al., 2022). Framing climate change in terms of health risks, such as food insecurity and direct bodily impacts of high pollution levels, may be an effective strategy for health psychologists to engage with citizens and help develop support for effective climate action, and collaborations with social psychologists may be useful to craft messages for most effective knowledge, attitude, and behaviour change.

Individual-level resources

Living in environments that afford unhealthy and unsustainable behaviours imposes challenges for individuals that are similar in public health and in climate change mitigation. People's ability to behave in line with their long-term goals (e.g., to protect their physical health or planetary health) widely relies on, for example, having behaviour-specific knowledge and skills, sufficient money and time, and the ability to resist short-term temptations – resources generally unevenly distributed between people. This has been well-documented in the domain of health behaviours, and relates to health inequalities (e.g., Ludwig et al., 2019). Similar processes apply to the domain of climate change mitigation behaviours (Marteau, 2017; Wehbe et al., 2022). To address this, health psychologists can bring insights from research in health behaviour to the domain of climate to support behaviour change (see also Nielsen, Clayton, et al., 2021a).

Resistance of vested interests

In both public and planetary health, there is a strong evidence base for effective policy interventions, including the use of economic and regulatory instruments to change incentives and environments (IPCC, 2022b; Marteau, 2022). However, in both domains, such interventions are often met with resistance from popular media, and with resistance from vested interests in the food, tobacco, alcohol, car, or fossil fuel industries, even when public acceptability is high or highly malleable (e.g., Faure et al., 2022; Petrescu et al., 2016; Reisch et al., 2017). The pressure from industry lobby groups can be significant and has been well documented in both public health (Nestle, 1993; Savell et al., 2014, 2016, p. 201) and climate change mitigation (e.g., Franta, 2021; Goldberg et al., 2020; Lewandowsky et al., 2015; Stoddard et al., 2021). Health psychologists have expertise and experience in navigating relationships and policy challenges under those conditions, which they could bring to the field of climate change mitigation to facilitate the implementation of urgently needed policies.

Addressing climate change with health psychology expertise and skills

Health psychologists have essential expertise of relevance to climate change mitigation, most notably on behaviour change and its underlying mechanisms, systems science, intervention development, evidence synthesis, and implementation science. This expertise should be brought to the highly interdisciplinary research challenge of climate change mitigation and adaptation.

Environmental psychologists have made important progress in showing how individual-level variables such as values, norms, and beliefs shape individual-level pro-environmental behaviour, especially when this concerns relatively frequent, easily observable behaviours (e.g., Hampton & Whitmarsh, 2023; Nielsen, Clayton, et al., 2021a; Wolske & Stern, 2018). Less attention has been dedicated to studying one-off or infrequent behaviours with high mitigation potential (e.g., home energy efficiency measures), to increasing the implementation feasibility of ambitious and large-scale interventions, and to promoting climate-friendly individual behaviour in non-consumer roles (Nielsen, Clayton, et al., 2021a). In collaboration with environmental psychologists and climate scientists, health psychologists can make important contributions to addressing these research and implementation gaps, and to several other areas of climate change mitigation, which we discuss next.

Behaviour change

Behaviour change is at the core of much of health psychology's work. This is reflected in the theories, taxonomies, and ontologies of behaviour change – developed in health psychology (e.g., Hollands et al., 2017; Kwasnicka et al., 2016; Marteau, Fletcher, et al., 2021b; Michie et al., 2011, 2013; Norris et al., 2019). These reflect a sophisticated understanding of what drives human behaviour relevant to health, encompassing both individual, structural, and cultural factors, and how these factors can be shaped to affect behaviours for public health benefit. Systematically bringing these insights to human behaviour relevant to climate change is a natural, and much-needed, next step. The focus of this work should be on changing high-emissions behaviour, and may therefore require, for example, interdisciplinary collaborations with climate and earth systems scientists.

Underlying psychological mechanisms

Realising societal transformations for public and planetary health requires varying degrees of engagement from citizens and other societal stakeholders. Health psychologists have important expertise in researching key constructs that underlie effective engagement, such as, for example, awareness of health risks, attitudes, social norms, self-efficacy, and habits (e.g., Sheeran et al., 2017; Tapper, 2021). Such constructs are highly relevant for engaging citizens with the impending systems and individual changes. Borrowing from social psychology, processes of self and social identity and intergroup relations may inform responses to societal transformation as well. Health psychologists can support the required societal transformations by establishing to what degree stakeholders understand the climate crisis and the changes needed, what their attitudes to the proposed policies are, how these are influenced by social norms, and what roles self-efficacy and habits play in engaging with change – ideally collaborating with social psychologists. Then, targeted behaviour change interventions can be designed to address these processes where appropriate, for example if low levels of awareness shape social norms to reject plant-based diets, or when uncertainty about anthropogenic climate change hampers policy support (Meshes et al., 2022). Through interdisciplinary collaborations with, for example, economists, political scientists, and social psychologists, evidence of underlying psychological mechanisms can be integrated into climate policy proposals and can help improve communication with citizens about such policies (see Mitev et al., 2023 for specific proposals).

Systems science

Health psychologists can bring crucial systems thinking to climate change mitigation because of their understanding that individual behaviour occurs within and interacts with complex systems.

In other words, a core tenet of health psychology is that behaviour occurs in social and structural conditions (e.g., biopsychosocial model, socio-ecological model), which affect capability, opportunity, and motivation to perform a behaviour (Glanz et al., 2008; Michie et al., 2011). The complex systems that are essential targets for climate change mitigation involve various individual actors and groups of actors, as well as varying physical, economic, policy and sociocultural environments that interact with these actors (Hampton & Whitmarsh, 2023; Sniehotta et al., 2017). They also have emergent properties, positive and negative feedback loops, delays, and tipping points. Intervening in these systems will require systems thinking and the associated interdisciplinary approaches and collaborations, for which public health research and interventions provides good examples (Leischow et al., 2008; Lunetto et al., 2022).

Intervention development

Health psychologists have unique expertise in developing interventions to tackle complex challenges to public health, often involving individual behaviours in complex systems (Skivington et al., 2021). The field has developed or adopted many systematic approaches for developing, reporting and evaluating interventions and their mechanisms, including intervention mapping (Kok et al., 2004), the ORBIT model (Czajkowski et al., 2015), the Behaviour Change Wheel (Michie et al., 2011), the Experimental Medicine Approach (Sheeran et al., 2017), the SPIRIT and CONSORT checklists (Chan et al., 2013; Plint et al., 2006), and guidance from professional bodies such as the Medical Research Council and the National Institute for Health and Care Excellence in the UK (e.g., Skivington et al., 2021). In collaboration with climate scientists and environmental psychologists to select the most suitable intervention targets, health psychologists are thus well-placed not only to develop (Araújo-Soares et al., 2019), implement, evaluate, and scale interventions needed for climate change mitigation, but also to train and assist others in doing the same, and to engage with stakeholders and end-users (Currie et al., 2022).

Implementation science

Implementation science addresses how research evidence can best be translated into effective application in the settings where it is needed. In other words, this field examines how to promote the uptake and sustained application of innovations, such as novel interventions, including in community and policy contexts (Bauer & Kirchner, 2020; Eccles & Mittman, 2006). Again, implementation is at the core of health psychologists' work, and the relatively young discipline of implementation science originated from health research. Climate change mitigation is to a large degree a problem of behaviour, and of implementing behaviour change insights to affect the behaviour of individuals, be it as private citizens, organisational citizens, policy makers, or business or political leaders (Nielsen, Nicholas, et al., 2021c; Papies et al., 2022). Hence, health psychologists' implementation science expertise could be extremely useful in the efforts to cut GHG emissions rapidly and deeply across all sectors of society. Research in implementation science also offers important insights for intervention reporting, evidence synthesis, and for unpacking how features of implementation influence intervention effectiveness. Such systematic approaches are still in their infancy in existing research on climate change (Stern et al., 2023).

Evidence synthesis

The field of individual behaviour prediction and behaviour change interventions is rapidly expanding. This is a welcome development to produce more behaviourally informed and actionable evidence around climate change mitigation. Unfortunately, the generated evidence is currently scattered across different research silos with insufficient synthesis and integration (Munafò & Davey Smith, 2018). Here, health psychologists are uniquely positioned to bring their expertise in systematic evidence synthesis and in developing sophisticated and interdisciplinary research infrastructure to curate evidence (e.g., the Human Behaviour Change Project; Sumner et al., 2018). Due to the complexity and contextual nature of human behaviour, evidence synthesis is critically

important and urgently needed. It will both strengthen the science of behaviour change, and advance knowledge of how to design and implement effective behaviour change interventions across contexts and actors. The latter is particularly critical for delivering more actionable knowledge to policymakers and other change agents, which may empower the voice and influence of behavioural science in informing the selection and design of mitigation measures.

Health psychologists have essential spheres of influence

Health psychologists sit at the nexus of science, applied practice, health, and education. They can interpret and communicate on science, they can advocate for acting on the science, and they can influence the behaviour of countless other groups and actors. Hence, health psychologists have the power to push forward climate mitigation in different societal roles and spheres of influence (Nielsen, Nicholas, et al., 2021c).

Addressing climate change in research

Given that we are in the middle of a life-changing health emergency that threatens global health more existentially than ever before, we suggest that funders and researchers critically evaluate where they target resources and investigative efforts. Much of the research completed in the past decades has advanced our knowledge of human behaviour change and provides key frameworks for intervention, measurement, and implementation. As we have shown above, some of the work conducted within the area of health is potentially generalisable to climate-change relevant behaviours with health co-benefits. It will be useful to build on this, as transferring previous knowledge can accelerate research in the area of climate mitigation and adaption (KNAW, 2023). However, scientists should be cleareyed and understand that any recent gains in human health, and in the systems to protect it, could be undone by climate change. Hence, it may be rational for researchers and funders to direct more resources toward addressing climate change mitigation and adaptation. Some researchers, and especially those with the privilege of directing their own programmes, might find a simple question helpful, such as: will a research project still matter if the climate crisis is not somehow addressed? This question may help orient research activities toward the most pressing current questions.

Because of the urgency of the issue, behavioural scientists' work on climate change should aim to produce findings that can contribute to deep emission reductions in the near term. Hence, as discussed above, rather than deductively starting from a preferred theory, research should focus on climate impactful and modifiable behaviours, and then examine which theories can be most useful for understanding these behaviours (Nielsen, Cologna, et al., 2021b). Again, this is likely to benefit from working in interdisciplinary teams, which would also make it easier for early career researchers to bring their expertise to this challenge, and for health psychologists to build on the expertise of environmental psychologists and other behavioural and social scientists already working in the field. Researchers of every career stage can ask themselves where their specific expertise and skill set can contribute most effectively to speed up the phase-out of fossil fuels, the transformation of food systems, and the equitable reduction of overconsumption of energy and other resources in industrialised countries (see Table 1 for example research questions; see also Longlist of Knowledge Gaps in Planetary Health, 2023; Steg et al., 2021).

Rather than relying on self-report and behavioural proxies (e.g., intentions), research should assess actual behaviour as much as possible, so that eventually the climatic impact of an intervention can be measured. This applies to both habitual behaviours (e.g., eating) as well as infrequent behaviours (e.g., energy efficiency measures in the home). When target behaviours have not received much empirical attention, researchers should carefully observe and map these behaviours in their real-life contexts (Araújo-Soares et al., 2019; Lange et al., 2021; Rodger et al., 2023a). This will improve the applicability of findings to interventions in the contexts where change is needed and

Table 1. Examples of interdisciplinary research questions in which health psychologists' expertise is needed and which would move climate change mitigation research forward if addressed effectively.

Topic	Research question
Societal Discourse	How can openly talking about climate change become the norm, particularly in places where change must happen?
Knowledge	How can climate change misinformation be countered in a climate of mistrust of authorities and political polarisation?
Attitudes	How can we overcome climate change denial and inaction?
Risk communication	How can communication about climate change increase the sense of urgency among the public, without causing defensive processing and defeatism?
Social imaginaries	How can new collective images and aims be created of low-carbon, high-wellbeing futures that societies can strive for (i.e., post-growth societies)?
Democratic participation	How can citizens best be involved in policy design for low-carbon, high-wellbeing societies?
Systems (re) design and Implementation	How can food systems be transformed to be more resilient, equitable, healthy, and sustainable? How can current policies (e.g., EU Farm to Fork) be implemented?
Systems (re) design and implementation	How can cities be transformed to be greener, healthier, more liveable, and to reflect and support equitable, caring societies? What is the role of stakeholders and end users?
Policy support	How can citizens in industrialised societies overcome habits and social norms of overconsumption, and be motivated for the transition to low-carbon, high-wellbeing societies?
Organisational decision making	How can decision makers in organisations throughout society be trained and held accountable for climate-aware decision making?
Behaviour change – decision makers	How can effective policy action for long-term planetary health be initiated among key decision makers within current political power structures that often favour corporate interests and short-term political, electoral or financial gain?
Behaviour change – citizens	How can the large-scale transitions to more sustainable, predominantly plant-based diets be supported?

may promote stronger theory development as well (Bonetto et al., 2023; Bringmann et al., 2022; Diener et al., 2022; Rodger et al., 2023b).

As health psychologists are aware, behaviours do not occur in isolation but within complex systems, and interventions within these systems hardly create change in a linear way (Diener et al., 2022; Skivington et al., 2021). Psychological research should therefore carefully describe the context and structural factures that may affect the behaviour of interest more than psychological predictors. The societal transformations that need to happen to mitigate climate change are radical and far reaching – however, they need to happen across organisations, households, and other public and private settings. Each time, the context is different, and interventions may not be easily (or appropriately) transferrable from, for example, one school to another. However, documenting carefully what works in one context, while outlining processes, challenges, and facilitators, can be highly informative for similar endeavours in other contexts (Skivington et al., 2021; Taylor et al., 2023).

Addressing climate change in teaching

Health psychologists are needed to bring the health threats of climate change into the curriculum at the organisations in which they teach (Dablander, 2023). This can be at universities, colleges, and medical schools, but also in other sectors of professional development, coaching, and even secondary education where possible and appropriate. Through collaborations with mental health experts or by following appropriate training (e.g., with the Climate Psychology Alliance in the UK), this education can be delivered in ways that empower individuals and communities, and protects, rather than threatens, mental health (e.g., Pedro et al., 2022). Health psychologists can authoritatively communicate the health co-benefits of mitigating climate change and teach ways of developing both individual-level and systems-level interventions. Health psychologists can also support their colleagues in other disciplines to learn about climate change and provide resources to integrate climate change topics into courses in other domains, such as medicine, economics, sociology, law, history, or literature. Indeed, several medical faculties across the globe are already educating

medical students on climate change, turning these into trusted climate change communicators who can bring climate awareness into interactions with their patients (Teaching Climate Change in Med School Gains Momentum, 2022). More generally, universities will have to rethink what is being taught to students to prepare them for a climate-changed world, and health psychologists can help revise the curriculum such that health and social justice play central roles.

Climate anxiety is a significant and increasing problem among young people, and many adolescents report that their feelings about the climate crisis negatively affect their daily functioning (Hickman et al., 2021). Given the enormity of the crisis, this is not a pathological or maladaptive phenomenon, but can be considered an appropriate, even motivating response (Sangervo et al., 2022; Whitmarsh et al., 2022), although it is associated with significant suffering. Notably, this anxiety correlates significantly with young people's perceptions that their concerns are being ignored, and that governments are not doing enough to address the crisis (Hickman et al., 2021). These are significant and valid concerns, and it has been argued that exposing young people to this level of long-term and potentially inescapable stress is inhumane, unjust, and amounts to moral injury (Hickman et al., 2021). Health psychologists can act on this by acknowledging young people's fears and experiences, placing the root causes of these experiences centrally in their teaching and research, and exert influence in policy making and organisations to push for more significant climate action (Crandon et al., 2022; Gardner et al., 2021).

Addressing climate change in policy advocacy

Health psychologists traditionally have strong links with local, regional and national policy makers to ensure that research evidence is used in health policies. Climate change is undoubtedly the most significant threat to public health, so any climate policy, or lack thereof, has health implications. Hence, the realm in which health psychologists should try to influence policy making is now much wider than traditional public health views would suggest (Horton et al., 2014). In other words, policy on energy provision, transport infrastructure, air travel, building standards, or agricultural subsidies bears on public health, through effects on climate change. Therefore, policy making in these domains needs vocal input from health psychologists as much as policy in the more 'conventional' areas of, for example, food, smoking, physical activity, or cancer screening. Indeed, healthcare professionals have been vocal in their resistance to fossil fuels (e.g., Howard et al., 2022; Kemple, 2020). While energy provision has not traditionally been a matter for doctors, it is now, because fossil fuels threaten health through climate change in ways that could make other medical interventions futile.

To accelerate climate change mitigation, health psychologists should demand more ambitious action from policy makers in line with the recommendations of the IPCC reports. Most critically, this includes economic and regulatory instruments such as limiting fossil fuel production, for example through an multilateral agreement (van Asselt & Newell, 2022), which health scientists should support. It will also require creating much stronger economic and regulatory incentives for expanding renewable energy infrastructure, building retrofit, active and public transport infrastructure, biodiversity conservation, and shifting to plant-based foods. Recognising that simply communicating evidence and hoping that it will be used in policy making is insufficient (Dablander, 2023; Marteau, 2023; Papies et al., 2022), health psychologists should invest in developing good, trusting relationships with policy makers to maximise and communicate health co-benefits of such policies. Moreover, they should serve as trusted knowledge brokers between the public and policy makers by communicating the value and support for climate- and health-related policies to both parties. Health psychologists can also support citizen activists effectively engage with policy makers (e.g., Sherman et al., 2021). In addition, health psychologists can push for and inform much-needed education campaigns targeting the general public and

school curricula to greatly increase citizens' engagement with and support for the needed societal transformations.

Addressing climate change within organisations

Health psychologists work in organisations that likely cause significant GHG emissions, including universities, and healthcare organisations like the NHS in the UK (Romanello et al., 2022). Organisations' emissions result from buildings and energy use of daily operations, as well as business travel, commuting, food, and financial investments in fossil fuel industries. Health psychologists can play key roles in decarbonising their organisations, through pushing for low emissions buildings, supply chains, catering, conferencing, and travel options, thus creating conditions that afford more sustainable individual actions and change organisational and ultimately, societal norms to rapidly scale up efforts to limit climate change (see e.g., Köhler et al., 2022; Nielsen, Nicholas, et al., 2021c; Salamon, 2019; Taylor et al., 2023; Urai & Kelly, 2023).

On a more systemic level, health psychologists can help speed up climate change mitigation by demanding that ties with fossil fuel industries through research funding, financial investments, banking, and student recruitment are deliberately cut (e.g., Grady-Benson & Sarathy, 2016). In addition, if one acknowledges that an organisation's GHG emissions cause harm by accelerating climate change, a climate impact assessment should accompany every organisational decision. This includes decisions on research ethics (Samuel & Richie, 2022), especially when the planned research relies on energy-intensive technologies such as imaging and high-intensity computing, including recent advances in artificial intelligence. This also includes individual and organisational decisions on business travel and conferences, which for researchers from wealthier institutions typically involve highly carbon-intensive activities (e.g., intercontinental air travel) and hence cause harm to others that may be hard to justify from a health and ethics perspective. Many fields have started discussing how to make conferences more sustainable, and health psychologists should lead on this by example (Geitmann, 2020; Köhler et al., 2022; Kreil, 2021; Quinton, 2020; Skiles et al., 2022; Whitmarsh & Kreil, 2022). Indeed, members of the European Health Psychology society have published an opinion piece on how to turn society conferences more climate friendly, from transport to food provision (Warner et al., 2022).

Addressing climate change as private citizens

Health psychologists can have significant influence by adopting low-carbon lifestyles and leading by example. This could involve among others, transitioning to predominantly plant-based diets, reducing or eliminating air travel for business and pleasure, switching to public or active transport as much as possible, investing in home energy efficiency and electrification, reducing the consumption of less-necessary products, and divesting (pension) savings and bank accounts to fossil-free institutions. With all these behaviours, higher visibility will increase their effects within one's social networks, setting a descriptive norm in favour of these behaviours (Cialdini & Jacobson, 2021; Frank, 2020). Health psychologists can also take meaningful actions by simply talking with people about climate change, which can help spread the (correct) impression that many people are indeed concerned about climate change and support major legislation to address it (Sparkman et al., 2022). Talking about climate change, finding or building communities, and joining in collective action, can be a highly effective strategy for mitigation and adaptation, including protecting one's mental health from the impacts of the unfolding crisis.

Many health psychologists will be involved in social networks and organisations as private citizens where they can support the transition to low-carbon, high-wellbeing communities and societies. This could include schools, sports clubs, churches, and community organisations, with opportunities to promote, for example, plant-based school food, active travel, and energy efficiency measures. Where this is possible and safe, participating in democratic processes such as elections, public

consultations, social movements, and public protests is another form of influence on both individual and systems level processes that can help mitigate climate change. In addition, many health psychologists will be connected to societal decision makers in their social networks who can affect climate policy in businesses and in public institutions (Nielsen, Nicholas, et al., 2021c). With their specific knowledge and skills, health psychologists can contribute to the needed societal transformations by speaking about climate change, sharing expertise, and creating and communicating support for new 'social imaginaries' (Stoddard et al., 2021) and transformative policies to achieve them.

Academic health psychologists can also join social movements or activist groups like Scientists for Future. This interdisciplinary group of scientists exists in many countries and universities and actively engages with local communities and authorities to support with knowledge and skills in projects such as the ones targeting energy transition (https://scientists4future.org/). In the past, social movements have been instrumental for achieving significant societal transformations, and they are likely to play a similar role in addressing the climate crisis. Indeed, strong social movements that effectively unite different interest groups (e.g., environmental groups, trade unions, scientists, health professionals) will likely be needed to enact the necessary transformations that challenge vested political and economic interests but that would unlock significant wellbeing gains for everyone else (Dablander, 2023). Reflecting the urgency and severity of the issue, there are increasing discussions on the possibility or responsibility for scientists to engage in civil disobedience to alert the public to the severity of the planetary health crisis and to pressure governments into action (Bennett et al., 2020; Capstick et al., 2022; Gardner et al., 2021; Gardner & Wordley, 2019), inspired by successful applications of these strategies in the past.

In Table 2, we present an overview of ways that health psychologists can contribute their influence and expertise to drive forward the societal transformations needed to mitigate climate change.

Summary and call to action

Climate change is a threat multiplier that undermines and potentially reverses 'decades of health progress' (World Health Organisation, 2023). It represents a global health emergency primarily caused by economic activities in industrialised societies in the Global North. These activities predominantly benefit a privileged elite, while they produce significant and harmful health and social inequalities within and between countries, and threaten the health of billions of people worldwide. Rapid and deep emission reductions are needed to limit further climate change, in particular in the sectors of transport, food, and buildings. Reducing and redistributing the use of energy and resources to satisfy the needs of all people, and not just a privileged percentage, requires significant societal transformations whereby wellbeing and need satisfaction become the core focus of the economy. Health psychologists can play key roles in realising these changes by using their expertise in shaping human behaviour within complex systems. Working to facilitate these transformations may arguable be the most important task for health psychologists now, and in the decades to come.

High-income nations are failing to reduce emissions by the speed required to avoid potentially catastrophic climate change. However, it is clear what needs to be done. The challenge lies in adoption and implementation. This is where health psychologists should focus their efforts, across their roles in research, teaching, policy, organisations, and private life (see Table 2).

Existing systems, cultural norms, and power structures make the needed transformations highly challenging, and pushing for them may be uncomfortable at times. However, health psychologists are in a privileged position to enact change for climate mitigation and adaptation. Their training and action realm make health psychologists, either as academics or practitioners, acutely aware of the impact of both the environment and context on the health of the populations, as well as of the complex relations of stakeholders invested in the status quo or system change. They are familiar with multiple models of behaviour, behaviour change and maintenance and have important skills to generate and apply evidence and theory-based interventions that can increase acceptability,

Table 2. Examples of activities that health psychologists can engage in across five domains to drive forward the societal transformations needed to mitigate climate change, through targeting both individual and system changes.

	Individual changes	System changes
Research that focuses on …	✓ conditions for sustained behaviour change in the domains of transport and food ✓ less frequent, high-impact consumer decisions ✓ behaviour change in non-consumer roles	✓ equitable systems transformation ✓ social imaginaries for low-carbon, high wellbeing futures ✓ preventing health inequalities within and between countries worsening due to climate change ✓ increasing the implementation feasibility of ambitious and large-scale interventions
Teaching that co-creates knowledge and skills in …	✓ low-carbon careers ✓ effective climate change communication ✓ advocating for health-focused climate policy ✓ protecting mental health	✓ systems science ✓ implementation science to increase effects of behavioural science ✓ interdisciplinary approaches to climate justice (e.g., links with racism, colonialism, extractive economic models)
Policy influence that advocates for …	✓ comprehensive carbon labelling ✓ updated food-based dietary guidelines to support dietary change ✓ climate and social justice education in schools ✓ supporting households in building retrofit	✓ equitable policy to phase out fossil fuels in all sectors ✓ shifting subsidies from fossil fuels, animal agriculture to public resources ✓ higher environmental standards for public procurement ✓ prioritising wellbeing over economic growth and exploitation
Actions within organisations that lead to …	✓ low-emissions catering, conferencing, and travel options ✓ staff carbon literacy training ✓ less waste and resource use	✓ divestment away from fossil fuels ✓ carbon-neutral buildings ✓ emissions assessment for all activities
Actions in private life that …	✓ strongly limit meat and dairy consumption, car travel, air travel, less necessary purchases ✓ normalise engaging in and communicating about low-carbon, high-wellbeing lifestyles in families and communities ✓ normalise climate activism	✓ support fossil-fuel free banks and pension funds ✓ support systems change through civil society engagement and collective action (e.g., with Scientists for Future) ✓ provide resources to climate movements and political candidates

feasibility, and maintenance. This knowledge is crucial, and can potentially be transferred from the area of health to the area of climate mitigation, given that many key mitigation behaviours have health co-benefits and are affected by similar processes as health behaviours.

Working in inter- and transdisciplinary groups of experts, stakeholders and end users is an intrinsic part of the skills and professional identity of health psychologists. Targeting complex issues demands such skills and places these professionals at the core of any team that aims at supporting the implementation of system change initiatives to mitigate climate change whilst bringing both public and politicians willingly on board. Health psychologists are the ideal partners to engage with if, together, we are to lead humanity out of this complex, urgent and potentially catastrophic situation.

We appeal to you, our readers and colleagues: engage and lead with love, care, and courage. Bring your understanding of the climate emergency and its urgency into all aspects of your professional and private lives. Build insights, networks, and avenues for effective climate action. We are all in positions of influence, for example in what we research and how we communicate it: let

us focus on actionable findings and impact. We have influence on how and what we teach: let us work with the next generation of change-makers to interrogate dominant mindsets that place extraction and economic growth over interdependence and planetary health. Finally, we have influence in how we use our professional and private voices: let them be heard in support of the linked goals of social justice and planetary health. How we use our influence has never mattered more. Let us use our influence to help secure a liveable and sustainable future for all.

Acknowledgements

We are grateful to Miriam Ngarega for producing Figure 2, and to Annika Hjelmskog and members of the Healthy Cognition Lab at the University of Glasgow for feedback on an earlier version of this manuscript. For the purpose of open access, the authors have applied a Creative Commons Attribution (CC BY) licence to any Author Accepted Manuscript version arising from this submission.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Economic and Social Research Council (UK) under Research Grant ES/T011343/1 to EKP and by the Carlsberg Foundation under grant number: CF22-1059 to KSN.

References

Andrew, R. M., & Peters, G. P. (2021). *The Global Carbon Project's fossil CO2 emissions dataset* [dataset]. Zenodo. https://doi.org/10.5281/zenodo.5569235.

Araújo-Soares, V., Hankonen, N., Presseau, J., Rodrigues, A., & Sniehotta, F. F. (2019). Developing behavior change interventions for self-management in chronic illness. *European Psychologist*, *24*(1), 7–25. https://doi.org/10.1027/1016-9040/a000330

Armstrong McKay, D. I., Staal, A., Abrams, J. F., Winkelmann, R., Sakschewski, B., Loriani, S., Fetzer, I., Cornell, S. E., Rockström, J., & Lenton, T. M. (2022). Exceeding 1.5°C global warming could trigger multiple climate tipping points. *Science*, *377*(6611), eabn7950. https://doi.org/10.1126/science.abn7950

Attari, S. Z. (2021). Transforming energy use. *Current Opinion in Behavioral Sciences*, *42*, 104–108. https://doi.org/10.1016/j.cobeha.2021.04.008

Bain, P. G., Milfont, T. L., Kashima, Y., Bilewicz, M., Doron, G., Garðarsdóttir, R. B., Gouveia, V. V., Guan, Y., Johansson, L.-O., Pasquali, C., Corral-Verdugo, V., Aragones, J. I., Utsugi, A., Demarque, C., Otto, S., Park, J., Soland, M., Steg, L., González, R., … Saviolidis, N. M. (2016). Co-benefits of addressing climate change can motivate action around the world. *Nature Climate Change*, *6*(2), Article 2. https://doi.org/10.1038/nclimate2814

Balakrishnan, K., Dey, S., Gupta, T., Dhaliwal, R. S., Brauer, M., Cohen, A. J., Stanaway, J. D., Beig, G., Joshi, T. K., Aggarwal, A. N., Sabde, Y., Sadhu, H., Frostad, J., Causey, K., Godwin, W., Shukla, D. K., Kumar, G. A., Varghese, C. M., Muraleedharan, P., … Dandona, L. (2019). The impact of air pollution on deaths, disease burden, and life expectancy across the states of India: The global burden of disease study 2017. *The Lancet Planetary Health*, *3*(1), e26–e39. https://doi.org/10.1016/S2542-5196(18)30261-4

Bauer, M. S., & Kirchner, J. (2020). Implementation science: What is it and why should I care? *Psychiatry Research*, *283*, 112376. https://doi.org/10.1016/j.psychres.2019.04.025

Benatar, S., Upshur, R., & Gill, S. (2018). Understanding the relationship between ethics, neoliberalism and power as a step towards improving the health of people and our planet. *The Anthropocene Review*, *5*(2), 155–176. https://doi.org/10.1177/2053019618760934

Bennett, H., Macmillan, A., Jones, R., Blaiklock, A., & McMillan, J. (2020). Should health professionals participate in civil disobedience in response to the climate change health emergency? *The Lancet*, *395*(10220), 304–308. https://doi.org/10.1016/S0140-6736(19)32985-X

Bernard, P. (2019). Health psychology at the age of Anthropocene. *Health Psychology and Behavioral Medicine*, *7*(1), 193–201. https://doi.org/10.1080/21642850.2019.1617150

Bonetto, E., Guiller, T., & Adam-Troian, J. (2023). *A lost idea in psychology: Observation as starting point for the scientific investigation of human behavior*. PsyArXiv. https://doi.org/10.31234/osf.io/9yk3n.

Bongaerts, E., Lecante, L. L., Bové, H., Roeffaers, M. B. J., Ameloot, M., Fowler, P. A., & Nawrot, T. S. (2022). Maternal exposure to ambient black carbon particles and their presence in maternal and fetal circulation and organs: An analysis of two independent population-based observational studies. *The Lancet Planetary Health*, *6*(10), e804–e811. https://doi.org/10.1016/S2542-5196(22)00200-5

Brand-Correa, L. I., Mattioli, G., Lamb, W. F., & Steinberger, J. K. (2020). Understanding (and tackling) need satisfier escalation. *Sustainability: Science, Practice and Policy*, *16*(1), 309–325. https://doi.org/10.1080/15487733.2020.1816026

Bringmann, L. F., Elmer, T., & Eronen, M. I. (2022). Back to basics: The importance of conceptual clarification in psychological science. *Current Directions in Psychological Science*, *31*(4), 340–346. https://doi.org/10.1177/09637214221096485

Bryant, C. J. (2019). We can't keep meating like this: Attitudes towards vegetarian and vegan diets in the United Kingdom. *Sustainability*, *11*(23), Article 23. https://doi.org/10.3390/su11236844

Büchs, M., & Koch, M. (2019). Challenges for the degrowth transition: The debate about wellbeing. *Futures*, *105*, 155–165. https://doi.org/10.1016/j.futures.2018.09.002

Caleffi, S., Hawkes, C., & Walton, S. (2023). *45 actions to orient food systems towards environmental sustainability: Co-benefits and trade-offs*. Centre for Food Policy, City, University of London.

Camilleri, A. R., Larrick, R. P., Hossain, S., & Patino-Echeverri, D. (2019). Consumers underestimate the emissions associated with food but are aided by labels. *Nature Climate Change*, *9*(1), Article 1. https://doi.org/10.1038/s41558-018-0354-z

Capstick, S., Thierry, A., Cox, E., Berglund, O., Westlake, S., & Steinberger, J. K. (2022). Civil disobedience by scientists helps press for urgent climate action. *Nature Climate Change*, *12*(9), Article 9. https://doi.org/10.1038/s41558-022-01461-y

Carlson, C. J., Albery, G. F., Merow, C., Trisos, C. H., Zipfel, C. M., Eskew, E. A., Olival, K. J., Ross, N., & Bansal, S. (2022). Climate change increases cross-species viral transmission risk. *Nature*, *607*(7919), Article 7919. https://doi.org/10.1038/s41586-022-04788-w

Cass, N., Büchs, M., & Lucas, K. (2023). How are high-carbon lifestyles justified? Exploring the discursive strategies of excess energy consumers in the United Kingdom. *Energy Research & Social Science*, *97*, 102951. https://doi.org/10.1016/j.erss.2023.102951

Cepeda, M., Schoufour, J., Freak-Poli, R., Koolhaas, C. M., Dhana, K., Bramer, W. M., & Franco, O. H. (2017). Levels of ambient air pollution according to mode of transport: A systematic review. *The Lancet Public Health*, *2*(1), e23–e34. https://doi.org/10.1016/S2468-2667(16)30021-4

Chan, A.-W., Tetzlaff, J. M., Altman, D. G., Laupacis, A., Gøtzsche, P. C., Krleža-Jerić, K., Hróbjartsson, A., Mann, H., Dickersin, K., Berlin, J. A., Doré, C. J., Parulekar, W. R., Summerskill, W. S. M., Groves, T., Schulz, K. F., Sox, H. C., Rockhold, F. W., Rennie, D., & Moher, D. (2013). SPIRIT 2013 statement: Defining standard protocol items for clinical trials. *Annals of Internal Medicine*, *158*(3), 200–207. https://doi.org/10.7326/0003-4819-158-3-201302050-00583

Chancel, L. (2022). Global carbon inequality over 1990–2019. *Nature Sustainability*, *5*(11), Article 11. https://doi.org/10.1038/s41893-022-00955-z

Chen, W., Carstensen, T. A., Wang, R., Derrible, S., Rueda, D. R., Nieuwenhuijsen, M. J., & Liu, G. (2022). Historical patterns and sustainability implications of worldwide bicycle ownership and use. *Communications Earth & Environment*, *3*(1), Article 1. https://doi.org/10.1038/s43247-022-00497-4

Chevance, G., & Bernard, P. (2023). Six ways health psychology can contribute to climate change mitigation and adaptation. In R. Sanderman & K. Morgan (Eds.), *Routledge handbook of health psychology*. Routledge. https://guillaumechevancecom.files.wordpress.com/2023/03/hp-climate-chevance-bernard-clean.pdf.

Chevance, G., Fresán, U., Hekler, E., Edmondson, D., Lloyd, S. J., Ballester, J., Litt, J., Cvijanovic, I., Araújo-Soares, V., & Bernard, P. (2022). Thinking health-related behaviors in a climate change context: A narrative review. *Annals of Behavioral Medicine*, *57*, kaac039. https://doi.org/10.1093/abm/kaac039

Chevance, G., Fresán, U., Hekler, E., Edmondson, D., Lloyd, S. j., Ballester, J., Litt, J., Cvijanovic, I., Soares, V. A., & Bernard, P. (2021). *Thinking health-related behaviors in a climate change context: A narrative review*. OSF Preprints. https://doi.org/10.31219/osf.io/pb8vc.

Cialdini, R. B., & Jacobson, R. P. (2021). Influences of social norms on climate change-related behaviors. *Current Opinion in Behavioral Sciences*, *42*, 1–8. https://doi.org/10.1016/j.cobeha.2021.01.005

Clark, M., Springmann, M., Rayner, M., Scarborough, P., Hill, J., Tilman, D., Macdiarmid, J. I., Fanzo, J., Bandy, L., & Harrington, R. A. (2022). Estimating the environmental impacts of 57,000 food products. *Proceedings of the National Academy of Sciences*, *119*(33), e2120584119. https://doi.org/10.1073/pnas.2120584119

Crandon, T. J., Dey, C., Scott, J. G., Thomas, H. J., Ali, S., & Charlson, F. J. (2022). The clinical implications of climate change for mental health. *Nature Human Behaviour*, *6*, 1–8. https://doi.org/10.1038/s41562-022-01477-6

Creutzig, F., Jochem, P., Edelenbosch, O. Y., Mattauch, L., Vuuren, D. P. van, McCollum, D., & Minx, J. (2015). Transport: A roadblock to climate change mitigation? *Science*, *350*(6263), 911–912. https://doi.org/10.1126/science.aac8033

Creutzig, F., Niamir, L., Bai, X., Callaghan, M., Cullen, J., Díaz-José, J., Figueroa, M., Grubler, A., Lamb, W. F., Leip, A., Masanet, E., Mata, É, Mattauch, L., Minx, J. C., Mirasgedis, S., Mulugetta, Y., Nugroho, S. B., Pathak, M., Perkins, P., … Ürge-Vorsatz, D. (2022). Demand-side solutions to climate change mitigation consistent with high levels of well-being. *Nature Climate Change*, *12*(1), Article 1. https://doi.org/10.1038/s41558-021-01219-y

Creutzig, F., Roy, J., Devine-Wright, P., Diaz-José, J., Geels, F., Grubler, A., Maïzi, N., Masanet, E., Mulugetta, Y., & Onyige-Ebeniro, C. D. (2022). Demand, services and social aspects of mitigation. In P. R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, & Malley, J. (Eds.), *IPCC, 2022: Climate change 2022: Mitigation of climate change. Contribution of working group III to the sixth assessment report of the intergovernmental panel on climate change* (pp. 752–943). Cambridge University Press.

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F. N., & Leip, A. (2021). Food systems are responsible for a third of global anthropogenic GHG emissions. *Nature Food*, *2*(3), 198–209. https://doi.org/10.1038/s43016-021-00225-9

Currie, C. C., Walburn, J., Hackett, K., McCabe, R., Sniehotta, F. F., O'Keeffe, S., Beerlage-de Jong, N., & Araújo-Soares, V. (2022). Intervention development for health behavior change: Integrating evidence and the perspectives of users and stakeholders. *Comprehensive Clinical Psychology*, *8*, 118–148.

Czajkowski, S. M., Powell, L. H., Adler, N., Naar-King, S., Reynolds, K. D., Hunter, C. M., Laraia, B., Olster, D. H., Perna, F. M., & Peterson, J. C. (2015). From ideas to efficacy: The ORBIT model for developing behavioral treatments for chronic diseases. *Health Psychology*, *34*(10), 971. https://doi.org/10.1037/hea0000161

Dablander, F. (2023). *Understanding and preventing climate breakdown: A guide for social and behavioral scientists*. PsyArXiv. https://doi.org/10.31234/osf.io/4uzjs.

Davis, T., & Papies, E. K. (2022). Pleasure vs. identity: More eating simulation language in meat posts than plant-based posts on social media #foodtalk. *Appetite*, *175*, 106024. https://doi.org/10.1016/j.appet.2022.106024

De-la-Torre, G. E. (2020). Microplastics: An emerging threat to food security and human health. *Journal of Food Science and Technology*, *57*(5), 1601–1608. https://doi.org/10.1007/s13197-019-04138-1

Diener, E., Northcott, R., Zyphur, M. J., & West, S. G. (2022). Beyond experiments. *Perspectives on Psychological Science*, *17*(4), 1101–1119. https://doi.org/10.1177/17456916211037670

Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., & Vandenbergh, M. P. (2009). Household actions can provide a behavioral wedge to rapidly reduce US carbon emissions. *Proceedings of the National Academy of Sciences*, *106*(44), 18452–18456. https://doi.org/10.1073/pnas.0908738106

Dietz, T., & Whitley, C. T. (2018). Inequality, decisions, and altruism. *Sociology of Development*, *4*(3), 282–303. https://doi.org/10.1525/sod.2018.4.3.282

Dimbleby, H. (2021). *The National Food Strategy—Part Two*. https://www.nationalfoodstrategy.org/.

Duncan, S., Hjelmskog, A., & Papies, E. K. (2023). *Lack of Agency and Responsibility: Exploring perceptions of climate change action among people with high socioeconomic status in the UK*. PsyArXiv. https://doi.org/10.31234/osf.io/8zweh.

Eccles, M. P., & Mittman, B. S. (2006). Welcome to implementation science. *Implementation Science*, *1*(1), 1, 1748-5908-1–1. https://doi.org/10.1186/1748-5908-1-1

Fanning, A. L., & O'Neill, D. W. (2019). The Wellbeing–Consumption paradox: Happiness, health, income, and carbon emissions in growing versus non-growing economies. *Journal of Cleaner Production*, *212*, 810–821. https://doi.org/10.1016/j.jclepro.2018.11.223

Fanning, A. L., O'Neill, D. W., Hickel, J., & Roux, N. (2021). The social shortfall and ecological overshoot of nations. *Nature Sustainability*, *5*, 1–11. https://doi.org/10.1038/s41893-021-00799-z

Faure, C., Guetlein, M.-C., Schleich, J., Tu, G., Whitmarsh, L., & Whittle, C. (2022). Household acceptability of energy efficiency policies in the European Union: Policy characteristics trade-offs and the role of trust in government and environmental identity. *Ecological Economics*, *192*, 107267. https://doi.org/10.1016/j.ecolecon.2021.107267

Frank, R. H. (2020). *Under the Influence*. https://press.princeton.edu/books/hardcover/9780691193083/under-the-influence.

Franta, B. (2021). Weaponizing economics: Big Oil, economic consultants, and climate policy delay. *Environmental Politics*, *31*(4), 1–21. https://doi.org/10.1080/09644016.2021.1947636

Gardner, C. J., Thierry, A., Rowlandson, W., & Steinberger, J. K. (2021). From publications to public actions: The role of universities in facilitating academic advocacy and activism in the climate and ecological emergency. *Frontiers in Sustainability*, *2*. https://doi.org/10.3389/frsus.2021.679019

Gardner, C. J., & Wordley, C. F. R. (2019). Scientists must act on our own warnings to humanity. *Nature Ecology & Evolution*, *3*(9), 1271–1272. https://doi.org/10.1038/s41559-019-0979-y

Garnett, T., Appleby, M. C., Balmford, A., Bateman, I. J., Benton, T. G., Bloomer, P., Burlingame, B., Dawkins, M., Dolan, L., Fraser, D., Herrero, M., Hoffmann, I., Smith, P., Thornton, P. K., Toulmin, C., Vermeulen, S. J., & Godfray, H. C. J. (2013). Sustainable intensification in agriculture: Premises and policies. *Science*, *341*(6141), 33–34. https://doi.org/10.1126/science.1234485

Gatti, L. V., Basso, L. S., Miller, J. B., Gloor, M., Gatti Domingues, L., Cassol, H. L. G., Tejada, G., Aragão, L. E. O. C., Nobre, C., Peters, W., Marani, L., Arai, E., Sanches, A. H., Corrêa, S. M., Anderson, L., Von Randow, C., Correia, C. S. C., Crispim, S. P., & Neves, R. A. L. (2021). Amazonia as a carbon source linked to deforestation and climate change. *Nature*, *595*(7867), Article 7867. https://doi.org/10.1038/s41586-021-03629-6

Geitmann, A. (2020). Travel less. Make it worthwhile. *Cell*, *182*(4), 790–793. https://doi.org/10.1016/j.cell.2020.07.026

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, *3*(7), e1700782. https://doi.org/10.1126/sciadv.1700782

Gibb, R., Redding, D. W., Chin, K. Q., Donnelly, C. A., Blackburn, T. M., Newbold, T., & Jones, K. E. (2020). Zoonotic host diversity increases in human-dominated ecosystems. *Nature*, *584*(7821), Article 7821. https://doi.org/10.1038/s41586-020-2562-8

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education: Theory, research, and practice*. John Wiley & Sons.

Godfray, H. C. J., Aveyard, P., Garnett, T., Hall, J. W., Key, T. J., Lorimer, J., Pierrehumbert, R. T., Scarborough, P., Springmann, M., & Jebb, S. A. (2018). Meat consumption, health, and the environment. *Science*, *361*(6399), eaam5324. https://doi.org/10.1126/science.aam5324

Goldberg, M. H., Marlon, J. R., Wang, X., Linden, S. van der, & Leiserowitz, A. (2020). Oil and gas companies invest in legislators that vote against the environment. *Proceedings of the National Academy of Sciences*, *117*(10), 5111–5112. https://doi.org/10.1073/pnas.1922175117

Grady-Benson, J., & Sarathy, B. (2016). Fossil fuel divestment in US higher education: Student-led organising for climate justice. *Local Environment*, *21*(6), 661–681. https://doi.org/10.1080/13549839.2015.1009825

Green, F., & Healy, N. (2022). How inequality fuels climate change: The climate case for a green new deal. *One Earth*, *5*(6), 635–649. https://doi.org/10.1016/j.oneear.2022.05.005

Hadley, M. B., Baumgartner, J., & Vedanthan, R. (2018). Developing a clinical approach to air pollution and cardiovascular health. *Circulation*, *137*(7), 725–742. https://doi.org/10.1161/CIRCULATIONAHA.117.030377

Hampton, S., & Whitmarsh, L. (2023). Choices for climate action: A review of the multiple roles individuals play. *One Earth*, *6*(9), 1157–1172. https://doi.org/10.1016/j.oneear.2023.08.006

Hematian, H., & Ranjbar, E. (2022). Evaluating urban public spaces from mental health point of view: Comparing pedestrian and car-dominated streets. *Journal of Transport & Health*, *27*, 101532. https://doi.org/10.1016/j.jth.2022.101532

Hensher, M., & Zywert, K. (2020). Can healthcare adapt to a world of tightening ecological constraints? Challenges on the road to a post-growth future. *BMJ*, *371*, m4168. https://doi.org/10.1136/bmj.m4168

Hickel, J. (2021). *Less is More*. https://www.penguin.co.uk/books/441772/less-is-more-by-jason-hickel/9781786091215.

Hickel, J., Dorninger, C., Wieland, H., & Suwandi, I. (2022). Imperialist appropriation in the world economy: Drain from the global South through unequal exchange, 1990–2015. *Global Environmental Change*, *73*, 102467. https://doi.org/10.1016/j.gloenvcha.2022.102467

Hickel, J., & Kallis, G. (2020). Is green growth possible? *New Political Economy*, *25*(4), 469–486. https://doi.org/10.1080/13563467.2019.1598964

Hickel, J., Kallis, G., Jackson, T., O'Neill, D. W., Schor, J. B., Steinberger, J. K., Victor, P. A., & Ürge-Vorsatz, D. (2022). Degrowth can work—here's how science can help. *Nature*, *612*(7940), 400–403. https://doi.org/10.1038/d41586-022-04412-x

Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R. E., Mayall, E. E., Wray, B., Mellor, C., & van Susteren, L. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *The Lancet Planetary Health*, *5*(12), e863–e873. https://doi.org/10.1016/S2542-5196(21)00278-3

Hollands, G. J., Bignardi, G., Johnston, M., Kelly, M. P., Ogilvie, D., Petticrew, M., Prestwich, A., Shemilt, I., Sutton, S., & Marteau, T. M. (2017). The TIPPME intervention typology for changing environments to change behaviour. *Nature Human Behaviour*, *1*(8), 0140. https://doi.org/10.1038/s41562-017-0140

Horton, R., Beaglehole, R., Bonita, R., Raeburn, J., McKee, M., & Wall, S. (2014). From public to planetary health: A manifesto. *The Lancet*, *383*(9920), 847. https://doi.org/10.1016/S0140-6736(14)60409-8

Howard, C., Beagley, J., Eissa, M., Horn, O., Kuhl, J., Miller, J., Narayan, S., Smith, R., & Thickson, W. (2022). Why we need a fossil fuel non-proliferation treaty. *The Lancet Planetary Health*, 6(10), e777–e778. https://doi.org/10.1016/S2542-5196(22)00222-4

Hsiang, S. M., & Burke, M. (2014). Climate, conflict, and social stability: What does the evidence say? *Climatic Change*, *123*(1), 39–55. https://doi.org/10.1007/s10584-013-0868-3

IEA. (2021). *Net Zero by 2050*. https://www.iea.org/reports/net-zero-by-2050.

Inauen, J., Contzen, N., Frick, V., Kadel, P., Keller, J., Kollmann, J., Mata, J., & van Valkengoed, A. M. (2021). Environmental issues are health issues. *European Psychologist*, *26*(3), 219–229. https://doi.org/10.1027/1016-9040/a000438

IPBES. (2019). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services*. Zenodo. https://doi.org/10.5281/zenodo.3553579.

IPCC. (2022a). *Climate change 2022: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. IPCC Geneva, The Netherlands.

IPCC. (2022b). *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge Univ. Press.

Ivanova, D., & Wood, R. (2020). The unequal distribution of household carbon footprints in Europe and its link to sustainability. *Global Sustainability*, *3*, e18. https://doi.org/10.1017/sus.2020.12

James-Martin, G., Baird, D. L., Hendrie, G. A., Bogard, J., Anastasiou, K., Brooker, P. G., Wiggins, B., Williams, G., Herrero, M., Lawrence, M., Lee, A. J., & Riley, M. D. (2022). Environmental sustainability in national food-based dietary guidelines: A global review. *The Lancet Planetary Health*, *6*(12), e977–e986. https://doi.org/10.1016/S2542-5196(22)00246-7

Kallis, G. (2011). In defence of degrowth. *Ecological Economics*, *70*(5), 873–880. https://doi.org/10.1016/j.ecolecon.2010.12.007

Kemple, T. (2020). The climate emergency: Are the doctors who take non-violent direct action to raise public awareness radical activists, rightminded professionals, or reluctant whistleblowers? *The New Bioethics*, *26*(2), 111–124. https://doi.org/10.1080/20502877.2020.1775390

King, L. C., Savin, I., & Drews, S. (2023). Shades of green growth scepticism among climate policy researchers. *Nature Sustainability*, *6*(11), Article 11. https://doi.org/10.1038/s41893-023-01198-2

Klein, N. (2014). *This changes everything*. Penguin Books. https://naomiklein.org/this-changes-everything/.

Knight, K. W., Rosa, E. A., & Schor, J. B. (2013). Could working less reduce pressures on the environment? A cross-national panel analysis of OECD countries, 1970–2007. *Global Environmental Change*, *23*(4), 691–700. https://doi.org/10.1016/j.gloenvcha.2013.02.017

Köhler, J. K., Kreil, A. S., Wenger, A., Darmandieu, A., Graves, C., Haugestad, C. A. P., Holzen, V., Keller, A., Lloyd, S., Marczak, M., Međugorac, V., & Rosa, C. D. (2022). The need for sustainability, equity, and international exchange: Perspectives of early career environmental psychologists on the future of conferences. *Frontiers in Psychology*, *13*. https://www.frontiersin.org/article/10.3389fpsyg.2022.906108.

Kok, G., Schaalma, H., Ruiter, R. A., Van Empelen, P., & Brug, J. (2004). Intervention mapping: Protocol for applying health psychology theory to prevention programmes. *Journal of Health Psychology*, *9*(1), 85–98. https://doi.org/10.1177/1359105304038379

König, L. M., & Araújo-Soares, V. (2021). Will the farm to fork strategy be effective in changing food consumption behavior? A health psychology perspective. *Applied Economic Perspectives and Policy*, *45*(2), 785–802. https://doi.org/10.1002/aepp.13220

Kreil, A. S. (2021). Does flying less harm academic work? Arguments and assumptions about reducing air travel in academia. *Travel Behaviour and Society*, *25*, 52–61. https://doi.org/10.1016/j.tbs.2021.04.011

Kuss, P., & Nicholas, K. A. (2022). A dozen effective interventions to reduce car use in European cities: Lessons learned from a meta-analysis and transition management. *Case Studies on Transport Policy*, *10*(3), 1494–1513. https://doi.org/10.1016/j.cstp.2022.02.001

Kwasnicka, D., Dombrowski, S. U., White, M., & Sniehotta, F. (2016). Theoretical explanations for maintenance of behaviour change: A systematic review of behaviour theories. *Health Psychology Review*, *10*(ja), 1–39. https://doi.org/10.1080/17437199.2016.1151372

Lage, J., Thema, J., Zell-Ziegler, C., Best, B., Cordroch, L., & Wiese, F. (2023). Citizens call for sufficiency and regulation—a comparison of European citizen assemblies and national energy and climate plans. *Energy Research & Social Science*, *104*, 103254. https://doi.org/10.1016/j.erss.2023.103254

Lange, F., Nielsen, K. S., Cologna, V., Brick, C., & Stern, P. C. (2021). *Lange 2021 Making theory useful for understanding high-impact behavior: A response to van Valkengoed et al., 2021*. PsyArXiv. https://doi.org/10.31234/osf.io/f2n3j.

Lau, W. W. Y., Shiran, Y., Bailey, R. M., Cook, E., Stuchtey, M. R., Koskella, J., Velis, C. A., Godfrey, L., Boucher, J., Murphy, M. B., Thompson, R. C., Jankowska, E., Castillo Castillo, A., Pilditch, T. D., Dixon, B., Koerselman, L., Kosior, E., Favoino, E., Gutberlet, J., … Palardy, J. E. (2020). Evaluating scenarios toward zero plastic pollution. *Science*, *369*(6510), 1455–1461. https://doi.org/10.1126/science.aba9475

Lee, J.-Y., Marotzke, J., Bala, G., Cao, L., Corti, S., Dunne, J. P., Engelbrecht, F., Fischer, E., Fyfe, J. C., & Jones, C. (2021). *Future global climate: Scenario-based projections and near-term information*. IPCC.

Leischow, S. J., Best, A., Trochim, W. M., Clark, P. I., Gallagher, R. S., Marcus, S. E., & Matthews, E. (2008). Systems thinking to improve the public's health. *American Journal of Preventive Medicine*, *35*(2, Supplement), S196–S203. https://doi.org/10.1016/j.amepre.2008.05.014

Leiserowitz, A., Roser-Renouf, C., Marlon, J., & Maibach, E. (2021). Global Warming's Six Americas: A review and recommendations for climate change communication. *Current Opinion in Behavioral Sciences*, *42*, 97–103. https://doi.org/10.1016/j.cobeha.2021.04.007

Lepinteur, A. (2019). The shorter workweek and worker wellbeing: Evidence from Portugal and France. *Labour Economics*, *58*, 204–220. https://doi.org/10.1016/j.labeco.2018.05.010

Le Quéré, C., Korsbakken, J. I., Wilson, C., Tosun, J., Andrew, R., Andres, R. J., Canadell, J. G., Jordan, A., Peters, G. P., & van Vuuren, D. P. (2019). Drivers of declining CO2 emissions in 18 developed economies. *Nature Climate Change*, *9*(3), Article 3. https://doi.org/10.1038/s41558-019-0419-7

Lewandowsky, S., Oreskes, N., Risbey, J. S., Newell, B. R., & Smithson, M. (2015). Seepage: Climate change denial and its effect on the scientific community. *Global Environmental Change*, *33*, 1–13. https://doi.org/10.1016/j.gloenvcha.2015.02.013

Longlist of knowledge gaps in Planetary Health. (2023). Royal Netherlands Academy of Arts and Sciences.

Ludwig, R. M., Flournoy, J. C., & Berkman, E. T. (2019). Inequality in personality and temporal discounting across socioeconomic status? Assessing the evidence. *Journal of Research in Personality*, *81*, 79–87. https://doi.org/10.1016/j.jrp.2019.05.003

Lunetto, M., Hale, J., & Michie, S. (2022). Achieving effective climate action in cities by understanding behavioral systems. *One Earth*, *5*(7), 745–748. https://doi.org/10.1016/j.oneear.2022.06.009

Marteau, T. M. (2017). Towards environmentally sustainable human behaviour: Targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160371. https://doi.org/10.1098/rsta.2016.0371

Marteau, T. M. (2022, June 7). Evidence-neglect: A major barrier to government health and climate ambitions. *Bennett Institute for Public Policy*, https://www.bennettinstitute.cam.ac.uk/blog/evidence-neglect/.

Marteau, T. M. (2023). Evidence-neglect: Addressing a barrier to UK health and climate policy ambitions. *Science and Public Policy*, *50*, scad021. https://doi.org/10.1093/scipol/scad021

Marteau, T. M., Chater, N., & Garnett, E. E. (2021a). Changing behaviour for net zero 2050. *BMJ*, *375*, n2293. https://doi.org/10.1136/bmj.n2293

Marteau, T. M., Fletcher, P. C., Munafò, M. R., & Hollands, G. J. (2021b). Beyond choice architecture: Advancing the science of changing behaviour at scale. *BMC Public Health*, *21*(1), 1531. https://doi.org/10.1186/s12889-021-11382-8

Matthews, H. D., & Wynes, S. (2022). Current global efforts are insufficient to limit warming to 1.5°C. *Science*, *376*(6600), 1404–1409. https://doi.org/10.1126/science.abo3378

Mattioli, G., Roberts, C., Steinberger, J. K., & Brown, A. (2020). The political economy of car dependence: A systems of provision approach. *Energy Research & Social Science*, *66*, 101486. https://doi.org/10.1016/j.erss.2020.101486

Mayer, J. (2017). *Dark money: The hidden history of the Billionaires Behi … .* Anchor. https://www.goodreads.com/book/show/27833494-dark-money.

McCartney, G., Hensher, M., & Trebeck, K. (2023). How to measure progress towards a wellbeing economy: Distinguishing genuine advances from 'window dressing'. *Public Health Research & Practice*, *33*(2), https://apo.org.au/node/323406.

Meadows, D. (1999). *Leverage points: Places to intervene in a system*. The Sustainability Institute. https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/.

Meshes, E., Kamau, L. Z., Summers, M., & Hoppin, K. B. (2022). Climate change and six americas: What can behavior analysts do? *Behavior and Social Issues*, https://doi.org/10.1007/s42822-022-00107-0

Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J., & Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, *46*(1), 81–95. https://doi.org/10.1007/s12160-013-9486-6

Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1), 42. https://doi.org/10.1186/1748-5908-6-42

Millward-Hopkins, J., Steinberger, J. K., Rao, N. D., & Oswald, Y. (2020). Providing decent living with minimum energy: A global scenario. *Global Environmental Change*, *65*, 102168. https://doi.org/10.1016/j.gloenvcha.2020.102168

Minor, K., Bjerre-Nielsen, A., Jonasdottir, S. S., Lehmann, S., & Obradovich, N. (2022). Rising temperatures erode human sleep globally. *One Earth*, *5*(5), 534–549. https://doi.org/10.1016/j.oneear.2022.04.008

Mitev, K., Player, L., Verfuerth, C., Westlake, S., & Whitmarsh, L. (2023). The implications of behavioural science for effective climate policy (CAST). *Climate Change Committee*, https://www.theccc.org.uk/publication/the-implications-of-behavioural-science-for-effective-climate-policy-cast/.

Mora, C., McKenzie, T., Gaw, I. M., Dean, J. M., von Hammerstein, H., Knudson, T. A., Setter, R. O., Smith, C. Z., Webster, K. M., Patz, J. A., & Franklin, E. C. (2022). Over half of known human pathogenic diseases can be aggravated by climate change. *Nature Climate Change*, *12*, 1–7. https://doi.org/10.1038/s41558-022-01426-1

Mora, C., Spirandelli, D., Franklin, E. C., Lynham, J., Kantar, M. B., Miles, W., Smith, C. Z., Freel, K., Moy, J., Louis, L. V., Barba, E. W., Bettinger, K., Frazier, A. G., Colburn IX, J. F., Hanasaki, N., Hawkins, E., Hirabayashi, Y., Knorr, W., Little, C. M., … Hunter, C. L. (2018). Broad threat to humanity from cumulative climate hazards intensified by greenhouse gas emissions. *Nature Climate Change*, *8*(12), Article 12. https://doi.org/10.1038/s41558-018-0315-6

Mueller, N., Rojas-Rueda, D., Cole-Hunter, T., de Nazelle, A., Dons, E., Gerike, R., Götschi, T., Int Panis, L., Kahlmeier, S., & Nieuwenhuijsen, M. (2015). Health impact assessment of active transportation: A systematic review. *Preventive Medicine*, *76*, 103–114. https://doi.org/10.1016/j.ypmed.2015.04.010

Munafò, M. R., & Davey Smith, G. (2018). Robust research needs many lines of evidence. *Nature*, *553*(7689), 399–401. https://doi.org/10.1038/d41586-018-01023-3

Nestle, M. (1993). Food lobbies, the food pyramid, and U.S. Nutrition policy. *International Journal of Health Services*, *23*(3), 483–496. https://doi.org/10.2190/32F2-2PFB-MEG7-8HPU

Nicholas, K. (2021). *Under the sky we make: How to be human in a warming world*. Putnam.

Nielsen, K. S., Clayton, S., Stern, P. C., Dietz, T., Capstick, S., & Whitmarsh, L. (2021a). How psychology can help limit climate change. *American Psychologist*, *76*(1), 130–144. https://doi.org/10.1037/amp0000624

Nielsen, K. S., Cologna, V., Lange, F., Brick, C., & Stern, P. C. (2021b). The case for impact-focused environmental psychology. *Journal of Environmental Psychology*, *74*, 101559. https://doi.org/10.1016/j.jenvp.2021.101559

Nielsen, K. S., Nicholas, K. A., Creutzig, F., Dietz, T., & Stern, P. C. (2021c). The role of high-socioeconomic-status people in locking in or rapidly reducing energy-driven greenhouse gas emissions. *Nature Energy*, *6*, 1–6. https://doi.org/10.1038/s41560-021-00900-y

Norris, E., Finnerty, A. N., Hastings, J., Stokes, G., & Michie, S. (2019). A scoping review of ontologies related to human behaviour change. *Nature Human Behaviour*, *3*(2), Article 2. https://doi.org/10.1038/s41562-018-0511-4

O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature Sustainability*, *1*(2), Article 2. https://doi.org/10.1038/s41893-018-0021-4

Oswald, Y., Owen, A., & Steinberger, J. K. (2020). Large inequality in international and intranational energy footprints between income groups and across consumption categories. *Nature Energy*, *5*(3), Article 3. https://doi.org/10.1038/s41560-020-0579-8

Owen, A., & Barrett, J. (2020). Reducing inequality resulting from UK low-carbon policy. *Climate Policy*, https://www.tandfonline.com/doi/abs/10.108014693062.2020.1773754.

Papies, E. K., Barsalou, L. W., Claassen, M. A., Davis, T., Farrar, S. T., Gauthier, E., Rodger, A., Tatar, B., Wehbe, L. H., & Werner, J. (2022). Grounding motivation for behavior change. In *Advances in experimental social psychology*. Academic Press. https://doi.org/10.1016/bs.aesp.2022.04.002.

Papies, E. K., Davis, T., Farrar, S., Sinclair, M., & Wehbe, L. H. (2023). How (not) to talk about plant-based foods: Using language to support the transition to sustainable diets. *Proceedings of the Nutrition Society, in Press*, *2023*. https://doi.org/10.31234/osf.io/5ang8

Paulson, L., & Büchs, M. (2022). Public acceptance of post-growth: Factors and implications for post-growth strategy. *Futures*, *143*, 103020. https://doi.org/10.1016/j.futures.2022.103020

Pedro, V. de A. S., Trierveiler-Pereira, L., & Baltazar, J. M. (2022). Adapt conservation biology teaching to address eco-anxiety in students. *PLOS Biology*, *20*(9), e3001774. https://doi.org/10.1371/journal.pbio.3001774

Pendrill, F., Persson, U. M., Godar, J., Kastner, T., Moran, D., Schmidt, S., & Wood, R. (2019). Agricultural and forestry trade drives large share of tropical deforestation emissions. *Global Environmental Change*, *56*, 1–10. https://doi.org/10.1016/j.gloenvcha.2019.03.002

Petrescu, D. C., Hollands, G. J., Couturier, D.-L., Ng, Y.-L., & Marteau, T. M. (2016). Public acceptability in the UK and USA of nudging to reduce obesity: The example of reducing sugar-sweetened beverages consumption. *PLoS One*, *11*(6), e0155995. https://doi.org/10.1371/journal.pone.0155995

Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite*, *91*, 114–128. https://doi.org/10.1016/j.appet.2015.04.011

Planetary Health. An emerging field to be developed—KNAW. (2023). Retrieved 28 November 2023, from https://knaw.nl/publications/planetary-health-emerging-field-be-developed.

Plint, A. C., Moher, D., Morrison, A., Schulz, K., Altman, D. G., Hill, C., & Gaboury, I. (2006). Does the CONSORT checklist improve the quality of reports of randomised controlled trials? A systematic review. *Medical Journal of Australia*, *185* (5), 263–267. https://doi.org/10.5694/j.1326-5377.2006.tb00557.x

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, *360* (6392), 987–992. https://doi.org/10.1126/science.aaq0216

Quiggin, D., De Meyer, K., Hubble-Rose, L., & Froggatt, A. (2021). *Climate change risk assessment 2021 (Environment and Society Programme)*. Chatham House.

Quinton, J. N. (2020). Cutting the carbon cost of academic travel. *Nature Reviews Earth & Environment*, *1*(1), Article 1. https://doi.org/10.1038/s43017-019-0008-3

Ragusa, A., Svelato, A., Santacroce, C., Catalano, P., Notarstefano, V., Carnevali, O., Papa, F., Rongioletti, M. C. A., Baiocco, F., Draghi, S., D'Amore, E., Rinaldo, D., Matta, M., & Giorgini, E. (2021). Plasticenta: First evidence of microplastics in human placenta. *Environment International*, *146*, 106274. https://doi.org/10.1016/j.envint.2020.106274

Ramírez, C. A., & Worrell, E. (2006). Feeding fossil fuels to the soil: An analysis of energy embedded and technological learning in the fertilizer industry. *Resources, Conservation and Recycling*, *46*(1), 75–93. https://doi.org/10.1016/j.resconrec.2005.06.004

Raworth, K. (2017). *Doughnut economics: Seven ways to think like a 21st-century economist*. Random House Business.

Reinforcing Europe's resilience. (2020). [Text]. European Commission - European Commission. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_884.

Reisch, L. A., Sunstein, C. R., & Gwozdz, W. (2017). Beyond carrots and sticks: Europeans support health nudges. *Food Policy*, *69*, 1–10. https://doi.org/10.1016/j.foodpol.2017.01.007

Ripple, W. J., Wolf, C., Gregg, J. W., Rockström, J., Newsome, T. M., Law, B. E., Marques, L., Lenton, T. M., Xu, C., Huq, S., Simons, L., & King, S. D. A. (2023). The 2023 state of the climate report: Entering uncharted territory. *BioScience*, *73*, biad080. https://doi.org/10.1093/biosci/biad080

Ritchie, H. (2020). *You want to reduce the carbon footprint of your food? Focus on what you eat, not whether your food is local*. Our World in Data. https://ourworldindata.org/food-choice-vs-eating-local.

Roberts, J. T., Steinberger, J. K., Dietz, T., Lamb, W. F., York, R., Jorgenson, A. K., Givens, J. E., Baer, P., & Schor, J. B. (2020). Four agendas for research and policy on emissions mitigation and well-being. *Global Sustainability*, *3*, e3. https://doi.org/10.1017/sus.2019.25

Rodger, A., Barsalou, L., & Papies, E. K. (2023a). *Exploring the Underlying Influences of Daily Water Intake Using the Situated Assessment Method*. PsyArXiv. https://doi.org/10.31234/osf.io/5f9gm.

Rodger, A., Barsalou, L., & Papies, E. K. (2023b). *Towards a Theory of Water Drinking: The Essential Health Behaviour*. PsyArXiv. https://doi.org/10.31234/osf.io/fys86.

Romanello, M., Napoli, C. D., Drummond, P., Green, C., Kennard, H., Lampard, P., Scamman, D., Arnell, N., Ayeb-Karlsson, S., Ford, L. B., Belesova, K., Bowen, K., Cai, W., Callaghan, M., Campbell-Lendrum, D., Chambers, J., Daalen, K. R. van,

Dalin, C., Dasandi, N., … Costello, A. (2022). The 2022 report of the Lancet Countdown on health and climate change: Health at the mercy of fossil fuels. *The Lancet*, *400*(10363), 1619–1654. https://doi.org/10.1016/S0140-6736(22)01540-9

Romanello, M., Napoli, C. di, Green, C., Kennard, H., Lampard, P., Scamman, D., Walawender, M., Ali, Z., Ameli, N., Ayeb-Karlsson, S., Beggs, P. J., Belesova, K., Ford, L. B., Bowen, K., Cai, W., Callaghan, M., Campbell-Lendrum, D., Chambers, J., Cross, T. J., … Costello, A. (2023). The 2023 report of the Lancet Countdown on health and climate change: The imperative for a health-centred response in a world facing irreversible harms. *The Lancet*, *402*(10419), https://doi.org/10.1016/S0140-6736(23)01859-7

Salamon, M. K. (2019). Leading the public into emergency mode. *The Climate Mobilization*.

Samuel, G., & Richie, C. (2022). Reimagining research ethics to include environmental sustainability: A principled approach, including a case study of data-driven health research. *Journal of Medical Ethics*, *49*, 428–433. https://doi.org/10.1136/jme-2022-108489

Sangervo, J., Jylhä, K. M., & Pihkala, P. (2022). Climate anxiety: Conceptual considerations, and connections with climate hope and action. *Global Environmental Change*, *76*, 102569. https://doi.org/10.1016/j.gloenvcha.2022.102569

Savell, E., Fooks, G., & Gilmore, A. B. (2016). How does the alcohol industry attempt to influence marketing regulations? A systematic review. *Addiction*, *111*(1), 18–32. https://doi.org/10.1111/add.13048

Savell, E., Gilmore, A. B., & Fooks, G. (2014). How does the tobacco industry attempt to influence marketing regulations? A systematic review. *PLoS One*, *9*(2), e87389. https://doi.org/10.1371/journal.pone.0087389

Scheelbeek, P. F., Bird, F. A., Tuomisto, H. L., Green, R., Harris, F. B., Joy, E. J., Chalabi, Z., Allen, E., Haines, A., & Dangour, A. D. (2018). Effect of environmental changes on vegetable and legume yields and nutritional quality. *Proceedings of the National Academy of Sciences*, *115*(26), 6804–6809. https://doi.org/10.1073/pnas.1800442115

Searchinger, T., Waite, R., Hanson, C., Ranganathan, J., & Matthews, E. (2019). *Creating a sustainable food future*. World Resources Institute. https://research.wri.org/wrr-food/about-report.

Semenescu, A., Gavreliuc, A., & Sârbescu, P. (2020). 30 years of soft interventions to reduce car use – A systematic review and meta-analysis. *Transportation Research Part D: Transport and Environment*, *85*, 102397. https://doi.org/10.1016/j.trd.2020.102397

Seto, K. C., Davis, S. J., Mitchell, R. B., Stokes, E. C., Unruh, G., & Ürge-Vorsatz, D. (2016). Carbon lock-in: Types, causes, and policy implications. *Annual Review of Environment and Resources*, *41*(1), 425–452. https://doi.org/10.1146/annurev-environ-110615-085934

Sheeran, P., Klein, W. M. P., & Rothman, A. J. (2017). Health behavior change: Moving from observation to intervention. *Annual Review of Psychology*, *68*(1), 573–600. https://doi.org/10.1146/annurev-psych-010416-044007

Sherman, D. K., Shteyn, M. F., Han, H., & Boven, L. V. (2021). The exchange between citizens and elected officials: A social psychological framework for citizen climate activists. *Behavioural Public Policy*, *5*(4), 576–605. https://doi.org/10.1017/bpp.2020.41

Sinclair, M., Combet, E., Davis, T., & Papies, E. K. (2023). *Sustainability in food-based dietary guidelines: A review of recommendations around meat and dairy consumption and their visual representation*. PsyArXiv. https://doi.org/10.31234/osf.io/xgq46.

Skiles, M., Yang, E., Reshef, O., Muñoz, D. R., Cintron, D., Lind, M. L., Rush, A., Calleja, P. P., Nerenberg, R., Armani, A. M., M. Faust, K., & Kumar (2022). Conference demographics and footprint changed by virtual platforms. Nature Sustainability, 5(2), Article 2. https://doi.org/10.1038/s41893-021-00823-2

Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., McIntosh, E., Petticrew, M., Rycroft-Malone, J., White, M., & Moore, L. (2021). A new framework for developing and evaluating complex interventions: Update of medical research council guidance. *BMJ*, *374*, n2061. https://doi.org/10.1136/bmj.n2061

Sniehotta, F. F., Araújo-Soares, V., Brown, J., Kelly, M. P., Michie, S., & West, R. (2017). Complex systems and individual-level approaches to population health: A false dichotomy? *The Lancet Public Health*, *2*(9), e396–e397. https://doi.org/10.1016/S2468-2667(17)30167-6

Sparkman, G., Geiger, N., & Weber, E. U. (2022). Americans experience a false social reality by underestimating popular climate policy support by nearly half. *Nature Communications*, *13*(1), Article 1. https://doi.org/10.1038/s41467-022-32412-y

Steentjes, K., Poortinga, W., Demski, C., & Whitmarsh, L. (2021). *UK perceptions of climate change and lifestyle changes* (08; Briefing Paper). CAST.

Steg, L., Perlaviciute, G., Sovacool, B. K., Bonaiuto, M., Diekmann, A., Filippini, M., Hindriks, F., Bergstad, C. J., Matthies, E., Matti, S., Mulder, M., Nilsson, A., Pahl, S., Roggenkamp, M., Schuitema, G., Stern, P. C., Tavoni, M., Thøgersen, J., & Woerdman, E. (2021). A research agenda to better understand the human dimensions of energy transitions. *Frontiers in Psychology*, *12*. https://www.frontiersin.org/articles/10.3389fpsyg.2021.672776.

Stern, P. C., Dietz, T., Nielsen, K. S., Peng, W., & Vandenbergh, M. P. (2023). Feasible climate mitigation. *Nature Climate Change*, *13*(1), Article 1. https://doi.org/10.1038/s41558-022-01563-7

Stoddard, I., Anderson, K., Capstick, S., Carton, W., Depledge, J., Facer, K., Gough, C., Hache, F., Hoolohan, C., Hultman, M., Hällström, N., Kartha, S., Klinsky, S., Kuchler, M., Lövbrand, E., Nasiritousi, N., Newell, P., Peters, G. P., Sokona, Y., … Williams, M. (2021). Three decades of climate mitigation: Why haven't we bent the global emissions curve?

Annual Review of Environment and Resources, *46*(1), 653–689. https://doi.org/10.1146/annurev-environ-012220-011104

Stylianou, K. S., Fulgoni, V. L., & Jolliet, O. (2021). Small targeted dietary changes can yield substantial gains for human health and the environment. *Nature Food*, *2*(8), Article 8. https://doi.org/10.1038/s43016-021-00343-4

Sumner, J. A., Carey, R. N., Michie, S., Johnston, M., Edmondson, D., & Davidson, K. W. (2018). Using rigorous methods to advance behaviour change science. *Nature Human Behaviour*, *2*(11), Article 11. https://doi.org/10.1038/s41562-018-0471-8

Swinburn, B. A., Kraak, V. I., Allender, S., Atkins, V. J., Baker, P. I., Bogard, J. R., Brinsden, H., Calvillo, A., Schutter, O. D., Devarajan, R., Ezzati, M., Friel, S., Goenka, S., Hammond, R. A., Hastings, G., Hawkes, C., Herrero, M., Hovmand, P. S., Howden, M., … Dietz, W. H. (2019). The global syndemic of obesity, undernutrition, and climate change: The lancet commission report. *The Lancet*, *393*(10173), 791–846. https://doi.org/10.1016/S0140-6736(18)32822-8

Tapper, K. (2021). *Health psychology and behaviour change*. Bloomsbury Publishing.

Taylor, I., Bull, J. W., Ashton, B., Biggs, E., Clark, M., Gray, N., Grub, H. M. J., Stewart, C., & Milner-Gulland, E. J. (2023). Nature-positive goals for an organization's food consumption. *Nature Food*, *4*(1), Article 1. https://doi.org/10.1038/s43016-022-00660-2

Teaching Climate Change in Med School Gains Momentum. (2022, September 21). https://www.medpagetoday.com/special-reports/exclusives/100852.

Teran-Escobar, C., Duché, S., Bouscasse, H., Isoard-Gatheur, S., Juen, P., Lacoste, L., Lyon-Caen, S., Mathy, S., Ployon, E., Risch, A., Sarrazin, P., Slama, R., Tabaka, K., Treibich, C., Chardonnel, S., & Chalabaev, A. (2022). Intermob: A 24-month randomised controlled trial comparing the effectiveness of an intervention including behavioural change techniques and free transport versus an intervention including air pollution awareness-raising on car use reduction among regular car users living in Grenoble, France. *BMC Public Health*, *22*(1), 1763. https://doi.org/10.1186/s12889-022-14099-4

Tilman, D., Clark, M., Williams, D. R., Kimmel, K., Polasky, S., & Packer, C. (2017). Future threats to biodiversity and pathways to their prevention. *Nature*, *546*(7656), Article 7656. https://doi.org/10.1038/nature22900

Urai, A. E., & Kelly, C. (2023). Rethinking academia in a time of climate crisis. *eLife*, *12*, e84991. https://doi.org/10.7554/eLife.84991

van Asselt, H., & Newell, P. (2022). Pathways to an international agreement to leave fossil fuels in the ground. *Global Environmental Politics*, *22*(4), 28–47. https://doi.org/10.1162/glep_a_00674

Venegas Hargous, C., Strugnell, C., Allender, S., Orellana, L., Corvalan, C., & Bell, C. (2023). Double- and triple-duty actions in childhood for addressing the global syndemic of obesity, undernutrition, and climate change: A scoping review. *Obesity Reviews*, *24*(4), e13555. https://doi.org/10.1111/obr.13555

Vogel, J., & Hickel, J. (2023). Is green growth happening? An empirical analysis of achieved versus Paris-compliant CO2–GDP decoupling in high-income countries. *The Lancet Planetary Health*, *7*(9), e759–e769. https://doi.org/10.1016/S2542-5196(23)00174-2

Vogel, J., Steinberger, J. K., O'Neill, D. W., Lamb, W. F., & Krishnakumar, J. (2021). Socio-economic conditions for satisfying human needs at low energy use: An international analysis of social provisioning. *Global Environmental Change*, *69*, 102287. https://doi.org/10.1016/j.gloenvcha.2021.102287

Wang, Y., Huang, J., Zhu, F., & Zhou, S. (2021). Airborne microplastics: A review on the occurrence, migration and risks to humans. *Bulletin of Environmental Contamination and Toxicology*, *107*(4), 657–664. https://doi.org/10.1007/s00128-021-03180-0

Warner, L. M., Teran-Escobar, C., Janssen, A., Masaryk, R., Rehackova, L., Bourke, B., & Araújo-Soares, V. (2022). How to make EHPS conferences more climate-friendly: First ideas for the 2022 meeting of the European health psychology society. *European Health Psychologist*, *22*(5), Article 5.

Wehbe, L. H., Banas, K., & Papies, E. K. (2022). It's easy to maintain when the changes are small: Exploring environmentally motivated dietary changes from a self-control perspective. *Collabra: Psychology*, *8*(1), 38823. https://doi.org/10.1525/collabra.38823

Whitmarsh, L., & Kreil, A. (2022). Challenging the values of the polluter elite: A global consequentialist response to Evensen and Graham's (2022) 'The irreplaceable virtues of in-person conferences'. *Journal of Environmental Psychology*, *83*, 101881. https://doi.org/10.1016/j.jenvp.2022.101881

Whitmarsh, L., Player, L., Jiongco, A., James, M., Williams, M., Marks, E., & Kennedy-Williams, P. (2022). Climate anxiety: What predicts it and how is it related to climate action? *Journal of Environmental Psychology*, *83*, 101866. https://doi.org/10.1016/j.jenvp.2022.101866

Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., Dias, B. F. de. S., Ezeh, A., Frumkin, H., Gong, P., Head, P., Horton, R., Mace, G. M., Marten, R., Myers, S. S., Nishtar, S., Osofsky, S. A., Pattanayak, S. K., Pongsiri, M. J., Romanelli, C., … Yach, D. (2015). Safeguarding human health in the Anthropocene epoch: Report of The Rockefeller Foundation–Lancet Commission on planetary health. *The Lancet*, *386*(10007), 1973–2028. https://doi.org/10.1016/S0140-6736(15)60901-1

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., Jonell, M., Clark, M., Gordon, L. J., Fanzo, J., Hawkes, C., Zurayk, R., Rivera, J. A., Vries, W. D., Sibanda, L. M., … Murray,

C. J. L. (2019). Food in the Anthropocene: The EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, *393*(10170), 447–492. https://doi.org/10.1016/S0140-6736(18)31788-4

Wolske, K. S., & Stern, P. C. (2018). 6 - Contributions of psychology to limiting climate change: Opportunities through consumer behavior. In S. Clayton & C. Manning (Eds.), *Psychology and climate change* (pp. 127–160). Academic Press. https://doi.org/10.1016/B978-0-12-813130-5.00007-2.

World Health Organisation. (2023). *Climate change*. https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health.

Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, *12*(7), 074024. https://doi.org/10.1088/1748-9326/aa7541

Xu, X., Sharma, P., Shu, S., Lin, T.-S., Ciais, P., Tubiello, F. N., Smith, P., Campbell, N., & Jain, A. K. (2021). Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods. *Nature Food*, 1–9. https://doi.org/10.1038/s43016-021-00358-x

Zhu, C., Kobayashi, K., Loladze, I., Zhu, J., Jiang, Q., Xu, X., Liu, G., Seneweera, S., Ebi, K. L., Drewnowski, A., Fukagawa, N. K., & Ziska, L. H. (2018). Carbon dioxide (CO2) levels this century will alter the protein, micronutrients, and vitamin content of rice grains with potential health consequences for the poorest rice-dependent countries. *Science Advances*, *4*(5), eaaq1012. https://doi.org/10.1126/sciadv.aaq1012

Zukowska, J., Gobis, A., Krajewski, P., Morawiak, A., Okraszewska, R., Woods, C. B., Volf, K., Kelly, L., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Braver, N. den, & Bengoechea, E. G. (2022). Which transport policies increase physical activity of the whole of society? A systematic review. *Journal of Transport & Health*, *27*, 101488. https://doi.org/10.1016/j.jth.2022.101488