

“The climate apocalypse is coming. I want to eat brownies!:)”
How climate change’s threat influences vice food consumption

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A.A. 2024-2025

*To all the young climate activists who strike for the climate.
To everyone fighting for social justice, civil rights, and a better world.*



Abstract

Addressing climate change and safeguarding consumers' health are critical imperatives; however, balancing these objectives can be challenging, as individuals' perceptions of climate change may lead to increased consumption of unhealthy foods. Drawing on appraisal theory, this study examines *whether*, *how*, and *when* climate change appraisals influence vice food consumption.

Using a mixed-method design that combines in-depth interviews (Study 1), three online experiments, and a field experiment (Studies 2, 3, 4, and 5), this research provides a multifaceted perspective on the phenomenon. I demonstrate that low collective efficacy perceptions among consumers lead to increased consumption of vice foods rather than healthy options. Anxiety is identified as the primary psychological mechanism driving this effect, more so than alternative emotional explanations (e.g., fear). The mediating effect of anxiety also gets amplified among vulnerable consumers with low self-control.

This research provides insights to support the simultaneous achievement of the United Nations' Sustainable Goals for addressing climate change and promoting individual health and well-being, with significant implications for policymakers and society at large.

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While browsing for something to watch one evening, you stumble upon *Lost Future*, a documentary about climate change. An eminent naturalist warns, “Climate change is the biggest threat modern humans have ever faced! There’s no going back, no matter how hard we try. There’s nothing we can do about climate change, and the most vulnerable are now certain to suffer.” Moments later, you wander into the kitchen and open a bag of potato chips—laden with calories, salt, and fat. Could the information about the existential threat of irreversible climate change influence your consumption of unhealthy (i.e., vice) food?

(...Could it happen to you?)

Introduction

A CHANGE OF PERSPECTIVE

Why study climate change and unhealthy food consumption



Questions like the ones you have just read have become particularly relevant in recent times. Climate change is arguably one of the most pressing issues facing our planet and its inhabitants. In bio and geophysical terms, climate change is defined as long-term changes in the averages and variability of surface temperature, precipitation, and wind, as well as associated changes in Earth's atmosphere, oceans and natural water supplies, snow and ice, land surface, ecosystems, and living organisms (IPCC, 2022). What distinguishes current global climate change from historical variations is the causal role of human activity, known as

anthropogenic forcing, and the projected dramatic changes in climate patterns across the globe (IPCC, 2022). To address this issue, policymakers are intensifying efforts to raise awareness of climate change, often employing alarming statistics and depictions of dramatic impacts (United Nations, 2022) that influence public perception.

At the same time, they are also grappling with promoting healthier diets to combat the growing obesity epidemic (United Nations, 2023). Obesity has become a significant public health crisis, contributing to rises in diabetes, cardiovascular diseases, and certain cancers, while placing immense pressure on healthcare systems and diminishing global quality of life (World Health Organization, 2024). A key driver of this trend is the widespread consumption of unhealthy foods high in sugars, fats, and salts (Centers for Disease Control and Prevention, 2024). Yet, as the vignette illustrates, if individuals turn to unhealthy food consumption as a coping mechanism for the threat posed by climate change, then achieving the dual goals of raising awareness about climate change and combating the obesity epidemic may become increasingly difficult. Such behavior may harm individual health, exacerbate the global obesity crisis, and leave the issue of climate change inadequately addressed.

Previous research suggests that people's perceptions of the severity of climate change and their individual efficacy in dealing with it (i.e., whether they have the necessary resources and ability) appear related to their food consumption, including sustainable eating behaviors. When people perceive climate change as more severe and feel more capable of addressing it, they are more willing to reduce their meat consumption for environmental reasons (Chen, 2022; Hunter & Röö, 2016). But in addition, a relatively less researched influence of climate change appraisals might involve disordered eating (Rodgers et al., 2023) or unhealthy food consumption (Kemp et al., 2014; Liu et al., 2022). According to Liu et al. (2022), perceptions of air pollution increase people's preferences for unhealthy food. Kemp et al. (2014) find that a perceived lack of control during a natural disaster is an indirect predictor of unhealthy eating.

Yet, we lack robust insights into how climate change appraisals influence unhealthy food consumption.

Such understanding is important though. Media coverage of climate change has surged, with a notable increase from about 47,000 articles in 2016-17 to nearly 87,000 in 2020-21 (IPCC, 2022), and 668,810 social media posts within just two months in 2023 (Golder & Graham, 2024), raising awareness about the severity of the climate threat and the collective dimension of the phenomenon (United Nations, 2022). However, the media often propagates a “doom and gloom” narrative suggesting that human collective actions can do nothing to tackle climate change, using statements such as “The climate apocalypse is coming [...] we need to admit that we can’t prevent it” (Franzen, 2019), [climate change] is an “unstoppable force at work” (Priestley, 2023), or [climate change] is a “painful, worsening rocky slope” down which we are tumbling with no clear resolution in sight (Milman et al., 2021). This portrayal, as I contend in this work, can lead people to engage in unhealthy eating practices as a form of coping. Few events have such a profound impact both nationally and globally as climate change. The worldwide threat it poses, along with related public messaging, may, therefore, have profound implications for public health and contribute to the global burden of obesity-related diseases (Centers for Disease Control and Prevention, 2024). Thus, addressing unhealthy food consumption is critical for curbing the obesity epidemic, improving public health outcomes, and reducing the long-term social and economic burdens associated with obesity-related conditions.

Building on these premises, I investigate *whether*, *how*, and *when* appraisals of climate change influence the consumption of unhealthy food. Drawing on appraisal theory (Lazarus & Folkman, 1984; Lazarus, 1991) and following an initial exploratory inquiry, I propose that low collective efficacy in addressing climate change leads to increased consumption of unhealthy, or 'vice,' foods. The psychological mechanism driving this behavior is identified as anxiety,

which surpasses alternative emotional explanations, such as fear. I propose that vice food consumption represents an emotion-focused response aimed at mitigating the negative state of anxiety induced by perceptions of low collective efficacy about climate change. This effect is particularly pronounced among vulnerable consumers with impaired self-control.

Methodologically, this work adopts a mixed-method approach, utilizing a sequential design (Davis et al., 2011). Specifically, Study 1, based on in-depth interviews, explores critical individuals' appraisals of climate change and the resulting discrete negative emotions. Building on these insights, Studies 2-4 (i.e., online experiments) and Study 5 (i.e., a field experiment) empirically examine the relationship between these appraisals, associated emotions, and unhealthy food consumption. These studies also examine consumers' actual consumption of unhealthy food and self-control as a key boundary condition.

By testing these predictions, this research offers three main theoretical contributions. First, my study extends the literature on how appraisals of climate change influence unhealthy food consumption. While existing research primarily focuses on individuals' lack of control over their personal life circumstances (Lunardo et al., 2022) or specific environmental disasters (Kemp et al., 2014), my work uniquely investigates the concept of collective efficacy about climate change. This refers to a group's shared belief in its ability to tackle complex, large-scale challenges, such as climate change (Hamann et al., 2023). Unlike the acute, localized nature of specific personal or environmental events, climate change presents a continuous, uncertain, and global threat that exceeds the problem-solving capacity of individuals acting alone (Jugert et al., 2016; Hamann et al., 2023). Therefore, perceptions of collective efficacy, rather than individual efficacy, are likely more relevant to the context of climate change (Chen, 2015; Kim et al., 2024). Additionally, my study contributes to the literature on the downstream effects of climate change appraisals by examining unhealthy food consumption as a dependent variable. While previous research has primarily focused on how individuals' perceptions of climate

change influence pro-environmental behaviors (e.g., Homburg & Stolberg, 2006; Bamberg et al., 2017), unethical behaviors (Lu et al., 2018), and other consumption choices extending beyond pro-environmental actions (e.g., Sneath et al., 2009; Ding et al., 2021), my study specifically investigates the effects on vice food consumption, an often-overlooked variable.

Second, I extend the literature on negative emotions in several ways. I contribute to the literature that investigates emotions in the context of climate change (Clayton, 2020; Contreras et al., 2024; Kemp et al., 2014; Odou & Schill, 2020). Previous research cites a general negative mood induced by climate stressors (Liu et al., 2022) or predicts similar consequences of both anxiety and fear (Kemp et al., 2014). Both anxiety and fear arise when people feel unable to alter the course of a threatening event (Lazarus, 1991), but, as I demonstrate, anxiety, not fear, manifests as a prolonged state of heightened vigilance and arousal that is difficult to control (Lazarus, 1991), leading people to seek for relief through vice food consumption. I thus distinguish anxiety and fear as discrete emotions with unique, asymmetric, downstream effects on vice food consumption and demonstrate that anxiety, not fear, correlates with consumption of vice food following appraisals of low collective efficacy about climate change. Moreover, I contribute to the literature that investigates negative emotions and unhealthy food consumption. Prior research mostly focuses on incidental emotions—those normatively irrelevant emotions carried over from unrelated situations, which can inadvertently affect behavior (Garg et al., 2007; Garg & Lerner, 2013). In contrast, this research delves into fear and anxiety as discrete, integral emotions that arise specifically from the appraisal of low collective efficacy in addressing climate change (Hillebrandt & Barclay, 2017; Lazarus, 1991; 2006). These are not random emotional responses but are directly tied to and influential in behaviors pertinent to the low efficacy of tackling the climate crisis.

Third, I identify self-control as a relevant trait-based boundary condition of the mediating effect of anxiety, which helps clarify how vulnerable populations may suffer the

worst consequences of anxiety in relation to climate change, engaging more than other populations in unhealthy food consumption (Sampaio & Sequeira, 2022). Rather than socio-demographic characteristics that define groups of vulnerable consumers (e.g., race and socio-economic status; Alm & Guttormsen, 2023; Swim et al., 2011), I investigate a prevalent dispositional trait of vulnerable consumers: impaired self-control. This shift in perspective is theoretically relevant because impaired self-control is more prevalent among individuals from lower socio-economic backgrounds, those with lower educational attainment, and those exposed to environments involving crime, violence, substance abuse, or dysfunctional family dynamics (Baumeister, 2002; Bradley & Corwyn, 2002; Vazsonyi & Huang, 2010). As a result, these individuals, already disproportionately affected by the socio-economic impacts of climate change, are also more likely to suffer intensely from anxiety due to perceived low collective efficacy about climate change, leading to increased eating of unhealthy foods. By focusing on self-control, my study deepens the understanding of how climate change threats impact the coping mechanisms of the most vulnerable populations.

In the following sections, I review the literature on climate change, eco-emotions, and consumers' behavioral responses to climate change. I then explore the qualitative study through the lens of appraisal theory (Lazarus, 1993) as a theoretical background. Next, I develop my research hypotheses and present the conceptual model. Following this, I describe the methodology and results of three online experimental studies and one field experiment. Finally, I discuss the results, suggest implications for both theory and practice, and propose directions for future research.

Chapter I

TALK ABOUT CLIMATE CHANGE

What previous literature has already told us



As I write, the Spotify playlist moves to Frank Covers' version of '*Colors of the Wind*.' I am a bit of a fatalist, so I don't think it is a coincidence. Climate change, after all, is an issue with many colors and shades—a complex, multifaceted, and often controversial subject. It feels close, yet not close enough; present, yet out of sight. Deep uncertainty surrounds its immediate and long-term consequences and whether humanity can withstand the challenges it brings. Given the urgency and perceived threat of climate change, one might wonder: why doesn't everyone take action now?

Many barriers to action exist, both on individual and social levels (e.g., Swim et al., 2011). Individual barriers include lack of knowledge, uncertainty, skepticism, distrust in information sources, shifting responsibility and blame, reliance on technology, viewing climate change as a distant threat, prioritizing other concerns, reluctance to change lifestyles, fatalism, and a sense of helplessness. Social barriers, meanwhile, encompass a lack of action by governments, businesses, and industries; the ‘free rider effect’; social norms and pressures; and the absence of enabling initiatives. In short, simply being informed about climate change is not enough for meaningful engagement; people need to care deeply, feel motivated, and believe they have the power to act. While consumers often recognize personal, social, or moral responsibilities to address climate change, they cite many reasons for not doing so (Lorenzoni et al., 2007). Even though sustainable behaviors can buffer the adverse effects of ecological threats on life satisfaction, individuals still hesitate to act (Schmitt et al., 2018).

These examples hint at the topic’s profound complexity. That’s why I believe it cannot be simplified or trivialized; it must be thoroughly and closely examined. Although my research doesn’t aim to capture everything about climate change, it seeks to draw a line—shedding light on one small but essential part of this vast issue.

Ready to dive in with me?

1.1 What is climate change?

Climate change is the defining issue of our time (United Nations, 2024). It refers to long-term shifts in temperatures and weather patterns. While these shifts can be natural—from changes in solar activity or large volcanic eruptions—since the 1800s, human activities have become the primary driver, mainly by burning fossil fuels like coal, oil, and gas (United Nations, 2024).

According to the Intergovernmental Panel on Climate Change (IPCC), established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to provide scientifically objective information on climate change, climate change is defined as a change in the state of the climate that persists over decades or longer, whether due to natural variability or human activity. Since its inception, the IPCC has provided regular assessments on the scientific basis of climate change. Key findings from the most recent IPCC report (2023) reveal that:

- Human influence has warmed the atmosphere, ocean, and land unequivocally, resulting in widespread and rapid changes across the climate system.
- Many aspects of the current climate system are unprecedented on timescales spanning centuries to thousands of years.
- An estimated 3.3 to 3.6 billion people live in regions highly vulnerable to climate change.
- The vulnerability of ecosystems and human populations to climate change varies significantly across and within regions.
- If global warming temporarily exceeds 1.5°C, many human and natural systems will face increased risks compared to scenarios where warming remains below this threshold.

In environmental psychology, climate change manifestations are often categorized into two main types: discrete events and chronic environmental stressors. Discrete events include sudden, extreme phenomena like hurricanes and tornadoes, which affect large populations with little warning, as well as personal stressors, such as illness or loss, that may impact fewer people and may or may not be anticipated. Researchers have warned that climate change will increase the frequency, intensity, and impact of natural disasters, including severe storms, floods, wildfires, and other rapid-onset events.

In contrast, chronic stressors are prolonged adverse conditions, such as drought or pollution, that place ongoing pressure on communities. These types of stressors are often considered ambient stressors—persistent environmental conditions that affect large populations and may go unnoticed, either because they are subtle or because people become habituated to them over time (e.g., Adeola, 2000). Climate change can thus be viewed as a complex ambient stressor punctuated by acute, catastrophic events.

Additionally, climate change can be conceptualized as both a natural and a technological disaster, drawing on research into these types of crises (e.g., Reyes & Jacobs, 2006). Disasters are traditionally classified by their origins—natural (often considered “acts of God”) versus human-caused—and impact patterns. Climate change blurs these distinctions: while it has natural underpinnings, its acceleration is mainly due to human technological activities. The resulting meteorological and environmental phenomena manifest as natural disasters but carry elements of human causation. Climate change also evokes responses typical of technological disasters, such as distrust in governments, corporations, regulatory bodies, and even science itself (for a comprehensive review, see Swim et al., 2011). Its unique global, multifaceted impacts are projected to be chronic and extend over an unprecedented timescale, making it resistant to conventional disaster policies and response strategies (Marshall et al., 2007). Some researchers suggest framing climate change as a global disaster, which could offer a clearer perspective on its scale and urgency, emphasizing the need for immediate disaster mitigation and preparedness measures (e.g., Reser et al., 2011). However, a realistic perspective may not always align with the most effective approach for promoting public well-being and achieving meaningful action.

1.2 Social and individual impacts of climate change on human life

Beyond definitions, it is evident that climate change impacts ecosystems worldwide with unprecedented intensity. Shifting weather patterns disrupt natural habitats, altering the migration and breeding cycles of countless animal species. Rising sea levels encroach on coastal ecosystems, threatening biodiversity in both marine and terrestrial environments. These changes cascade through forests, wetlands, and grasslands, affecting everything from soil health to plant distribution—ultimately reshaping the natural world (IPCC, 2023). Furthermore, climate change has profound social and individual consequences for *human life*.

1.2.1 Social impacts of climate change

Climate change is likely to impact social and community relationships in significant ways. While some of these effects may result directly from changes in the climate itself, many are likely to stem indirectly from shifts in how people use and inhabit land. As climate change alters the suitability of regions for agriculture, aquaculture, and habitation, both the experiences of people in specific areas and the geographical distribution of populations will shift, affecting interpersonal and intergroup relations. Furthermore, the disproportionate impact of climate change on individuals with less economic privilege or social status raises pressing social justice concerns that demand attention.

The *social consequences of climate change* encompass large-scale effects, such as resource conflicts, migration and displacement, diminished access to healthy ecosystems, socio-economic tensions, and heat-related violence (for a review, see Doherty & Clayton, 2011). For example, research demonstrates a causal link between rising temperatures and increased violence, predicting approximately 24,000 additional assaults or murders per year in the United States for each 2-degree Fahrenheit rise in average temperature (Anderson, 2001; Doherty & Clayton, 2011). Moreover, the recognition that predominantly Western nations have contributed disproportionately to a global crisis that will heavily impact less developed

countries is likely to escalate intergroup tensions, further highlighting the social justice implications of climate change.

1.2.2 Direct impacts on individuals and communities

The *direct consequences* of climate change extend beyond environmental damage, impacting individuals and communities on multiple levels. As extreme weather events, natural disasters, and environmental degradation become more frequent and intense, the effects on human well-being are both immediate and far-reaching. Communities face challenges that disrupt their daily lives, personal security, and stability, with repercussions that touch many aspects of life.

The direct effects of climate change often manifest through natural disasters and extreme weather events, which can lead to immediate and lasting impacts on individuals and communities. These acute impacts include injuries and challenges associated with adapting to degraded or disrupted environments (Doherty & Clayton, 2011). The increased frequency and intensity of these events will likely amplify the prevalence and severity of psychological issues within affected communities, creating significant demands on health services and disrupting the social, economic, and environmental factors that support well-being (e.g., Fritze et al., 2008).

For example, natural disasters are known to contribute to acute and posttraumatic stress disorder (Galea et al., 2005), somatic disorders (van den Berg et al., 2005), major depression (Marshall et al., 2007), and related issues such as substance abuse, higher suicide rates, and increased risk of child abuse (Fritze et al., 2008). Additionally, longer and more severe heat waves linked to climate change (Meehl & Tebaldi, 2004) are associated with rising mortality rates, as well as increases in homicide, suicide, physical assault, and spousal abuse (see Doherty & Clayton, 2011; Reser & Swim, 2011).

1.2.3 Indirect impacts on individuals and communities

Indirect and vicarious impacts of climate change involve intense emotional responses, often triggered by awareness of climate change's threats, portrayals of severe impacts, and witnessing environmental degradation and human suffering worldwide. Media representations play a significant role, as images and stories amplify psychological effects on individuals and communities not directly exposed to acute physical impacts, such as natural disasters (Reser & Swim, 2011). These indirect influences encompass emotional reactions to media portrayals of climate-related information and personal reflections on lifestyle and consumption choices.

The following paragraphs will further elaborate on the emotional and behavioral responses to these indirect impacts of climate change.

1.3 Being emotional about climate change

“There have been several instances lately where the impacts of climate change have hit me hard and unexpectedly. Perhaps this is because I am now a father or because scientific projections I learned about 15 years ago are now unfolding quicker than imagined. In March I went to my local train station to watch 500 schoolkids gather to commute to Melbourne for the big school strike. I was surprised that I found myself moved to tears and overcome with emotion, and that I wasn’t alone among the other adults there...What I find curious is that...these instances were essentially positive, inspiring moments. Yet they seemed to bring forth sadness or internalised grief that had been buried out of sight.” - Robert Law -

Imagine that you woke up early today, as usual, before your children stirred from their beds. You made a cup of coffee and turned on the TV, switching straight to your favorite early morning news and current affairs show. And there they were—hundreds of teenagers, skipping school the day before, protesting in the streets about climate change. They held handmade signs

with slogans ranging from serious and angry to humorous and profane: ‘There are no jobs on a dead planet.’ ‘Act now or swim later.’ ‘You’re burning our future.’ As you sipped your coffee, you thought, ‘Good on those kids for telling the powers that be, the older generation, that they need to do more about climate change.’ *And then it hit you.* At almost 50, you are part of that older generation, part of the generation in power. At that moment, it felt as if those teenagers, their funny and grave signs, were speaking directly to you. They need you to listen. They need you to act. And just then, something shifted inside you. It was a sensation difficult to describe, yet you can recall it with clarity—it felt almost physical as if vital organs had shifted within your body. Those teens were calling for action, and you responded aloud to the TV screen, ‘Okay.’

This ‘*Okay moment*’ is a story shared by sociologist Rebecca Huntley in her book *How to Talk About Climate Change in a Way That Makes a Difference*. Yet, as even Robert Law illustrates in the opening lines of his work, she is not alone. Emotions have the power to change lives. They can be understood as episodes characterized by shifts in appraisal, motor expression, autonomic physiology, action tendencies, and subjective feelings (Scherer, 2005). For example, in an episode of anger, a person instinctively appraises the situation as morally wrong (appraisal). This appraisal is often accompanied by frowning (motor expression), an elevated heart rate and skin conductance (autonomic physiology), and a heightened urge to confront those deemed responsible (action tendency). The individual experiencing these processes feels angry, indignant, or outraged (subjective feelings) (Landmann, 2020).

Robert and Rebecca have undergone *shifts* in appraisal, motor expression, autonomic physiology, action tendencies, and subjective feelings. This was not a reaction to an Intergovernmental Panel on Climate Change (IPCC) report or a climate scientist’s presentation on carbon dioxide levels. Their response was to a crowd of children holding signs in the streets.

They felt all of these changes and were *moved by emotion*. Through the emotions it evoked, climate change suddenly became personal.

If emotions genuinely hold transformative power, why not delve deeper into which emotions are currently experienced regarding climate change? Are these emotions positive or negative, and what are their downstream effects? If the effects are unintended, should we consider shaping these emotions?

1.3.1 A premise on ecological emotions

The current situation is as follows: as global awareness of immediate and future climate change threats intensifies, reports reveal an alarming rise in negative affective responses. For example, a study involving 10,000 adolescents and young adults from 10 countries found that 59% of participants were “very or extremely” concerned about climate change, and over 45% reported that climate change concerns were debilitating their daily lives. This distress is primarily driven by perceptions of a bleak future and perceived government inaction (Hickman et al., 2021). Similar rates of high negative emotions regarding climate change have been observed among adults worldwide to the extent that it was described as the most significant pop-culture trend of 2019 (McGinn, 2019), reflecting the increasing public preoccupation with the topic. This phenomenon is called eco-emotions—emotions specifically elicited in response to environmental crises (e.g., Contreras et al., 2024).

Historically, the emotional dimensions of environmental challenges received limited scholarly attention (Pihkala, 2022). While early work in the 1980s and 1990s explored aspects of eco-psychology and eco-emotions (e.g., Macy, 1983), it was in the early 2000s that more structured inquiries began to emerge. Notable developments included the introduction of “solastalgia” (Albrecht et al., 2007) and preliminary discussions that later shaped the concept of “eco-anxiety” (Fritze et al., 2008). Starting around 2010, the exploration of emotions and

their link to pro-environmental behaviors gained momentum, with terms like “eco-anxiety” and “climate anxiety” becoming prominent in both media and academic discourse (Salas Reyes et al., 2021; Pihkala, 2022). However, despite this increased interest, research on eco-emotions remained relatively peripheral until recently, with studies on the emotional impacts of climate change expanding significantly in the past few years (Ojala et al., 2021).

Today, climate change is central in the study of emotions, with eco-emotions becoming more relevant as emotional narratives are frequently employed to drive individual actions against climate change (Huntley, 2020). Researchers, communicators, and educators are increasingly examining how climate-related emotions might be harnessed to promote sustainable behaviors on both individual and collective levels (Salas Reyes et al., 2021). While evidence suggests that these climate emotions can significantly influence behavior, the mechanisms involved remain complex and challenging to decipher (Clayton & Ogunbode, 2023). However, gaining a deeper understanding of how individuals emotionally respond to climate threats—and the broader implications of these responses—is crucial.

Notably, given the rise in negative emotions related to climate change and the concerning possibility that these may become a significant mental health issue (World Economic Forum, 2022), I will focus exclusively on *negative eco-emotions*.

1.3.2 Unpacking negative eco-emotions: The ‘whether’, ‘why’ and ‘when’ of unsettling ecological emotions

Researchers broadly agree that climate change is likely to intensify mental distress, with emotions serving as a primary way individuals sense and internalize its effects (Clayton & Ogunbode, 2023). Reflecting this link, the term 'climate emotions' has recently emerged to capture the spectrum of emotional experiences related to climate change. Often used interchangeably with terms like “ecological emotions” or “eco-emotions,” this terminology can

be somewhat imprecise; these phrases frequently encompass not just emotions but also broader mental states, including thoughts, behaviors, and even complex mental health syndromes, which manifest through clusters of symptoms (Pihkala, 2022). As a result, categorizing and comparing these experiences can be challenging.

Early attempts to conceptualize climate-related mental distress were advanced by Albrecht and colleagues (2007), who contrasted environmental disruption's physical and mental impacts. While somaterratic syndromes (from *soma*, meaning body, and *terratic*, Earth-related) describe physical harm due to environmental contamination, Albrecht introduced 'psychoterratic syndromes' to describe mental distress arising from fractured connections between individuals and their natural surroundings.

Following this foundational framework, an increasing variety of 'eco-' prefixed emotions have emerged, as scholars have sought to label overlapping phenomena with varying degrees of empirical support (Kołwak & Weihgold, 2022). Despite the proliferation of terms, a validated taxonomy of climate emotions and associated forms of distress has yet to be established. Below, I outline the primary climate-related emotions and negative states identified in the literature.

Environmental stress

Environmental stress is a form of psychological distress that can emerge from various conditions, such as noise, overcrowding, poor living quality, deteriorating neighborhood environments, and traffic congestion. While these factors are not directly attributable to climate change, they may be indirectly influenced by its effects (Bilotta et al., 2018).

Eco-guilt and eco-shame

Both *eco-guilt* and *eco-shame* are emotions rooted in past actions. However, they focus on different dimensions: eco-guilt is tied to specific behaviors, while eco-shame reflects a more profound impact on one's sense of self. Although distinct, these terms often overlap, as actions can shape one's identity. Specifically, eco-guilt is an emotion closely linked to self-awareness (Graton et al., 2016), arising when individuals recognize that their behaviors may harm the environment (Fredericks, 2021) and feel they have violated personal or societal standards (Mallett, 2012). Eco-guilt often motivates corrective actions to amend perceived wrongs (Kurth & Pihkala, 2022). Marked by self-blame and dissatisfaction with one's actions (Ágoston et al., 2022), it generally encourages pro-environmental behavior as individuals seek to make better choices. However, some authors suggest this may not always be true (Zwicker et al., 2020). In contrast, eco-shame occurs when people view their harmful actions as a reflection of flawed character rather than an isolated misstep. This response frequently leads to withdrawal behaviors, such as denial or avoidance, rather than positive environmental engagement (Mallett, 2012). Additionally, eco-shame may involve a fear of social rejection, as a culture of shame around environmental responsibility can discourage meaningful change (Mkono & Hughes, 2020).

Eco-worry

Eco-worry is a cognitive process involving thoughts on the escalating severity of the climate crisis. As a component of anxiety, it is linked to feelings of tension, nervousness, irritability, and difficulty maintaining calm (Ojala et al., 2021). Worry about climate change appears to be an important determinant of pro-environmental actions and support for climate policies (e.g., Wang et al., 2018). For example, Verplanken et al. (2020) examined *habitual ecological worry*—free from any psychopathological elements—and found it to be associated with a pro-ecological worldview, a green self-identity, and pro-environmental behavior. This

type of worry was also linked to a personality structure marked by openness, strongly suggesting its constructive nature.

Eco-depression

Eco-depression occurs when ecological issues are strongly linked to feelings commonly associated with clinical depression, such as overwhelming sadness, mourning, profound grief, crying, and emotional pain. Despite the intensity of these emotions, they may not lead to clinical impairment; instead, they can motivate individuals toward greater engagement in collective action (Stanley et al., 2021).

Eco-anger

The discrete emotion of *anger* is associated with an impulse to attack (Xie et al., 2015) and has a higher activation level than depression (Stanley et al., 2021). In the context of eco-emotions, this *eco-anger* often targets those perceived to be responsible for ecocide, as well as leaders and institutions that have failed to address the threat of climate change effectively. Eco-anger can serve as an adaptive response, promoting greater engagement in pro-environmental behaviors than other eco-emotions, and appears to be the least associated with negative impacts on well-being (Stanley et al., 2021).

Solastalgia

Solastalgia is distress caused by the gradual loss of comfort in one's home environment due to its physical degradation, often driven by climate change. Unlike nostalgia, where the longing is for a place no longer inhabited, solastalgia occurs without dislocation—the home still exists but is altered. This experience can have serious consequences, eroding one's sense of belonging and identity (Albrecht, 2011).

Eco-grief

Ecological grief is the sorrow experienced in response to environmental degradation and the loss of beloved species and ecosystems (Cunsolo & Ellis, 2018; Ojala et al., 2021). Some authors argue that eco-grief is not a “pure” emotion but rather a combination of grief and sadness arising from the loss of cherished places and ecosystems (Ojala et al., 2021). This grief is part of a coping process through which individuals try to manage the emotional impact of losing critical environmental connections (Ojala et al., 2021).

Eco-grief can manifest in diverse ways, varying by place, culture, geography, and individual experience, and it may change over time and space. Additionally, it can evoke a range of emotional responses, such as anger, frustration, fear, stress, distress, hopelessness, helplessness, and even pre- and post-traumatic stress disorder (Ojala et al., 2021). Cunsolo and Ellis (2018) categorize ecological mourning into three broad types: (a) grief over physical ecological losses, such as the disappearance or degradation of ecosystems, landscapes, or species, often due to extreme weather events or gradual environmental changes; (b) grief related to the erosion of environmental knowledge and place-based identities, including the loss of one’s sense of self about landscapes, seasonal cycles, and ecosystems; and (c) anticipatory grief over expected future losses of ecosystems and territories.

Eco-anxiety

Eco-anxiety has become a troubling trend in recent years, reflecting the emotional impacts of climate change on individuals and encompassing a range of feelings tied to environmental degradation. For example, Google searches on this topic surged dramatically, with English-language searches increasing 27-fold in the first ten months of 2023 compared to

the same period in 2017 (Moench, 2023). Eco-anxiety is now recognized as an emerging mental health concern, particularly affecting children and adolescents (World Economic Forum, 2022). A substantial portion of younger Americans (67%) report that it negatively impacts their mental health (Clayton et al., 2021).

Despite its growing relevance, the term “eco-anxiety” lacks a universally clear definition. Scholars often use various terms interchangeably, such as “climate change anxiety,” “climate anxiety,” “ecological concern,” “ecological stress,” and “environmental distress” (Boluda-Verdú et al., 2022). Some authors identify subtle distinctions; for example, Clayton et al. (2017) initially defined eco-anxiety as a broad term encompassing negative emotions related to ecological crises while positioning climate anxiety as a specific sub-category related directly to climate change.

Beyond terminology, definitions of eco-anxiety remain inconsistent, often encompassing a wide spectrum of emotional and mental responses to climate threats (Ogunbode et al., 2022). Studies frequently define eco-anxiety as a combination of various emotions and mental states, including anxiety (Ogunbode et al., 2021; Searle & Gow, 2010; Stanley et al., 2021), worry (Berry & Peel, 2015; Ogunbode et al., 2021), tension (Ogunbode et al., 2021), helplessness, sadness, depression, anger (Hickman et al., 2021; Searle & Gow, 2010), grief, guilt (Hickman et al., 2021), frustration, overwhelm, despair, and even terror (Ágoston et al., 2022; Kurth & Pihkala, 2018; Hickman et al., 2021; Stanley et al., 2021; Ogunbode et al., 2021).

Operationalizing eco-anxiety also presents challenges. For example, the Climate Anxiety Scale developed by Clayton and Karazsia (2020) measures eco-anxiety as a blend of emotions, such as sadness (‘I find myself crying because of climate change’) and guilt (‘I feel guilty if I waste energy’). Like that of Verplanken et al. (2020), this approach combines distinct affective states—anxiety, sadness, guilt, and anger—into a single construct, treating them as coexisting elements (Kurth & Pihkala, 2022). Conversely, Ogunbode et al. (2022) use

Spielberger's (1983) State-Trait Anxiety Inventory (STAI) to measure climate-related emotions, assessing responses like calmness, tension, relaxation, anxiety, worry, or terror. This method offers a more holistic perspective, capturing not only anxiety and worry but also related mental states, such as tension and non-relaxation, for a more comprehensive view of the emotional impact of climate change (Ogunbode et al., 2022).

The complexity of eco-anxiety is further intensified by differing perspectives on whether it constitutes a normal response or a potential mental health concern (Boluda-Verdú et al., 2022). Some scholars view eco-anxiety as a typical reaction that does not inherently indicate pathology (Pihkala, 2020; Verplanken et al., 2020). Others, however, consider certain aspects of eco-anxiety indicative of cognitive-emotional impairment, manifested in symptoms like rumination, insomnia, difficulty concentrating, nightmares, appetite loss, panic attacks, irritability, and even crying over climate change (Clayton, 2020; Clayton & Karazsia, 2020; Hogg et al., 2021). For example, Schwartz and colleagues examined whether the Climate Change Anxiety Scale developed by Clayton and Karazsia (2020), comprising the subscales of cognitive emotional impairment and functional impairment, is associated with psychiatric symptoms, including those of major depressive disorder and generalized anxiety disorder. They also explored whether engaging in individual or collective action to address climate change might buffer these relationships. The results indicated that both climate change anxiety subscales were significantly associated with symptoms of generalized anxiety disorder, while only the functional impairment subscale was linked to higher symptoms of major depressive disorder. However, engaging in collective action (e.g., environmental activism), rather than individual action, significantly weakened the association between cognitive emotional impairment related to eco-anxiety and symptoms of major depressive disorder (Schwartz et al., 2022). Additionally, eco-anxiety may lead to various forms of denial (Pihkala, 2018).

Generally, eco-anxiety is not classified as an illness; rather, it is viewed along a continuum where only higher levels may contribute to a substantial mental health burden (Clayton et al., 2023). Symptoms can range from mild (e.g., occasional insomnia, restlessness, decision-making paralysis) to severe (e.g., pronounced insomnia, difficulty functioning, self-destructive behaviors). In extreme cases, eco-anxiety may escalate to what some clinicians refer to as *climate anxiety disorder* (Pihkala, 2022).

This overview reveals a complex eco-emotion landscape, underscoring the need for further exploration to achieve greater clarity. What is certain, however, is that the increasing focus on ecological emotions arises from their potential impact on both individual well-being and consumer behavior (Brosch & Sauter, 2023).

1.3.3 A brief summary of the literature on negative eco-emotions and pro-environmental behaviors

Eco-emotions have been studied primarily for their potential to encourage pro-environmental behaviors, which are essential in addressing the climate crisis (Topf & Speekenbrink, 2022). ‘Pro-environmental behaviors’ (PEBs) refer to actions that benefit the environment or help reduce environmental impact (Topf & Speekenbrink, 2022). PEBs can be categorized into direct and indirect (Alzubaidi et al., 2021). Direct behaviors directly impact the environment, such as purchasing organic products, reducing consumption, and recycling (Nguyen et al., 2016; de Leeuw et al., 2015). Indirect behaviors have a more mediated impact, such as joining environmental organizations or participating in protests (Ertz et al., 2016; Polonsky et al., 2014).

Although affective responses are essential motivators for environmental actions—for example, climate change information in the media can elicit emotions that influence behavioral

responses (Harth, 2021)—studies on the link between negative emotions related to climate change and sustainable behaviors have produced mixed results (Wang et al., 2018). For example, some research suggests that eco-anxiety and eco-worry induced by climate change information (Ogunbode et al., 2022) positively correlate with environmental identity and eco-friendly behaviors (e.g., Clayton & Ogunbode, 2023; Verplanken et al., 2020). Conversely, other studies report a negative or non-significant relationship (e.g., Clayton & Karazsia, 2020; Stanley et al., 2021).

Beyond eco-anxiety, which has been the focus of many studies, emerging research has also examined eco-guilt and eco-anger. Generally, eco-guilt has been found to stimulate sustainable consumption intentions and behaviors (e.g., Zwicker et al., 2020; Ágoston et al., 2022). However, some scholars argue that eco-guilt's effectiveness may be limited, as individuals often avoid situations that provoke guilt to escape uncomfortable feelings (Zwicker et al., 2020).

Eco-anger also shows promise in promoting sustainable behaviors. For example, Stanley et al. (2021) found that eco-anger uniquely inspires a commitment to climate solutions, which may not be as prominent in other eco-emotions like eco-depression and eco-anxiety. This study suggests that eco-anger fosters stronger environmental commitment and better mental health outcomes (Stanley et al., 2021). The authors discussed that the effect of greater pro-environmental behavior attributed to eco-anxiety in other studies could be caused by other unconsidered eco-emotions. This goes in line with the recommendation that each eco-emotion should be measured separately, holding the effects of other eco-emotions constant (Stanley et al., 2021).

1.3.4 Pulling the threads together: Challenges in eco-emotions research

We have observed that eco-emotions are often discussed ambiguously, leading to conflicting interpretations of their downstream effects. For example, eco-anxiety is discussed using varied terminology, definitions, and operationalizations to describe a range of emotional and cognitive reactions consumers have to the threat of climate change and environmental degradation (Clayton, 2020). This approach suggests that all such emotions and mental states arise simultaneously in response to climate threats and can be grouped into a single construct. However, each emotion and mental state is, in reality, distinctly different from the others. Consequently, despite numerous studies in this area, our understanding of eco-emotions and their downstream consequences remains limited in at least three key ways.

First, environmental psychology literature has yet to establish a consensus on defining and operationalizing different eco-emotions, with definitions sometimes overlapping. This variation creates confusion, particularly when addressing specific discrete emotions.

Second, existing findings on the downstream consequences of eco-emotions are inconsistent. Some studies affirm a positive link between certain eco-emotions and certain behaviors —mostly in the domain of sustainability — (e.g., Clayton & Ogunbode, 2023; Verplanken et al., 2020), while others present contradictory evidence (e.g., Clayton & Karazsia, 2020; Stanley et al., 2021). These conflicting outcomes impede a cohesive understanding of eco-emotions' downstream effects.

Third, research on this topic remains fragmented, lacking a systematic approach that facilitates a more comprehensive understanding of eco-emotions and their behavioral implications.

In sum, while valuable insights have emerged from the growing body of work on eco-emotions, substantial gaps persist, underscoring the need for a more precise conceptualization and more cohesive exploration of these complex emotional responses to climate change.

Therefore, in my empirical studies, I will deliberately avoid the term ‘eco-emotions.’ Instead, I will focus on specific emotions that arise in response to climate change and environmental degradation, referring to them as discrete emotions rooted in established psychological research.

1.4 Consumers’ behavioral responses to climate change appraisals

Beyond emotions, how do individuals perceive climate change, and how does this perception shape any distress they may experience and express behaviorally?

Most research to date has focused on the relationship between individuals’ perceptions of climate change and pro-environmental behaviors, aiming to understand how these perceptions might motivate sustainable actions. Additionally, a smaller body of work has examined how climate change perceptions influence other behavioral responses, including unethical behaviors and consumption choices that extend beyond pro-environmental actions.

The following sections delve deeper into these behavioral responses.

1.4.1 How climate change perceptions influence pro-environmental behaviors

Research explicitly focused on pro-environmental behaviors has delved into how individuals’ perceptions of climate change lead to downstream effects that encourage sustainability. This body of work has examined concepts such as *perceived rights violations among vulnerable populations* (e.g., Kutlaca et al., 2019), the role of *psychological distance* (e.g., Carmi & Kimchi, 2015; Jones et al., 2017), the impact of *framing and representations of climate change* (e.g., Witte & Allen, 2000; Morton et al., 2011), and *threat and coping appraisals* (e.g., Homburg & Stolberg, 2006; Bamberg et al., 2017).

Perceived rights violations amid climate change by vulnerable populations with objective disadvantage

This stream of research intersects with themes of climate justice, focusing on what motivates individuals vulnerable to climate change threats to pursue collective or individual actions aimed at changing their circumstances. For example, Kutlaca et al. (2019) found that participants living in areas most objectively affected by climate change perceived their personal and family rights to be violated most acutely, which strongly motivated their intentions to engage in collective action. Conversely, participants in less affected areas were motivated primarily by perceived violations of collective rights.

Psychological distance to climate change

Another key area of research focuses on the concept of *psychological distance* about climate change and its role in shaping consumer responses. Liberman and Trope (2008) introduced psychological distance as the perception of events in terms of time, probability, and personal relevance, where more immediate events are seen as “closer in time,” more certain events as “closer in probability,” and those with higher potential for personal harm as “socially closer.” Studies exploring this concept often use a multidimensional approach, examining geographic, temporal, social, and uncertainty-related dimensions of psychological distance. To test its effects, researchers typically compare messages emphasizing climate change's highly certain and immediate impacts with those highlighting less certain, more distant effects.

Given the inherent characteristics of climate change, many people may perceive it as a psychologically distant issue—a set of uncertain events that may occur far in the future, impacting distant places and affecting people unlike themselves (Carmi & Kimchi, 2015). This raises an important question: How does psychological distance about climate change influence individuals' responses?

Some studies suggest that reducing psychological distance in climate change communication could increase public engagement (e.g., Jones et al., 2017) or encourage pro-environmental behavior (Carmi & Kimchi, 2015). However, other studies challenge these assumptions. For example, Brugger et al. (2015) posit that reducing the psychological distance of climate change (i.e., proximizing) does not always prompt action as frequently assumed. The effects of proximizing depend on theoretical perspectives and individual characteristics, meaning it can produce positive effects, no effect, or even counterproductive outcomes. This complexity stems from psychological findings suggesting that threatening information can overwhelm individuals when made personally relevant. Such overwhelming information may trigger defensive reactions to alleviate negative feelings rather than addressing the threat. The negative connotations of climate change imply that proximizing this issue can increase the salience of perceived threats to a specific place and its components. People who care about things or individuals at risk due to proximal climate change may respond more strongly when they realize these cherished entities are at stake. This realization, however, can conflict with their desire for security—for themselves, their friends and family, homes, and possessions—inducing a state of aversive arousal. Notably, it is not only physical threats to valued things (e.g., natural environments or loved ones) that may elicit defensive reactions; climate change can also pose psychological threats, such as challenging an individual's positive self-view or desire for stability. These psychological threats, much like physical ones, are likely to generate discomfort and prompt coping strategies aimed at mitigating negative emotions.

In summary, research across psychology and other social sciences has demonstrated that individuals vary in their attachment to places and entities at different spatial scales. Therefore, the effectiveness of proximizing strategies depends on how closely the entities threatened by proximal climate change align with what individuals value. Those strongly attached to a specific place—especially one rich in natural elements, symbolic meanings, and people with whom they

identify—are more likely to respond to messages that threaten these cherished entities. Conversely, individuals who feel no connection to a place highlighted in proximized messages are less likely to be affected. Thus, the effects of proximizing are more complex than traditionally assumed.

Framing and representations of climate change

A further research focus investigates how the framing and representations of climate change influence individuals' attitudes and behaviors.

Health communication researchers have examined various framing techniques, appeals, and representations of climate change to determine which may be most effective in promoting pro-environmental behaviors and intentions. For example, Witte et al. (2000) and O'Neill & Nicholson-Cole (2009) explored the impact of fear appeals and fear-inducing representations. Witte et al. (2000) found that fear appeals can be counterproductive, especially without accompanying messages that increase perceived efficacy. Specifically, strong fear appeals generate high levels of perceived severity and susceptibility and are generally more persuasive than weaker ones. However, they also motivate both adaptive actions, such as message acceptance, and maladaptive actions, like defensive avoidance or reactance. The findings indicate that combining strong fear appeals with high-efficacy messages produces the greatest behavior change, while strong fear appeals with low-efficacy messages elicit the strongest defensive responses.

Similarly, O'Neill & Nicholson-Cole (2009) observed that catastrophic and alarmist visual imagery can actually decrease public engagement with climate change. While such representations capture attention, fear alone proves to be an ineffective tool for fostering personal engagement. Instead, non-threatening imagery and icons that connect with individuals' everyday emotions and concerns about this large-scale issue tend to be the most

engaging. Conversely, other research suggests that fear appeals can lead to more favorable attitudes toward pro-environmental behaviors if they are accompanied by strong supporting arguments (Meijnders et al., 2001).

In addition to fear appeals, Morton et al. (2011) examined the effects of framing climate change predictions in either negative or positive terms, focusing on how different frames moderate the impact of uncertainty on individual action. They found that individuals' intentions to act environmentally decreased when high uncertainty was paired with a negative frame (emphasizing potential losses). Conversely, when high uncertainty was paired with a positive frame (emphasizing the possibility that losses might not occur), individuals expressed stronger intentions to take action.

Threat appraisal and coping appraisal about climate change

Finally, research has explored how threat and coping appraisals impact individuals' engagement with climate change issues.

Studies in this area examine how appraisals of climate-related threats and coping strategies influence pro-environmental behaviors. Homburg and Stolberg (2006) developed a stress-theoretical model of pro-environmental behaviors based on these principles. In this model, environmental stressors, mediated through appraisal processes, activate problem-focused coping strategies (e.g., planning, taking action, problem-solving, and seeking assistance) to address the source of distress to resolve or mitigate its impact (Duhachek, 2005). This process ultimately leads to pro-environmental behaviors. Similarly, Bamberg et al. (2017) demonstrated that threat and coping appraisals are significantly associated with intentions and behaviors aimed at flood prevention. Ojala et al. (2012) investigated how young people cope with their appraisals of climate change and how different coping strategies relate to environmental engagement and pro-environmental behavior. They identified three coping

strategies: problem-focused coping, de-emphasizing the seriousness of climate change, and positive reappraisal (i.e., reinterpretation strategies aimed at viewing the situation more positively). Problem-focused coping and positive reappraisal were positively associated with environmental engagement and pro-environmental behaviors while de-emphasizing the threat had negative associations. Additionally, Wullenkord and Reese (2021) examined self-protective strategies that individuals use to shield themselves when appraising a threat. They posit that interpretive denial—recognizing climate change as a problem but reinterpreting its severity—and implicatory denial—acknowledging climate change as a problem while denying its psychological, political, or moral implications—can be seen as self-protective strategies. These strategies correlate negatively with pro-environmental behaviors and willingness to donate.

1.4.2 Beyond pro-environmental actions: Other behavioral responses to climate change perceptions

Studies examining perceptions of climate change have also investigated dependent variables beyond pro-environmental behaviors, though this area remains comparatively underexplored. These studies have addressed factors such as *vulnerability* (Baker et al., 2007), *public complacency* (Wang & Kapucu, 2008), *impulsive and compulsive behaviors* (Sneath et al., 2009), *atypical purchasing behaviors* (Kennett-Hensel et al., 2012), *protective actions* (Okazaki et al., 2015), *criminal and unethical behavior* (Lu et al., 2018), *prepping* (Campbell et al., 2019), *product features* (Ding et al., 2021), and *eco-reproductive concern* (Schneider-Mayerson et al., 2020; Helm et al., 2021).

For example, Sneath et al. (2009) found that a perceived lack of control and loss of personal possessions during a disaster can induce stress, which is positively related to depressive states that, in turn, drive individuals to engage in impulsive and compulsive buying

behaviors. Similarly, Kenneth-Hensel et al. (2012) observed that disaster victims may engage in atypical purchases as a coping mechanism, deviating from their usual buying patterns. Environmental factors associated with climate change, such as air pollution, influence moral and psychological behaviors. Lu et al. (2018) demonstrated that psychologically experiencing polluted environments can negatively impact ethical decision-making, suggesting that air pollution may affect individuals' moral standards. Furthermore, Ding et al. (2021) found that reduced visibility caused by air pollution fosters an abstract mindset, leading consumers to prioritize central and desirable features of products. In contrast, clearer visibility promotes a more concrete mindset, emphasizing practical product features. Additionally, Wang and Kapucu (2008) reported that repeated exposure to emergency warnings could lead to public complacency, underscoring the need for strategies to manage this tendency, as complacency may diminish preparedness for future climate-related emergencies.

In recent years, some studies have begun to investigate the relationship between individual perceptions regarding climate change and their effects on food consumption in terms of *sustainable consumption* (Chen, 2022; Hunter & Röö, 2016), *disordered eating* (Qi et al., 2022; Rodgers et al., 2023), and *unhealthy food consumption* (Kemp et al., 2014; Liu et al., 2022).

Climate change appraisals and food consumption

Food is a significant contributor to anthropogenic climate change, with impacts that parallel those of the transportation and housing sectors (Tukker & Jansen, 2006). In light of this, understanding the factors that shape food consumption choices has become increasingly important. Research suggests that individuals' perceptions of climate change severity and their sense of efficacy in addressing it—such as whether they feel equipped with the necessary resources and abilities—are closely linked to their food choices, including sustainable eating

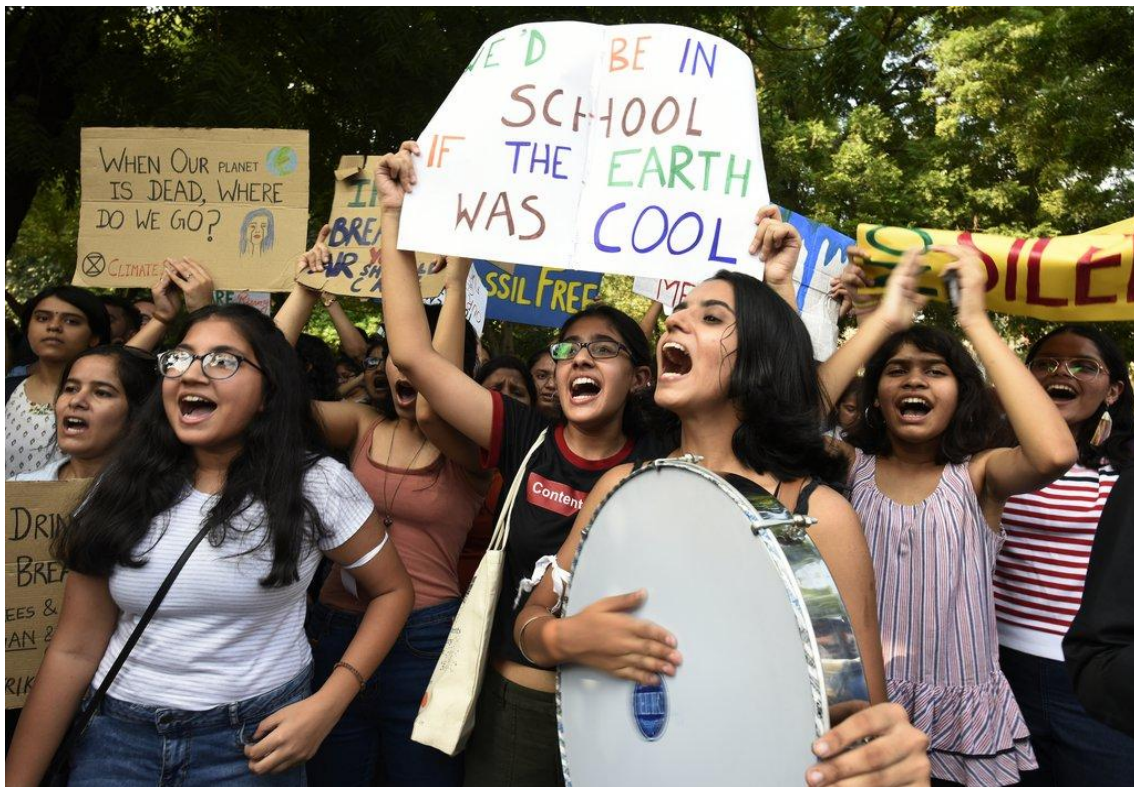
behaviors. For example, when people perceive climate change as more severe and feel more capable of addressing it, they are more willing to reduce their meat consumption for environmental reasons (Chen, 2022; Hunter & Röö, 2016). Specifically, Chen (2022) applied the Protection Motivation Theory and the Theory of Reasoned Action to explain and predict the intention to reduce meat consumption. In his results, perceived self-efficacy and perceived response efficacy predict intention to reduce meat consumption. Hunter & Röö (2016) have explored the danger control process of Protection Motivation Theory in a climate change-food context in order to understand the factors that motivate consumers to reduce or alter their meat consumption. Again, the results show that the individuals most willing to change their meat consumption are those whose self-efficacy is high. Similarly, having the belief that climate change is severe and the risk to oneself and one's family, or even the risk to society, people in poor countries, animals and plants, is real, is a strong predictor of mitigation intentions (Hunter & Röö, 2016).

One relatively neglected area of research is the potential influence of climate change appraisals on maladaptive eating behaviors, such as disordered eating (Rodgers et al., 2023), which is often conceptualized as a coping strategy in response to traumatic experiences (Convertino et al., 2022), or unhealthy food consumption (Kemp et al., 2014; Liu et al., 2022). Climate change is anticipated to have adverse health effects across various domains, including impacts on consumers' maladaptive eating patterns (Rodgers et al., 2023). For instance, Liu et al. (2022) found that air pollution increase people's preferences for unhealthy food, while Kemp et al. (2014) identified a perceived lack of control during a natural disaster as an indirect predictor of unhealthy eating. Yet, we lack robust insights into how appraisals of climate change specifically influence unhealthy food consumption, marking a notable gap in the literature — one that my research directly addresses.

Chapter II

MAKE IT REAL

What research design I have choose and why



Yes, but... How can I do that? How can I delve into the deeper layers of individuals' thoughts, feelings, and behaviors in response to climate change and then demonstrate that one factor directly causes another? I chose the path of employing multiple methods. Multiple methods research is relatively rare in marketing, representing less than 4% of empirical studies published in top marketing journals over nearly two decades (Davis et al., 2011). However, it offers a promising avenue for advancing the discipline by providing more robust findings that mitigate the substantial risk of method bias.

2.1 What is a mixed-method design?

Multiple methods research involves gathering data from multiple sources and applying more than one type of analysis (Davis et al., 2011). This approach can include using two or more qualitative methods, two or more quantitative methods, or a combination of both in what is known as a mixed methods approach. It is essential to clarify that studies using a single data source with different types of analyses (e.g., a survey with both scaled and open-ended responses) do not qualify as multiple-methods research. Similarly, studies using multiple data sources but applying only one method (e.g., multiple experiments) also fall outside this category.

Recent research has increasingly advocated integrating quantitative and qualitative methods through mixed methods designs (e.g., Creswell, 2003; Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998). Tashakkori (2010) further advanced this idea by introducing the concept of an integrated research design, emphasizing the importance of blending various methods at different stages of the research process to enhance insights and findings. According to Tashakkori and Teddlie (1998), there are four primary purposes for employing mixed-methods research: (1) *development*, or using the results of one study to inform the design of a subsequent study; (2) *initiation*, or launching the main study with insights gained from a preliminary study; (3) *complementarity*, or simultaneously examining different aspects of a phenomenon using multiple methods, and; (4) *interpretation*, or using a second study to clarify or confirm the findings of the main study.

When planning a mixed methods study, two crucial decisions must be made: the *weight* assigned to each method and the *timing* of their use (Creswell & Plano Clark, 2007; Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998). The *weight* refers to the emphasis on each method—whether each is given equal importance or one method takes precedence. *Timing*

refers to whether the methods are implemented sequentially or concurrently. In a sequential design, one method is applied to collect and analyze data first, followed by the second, resulting in distinct phases. In contrast, a concurrent design collects and analyzes data from both methods simultaneously in a single phase.

For this study, I adopt a *developmental, sequential design*. This approach uses equally weighted methods applied in sequence, where the first method's findings inform the second's design and focus. This allows the initial phase to deepen understanding, which is then expanded upon in the subsequent phase. The results are reported separately for each phase, followed by a general discussion of findings to create a cohesive overall narrative.

But what makes a mixed-methods approach a compelling choice?

2.2 Why a mixed-method approach for this research?

Historically, the field of marketing has been dominated by single-method quantitative designs, such as experiments, surveys, or secondary data modeling. But marketing phenomena are multifaceted, reflecting the complex behaviors of both individuals and groups. While each single method provides unique insights, the reliance on a limited set of preferred methods may introduces inherent biases, neglecting approaches that may be more suitable for investigating complex and dynamic phenomena (e.g., Deshpande 1983). Thus, the use of multiple methods to investigate the same phenomenon can produce robust findings that are “far more compelling than single method outcomes” (Stewart 2009, p. 382).

I have chosen a mixed-method design for my research to capitalize on the complementary strengths of both qualitative and quantitative approaches, addressing the complexity of how climate change appraisals influence unhealthy food consumption. The initial qualitative study, employing in-depth interviews, is designed to capture rich, nuanced insights into the personal experiences and contextual factors that shape individuals' appraisals of

climate change, and the main discrete emotions emerging. This approach allows for a deeper understanding of the subjective, emotional dimensions that are difficult to quantify but essential for informing the development of hypotheses in the subsequent experimental studies. The experimental studies, which follow the qualitative phase, enable a more controlled investigation of the causal relationships between specific appraisals of climate change (i.e., low collective efficacy in tackling climate change) and vice food consumption. By systematically manipulating variables in these experiments, I can test the generalizability of the patterns identified in the qualitative phase across different populations and contexts. This sequential design ensures that the findings from the qualitative study guide the development of focused experimental manipulations, strengthening the validity and relevance of the overall research. I therefore opted for a mixed-method to offer a more complete picture of the phenomenon under study and produce robust findings (Davis et al., 2011).

2.3 Research design

I explored the role of climate change appraisals in individuals' unhealthy food consumption across five studies. Table 1 (see Appendix A) provides an overview of the empirical studies. In Study 1, I explore consumers' appraisals of climate change and the primary discrete emotions arising. After generating the research hypotheses, I causally test whether low collective efficacy about climate change increases consumption of vice foods compared to healthy options (Study 2). In Study 3, I investigate anxiety as a mediating mechanism and include fear as an alternative emotional explanation. In Studies 4 and 5, I assess whether the mediating effect of anxiety is stronger among consumers with low self-control. Study 4 is an online experiment; Study 5 is a field experiment measuring actual consumption of vice food in a real-life context.

So...let the journey begin.

Chapter III

START DEEP LISTENING

What people tell me in a qualitative study



I didn't know where the path would lead when I embarked on this research journey. I carried fragments of insight, but the whole picture—how individuals genuinely see the climate change phenomenon—remained elusive. By individual perceptions, I mean the nuanced elements—the colors and shades. When people saw news about climate change on television or social media, what stood out to them? What do they perceive and prioritize, and how do these elements influence their deeper emotions? Previous literature suggested a wide range of possible emotional responses, but I was interested in what emotions were most commonly triggered and why—what evaluations led to these reactions? I adopted a qualitative approach

to explore these questions, starting with in-depth interviews. By listening deeply, I aimed to uncover the true feelings of participants. I framed this exploration through appraisal theory, one of the most prominent frameworks for understanding individuals' responses to complex encounters (Lazarus & Folkman, 1984), such as climate change (Liu et al., 2022; Heeren & Asmudson, 2023). The way people perceive and experience the impacts of climate change within their environment can indeed be a critical pathway that leads to its adverse effects on consumer behavior.

3.1 Theoretical background

When consumers encounter a situation, they evaluate its underlying characteristics through cognitive appraisal (Lazarus, 1991). *Cognitive appraisal* is the process of “categorizing an encounter, and its various facets, with respect to its significance for well-being” (Lazarus & Folkman, 1984, p. 31). Individuals use two types of cognitive appraisals to evaluate an encounter: *primary* and *secondary*. In the *primary appraisal process*, individuals evaluate whether they have something at stake, such as potential harm or risks to their health or well-being, or whether the event presents a challenge (Lazarus, 1991). A challenge appraisal involves recognizing that, although obstacles may impede progress, they can be overcome with determination, persistence, and self-confidence (Lazarus & Folkman, 1984). Conversely, a threat appraisal arises when the event is perceived as having negative or harmful consequences (Lazarus, 1966). Events that jeopardize consumers' well-being or goals typically trigger a primary appraisal of threat or harm (Kabat-Farr et al., 2019).

The primary appraisal process is crucial for determining emotional responses, as it involves three key components: *goal relevance*, *goal congruence* or *incongruence*, and *ego-involvement* (Lazarus, 1991). *Goal relevance* refers to the extent to which an encounter affects personal goals—whether or not the situation involves something the individual cares about. If

there is no relevance to personal goals, no emotion will arise. However, when the situation is relevant, an emotion will occur depending on the outcome of the encounter. *Goal congruence* or *incongruence* describes how consistent or inconsistent the situation is with the individual's desires. When the situation supports their goals, it creates goal congruence, leading to positive emotions. Conversely, when it hinders their goals, it results in goal incongruence and generates negative emotions. *Ego-involvement* relates to various aspects of a person's identity and personal commitments, such as self-esteem, social esteem, moral values, personal ideals, relationships, and life goals. These factors collectively shape ego-identity, which likely plays a role in most, if not all, emotional experiences.

Secondary appraisal, on the other hand, involves determining what can be done to prevent or mitigate harm or improve outcomes (Lazarus & Folkman, 1984). It assesses an individual's ability to cope with the encounter, particularly when it is perceived as threatening (Lazarus & Folkman, 1984). This appraisal focuses on whether their actions can prevent the threat, reduce its effects, or yield further harm or benefit. It plays a crucial role in shaping the overall evaluation of the situation and influences how threatened individuals feel (Bandura, 1982; Lazarus & Folkman, 1984). When consumers believe they have the necessary resources and ability to address the threat, they perceive the situation as less daunting. Conversely, when they doubt their ability to manage it, the situation feels more overwhelming (Lazarus, 1991).

Secondary appraisal also influences the specific emotions experienced. While primary appraisal determines whether an emotion will occur (goal relevance) and whether the emotion is positive or negative (goal congruence or incongruence), it is the secondary appraisal components that determine which specific emotion individuals will experience. Secondary appraisal has three components that influence the subsequent emotion generated: *blame* or *credit* (which can be external—directed at others—or internal—directed at oneself), *coping potential*, and *future expectancy* (Lazarus, 1991). *Blame* and *credit* are assigned based on who

is accountable or responsible for a frustrating situation. If it is clear that the responsible person had control over the frustrating act, credit or blame is attributed accordingly. *Coping potential* refers to an individual's perceived ability to manage the demands of the situation (Lazarus & Folkman, 1984; Lazarus, 1991). It is important to note that coping potential refers not to actual coping but to an individual's evaluation of their prospects for taking action or thinking in a way that could alter or protect their relationship with the environment. Finally, *future expectancy* concerns whether things are likely to change for better or worse in a psychological sense, becoming either more or less aligned with an individual's goals (i.e., more or less goal congruent).

Notice that the appraisal process in both primary and secondary stages begins with broad decisions, such as whether an emotion will occur and whether it will be positive or negative. As this process unfolds, the focus narrows, allowing individuals to identify one or, at most, two likely emotions within a specific context. These appraisals then shape how individuals cope with perceived threats (Bandura et al., 1982). For example, if consumers perceive that nothing can be done, they may seek alternative ways to manage the situation rather than actively addressing the threat (Lazarus, 1991).

Cognitive appraisals have been widely applied in marketing research to predict responses to various phenomena, such as irresponsible corporate behaviors (Antonetti & Maklan, 2016), supervisor incivility (Kabat-Farr et al., 2019), service failures (Obeidat et al., 2017), performance pressure (Tang et al., 2023), unethical behavior (Sufi et al., 2023), corporate ethics programs (Jannat et al., 2022), fear appeals (De Vos et al., 2017; Talebi et al., 2024), health-related stressors (Keeling et al., 2022), and negative emotions (e.g., Garg & Lerner, 2013; Rowe et al., 2019). Appraisal frameworks have also been applied in climate change research, as individuals' perceptions of climate change are recognized as a critical factor in promoting pro-environmental behaviors (e.g., Homburg & Stolberg, 2006). However, empirical

evidence on how these appraisals influence variables beyond pro-environmental behaviors remains limited despite recognizing that individuals' perceptions about climate change can contribute to wider range of adverse effects on consumers (Heeren & Asmudson, 2023). Focusing primarily on pro-environmental outcomes may overlook the broader spectrum of individual responses to climate change. By applying cognitive appraisal theory to examine psychological and behavioral impacts beyond sustainability-related actions, we can gain valuable insights into a range of complex responses, each with potential effects on various aspects of daily life and overall well-being.

3.2 Methodology

I conducted a qualitative study based on in-depth interviews to explore the individuals' perceptions about climate change, and the emotional responses elicited. The study adopted a convenience sampling procedure to select respondents. The collection of data was made in Italy until theoretical saturation was met; 40 participants took part in the study. Participants ranged from 19 to 63 years old, 55% were female and 45% were male (see Appendix A for demographic information on respondents). The interview protocol followed the Zaltman Metaphor Elicitation Technique (ZMET), which integrates projective techniques with semi-structured in-depth interviews to help respondents provide narratives that would reveal their perceptions and feelings of particular phenomena (Zaltman & Coulter, 1995; Zaltman, 1997). Before conducting the interviews, I provided participants with guidelines to help them understand the interview topic and reflect on it. Also, I asked them to collect at least 10 images from books, magazines, newspapers, or the Internet to illustrate their view of climate change's menace (Zaltman & Counter, 1995). These images provided the stimuli for the subsequent ZMET interviews. Since consumers choose their own pictures, they control the stimuli used in the guided conversation (Zaltman & Counter, 1995). In addition to images, I developed a brief

interview guide with open-ended questions designed to create a portrait of consumers' appraisals of climate change. Then, I explored the primary emotions elicited by these appraisals. All interviews were recorded, transcribed, and analyzed through a multiphase coding process, including thematic analysis. Transcripts are available upon request. The corpus was segmented into content units—comprising one or more sentences—which were then assigned to thematic categories (King & Horrocks, 2010). I conducted a line-by-line analysis and initially identified 'descriptive codes' to capture specific portions of the text. Through progressive abstraction and merging, I then identified 'integrative themes' (i.e., key concepts) and, subsequently, 'overarching themes.' This approach allowed me to distill the core themes that characterize respondents' perspectives.

To enhance the reliability of the analysis, I asked two independent expert coders to confirm the coding results. The inter-judge reliability—calculated via the “agreement ratio”—proved to be satisfactory (89%). The insights gained from the qualitative study, combined with prior literature, provided the basis for developing a conceptual model and related research hypotheses, which I report in Figure 1.

3.3 Findings

Through a multistage analysis process, I identified three overarching themes: the appraisal of climate change as an existential threat, the emphasis on collective efficacy beliefs as a secondary appraisal component, and the predominance of fear and anxiety as key negative emotions. In the following sections, I provide a detailed description of each theme.

3.3.1 The existential threat of climate change

Thematic content analysis revealed that most interviewees view climate change not as a challenge but as a significant threat, mainly because of its harmful and dramatic consequences.

Climate change evokes acute stressors, such as extreme weather events and natural disasters, and chronic, more subtle impacts. Interviewees' initial associations with climate change suggest that it disrupts personal goals, conflicts with their desires, and presents an overarching threat to their lives. Specifically, respondents voiced concerns about a wide range of essential needs at risk. They highlighted the scarcity and declining seasonality of natural food sources, increasing limitations on drinking water due to droughts, and worsening air quality from pollution. As one participant noted, *“An escalation can start with food. Certain plants and food were grown and cultivated because of a specific climate. Now, they can no longer be cultivated. It won’t be possible to eat certain foods anymore.”* (Interviewee 5).

Participants also conveyed a sense of being deprived of safety, stability, and certainty, appraising survival itself as threatened: *“I associate climate change with a vulture waiting for the right moment to destroy me, to reduce me to bones. In that case, I would try to cling to anything to survive.”* (Interviewee 13). Disorientation, destabilization, and unease were commonly mentioned, with many suggesting that climate change erodes psychological health and renders the world unsafe and unpredictable. The constant uncertainty demands ongoing problem-solving, complicating the ability to live peacefully. Respondents also described how climate change strips away familiar places, habits, and cultural heritage, undermining their sense of identity. Reproductive concerns also emerged, with participants questioning whether having children in an era dominated by climate change makes sense. Others reflected on the sacrifices made to build a future, only to face the possibility of disruption from the disastrous consequences of climate change.

These varied threats contribute to ontological insecurity, shaking confidence in the continuity of self-identity and the stability of the social and material environments in which they act (Campbell, 2020). When ontological security is disturbed, individuals become emotionally invested in re-establishing trust that the world—and even their sense of self—

remains predictable. However, this effort is not always successful. As one respondent expressed, *“What climate change deprives me of makes me feel like everything around me is precarious. I feel like I’m losing my balance. When I sense this uncertainty from external factors, I tend to internalize it as a deeply personal issue, as if the questions I already have become exacerbated.”* (Interviewee 6).

In brief...

While respondents felt that climate change impacted all aspects of their social and personal lives, their primary concerns centered on physiological and security needs: threats to survival, health, stability, and certainty. Consequently, climate change is widely perceived as an *existential threat to humanity*, marked by goal relevance, goal incongruence, and ego-involvement.

3.3.2 Appraisal of efficacy: Perceptions about collective capacity to mitigate climate change

The thematic content analysis further revealed a second overarching theme: respondents’ secondary appraisals regarding their individual and collective capacities to address climate change. People often form beliefs about their ability to mitigate or influence threatening situations (Antonetti & Maklan, 2014). In this study, respondents discussed the personal steps they could take to combat climate change while also acknowledging that the most severe impacts may be unavoidable. Their responses highlighted the intensity of their concerns and revealed a shared sense that individual actions often feel insignificant in the face of the immense threats posed by climate change. Many expressed feelings of personal inadequacy in organizing or carrying out the necessary actions, viewing the issue with pessimism and describing themselves as powerless to manage its consequences. Climate change

was seen as an unavoidable burden they had to endure unwillingly. One respondent vividly explained, *“You feel that climate change makes you sick and bothers you, and you want to reject it. You want to take it out and throw it away, but instead, you must throw it down and eat it. You eat it unwillingly, but you have to. You can’t do anything to avoid it.”* (Interviewee 2) This powerlessness extended to concerns about protecting loved ones, particularly among parents who felt unable to safeguard their children’s future. *“The worst thing for me as a mother is not being able to protect my daughters. Not knowing what may await them or what may happen to them. I only know that I will not be able to protect them.”* (Interviewee 26).

Beyond their individual agency, respondents evaluated their collective capacity to address climate change. Collective efficacy was a dominant theme, defined as the belief in a group’s ability to confront and address complex, threatening situations through interdependent efforts (Hamann et al., 2023). Respondents believed that collective human efforts were more relevant than individual ones, given the global nature of the threat. They spoke of themselves as part of a broader group of “humans” tasked with dealing with the problem together. In fact, while individual efforts were often dismissed as inadequate, collective action was viewed as the only viable solution. However, despite this emphasis on collective action, respondents overwhelmingly perceived these efforts as insufficient. They described a sense of futility, believing that climate change had grown beyond human control. *“I think that climate change has reached a level that humanity can no longer control it. And we don’t even have the tools to defend ourselves.”* (Interviewee 27) This low sense of collective efficacy led many to disengage, pushing thoughts of the issue aside as a coping mechanism. One participant described this avoidance strategy: *“Knowing that everything humanity does is useless is something that destabilizes. I, on a psychological level, try to find a system of self-protection, with the philosophy of ‘Don’t think about it. It will be dealt with when it comes.’”* (Interviewee 36)

The media was also seen as playing a significant role in shaping respondents' perceptions of collective efficacy. Many felt overwhelmed by the constant barrage of catastrophic climate-related images and information on the news and social media, which reinforced the perception that climate change's consequences were irreversible. This saturation contributed to feelings of insignificance in the face of nature's overwhelming power, as one respondent reflected, "*From the images about climate change that I see scrolling on TV and social media, I realize that we are insignificant compared to nature, which has created climate change as an act of rebellion. There is no way out.*" (Interviewee 22) This sense of futility was often described using metaphors of finality and inevitability. "*I see climate change as a black hole, a point of no return. Like a black hole that attracts things into itself, and it's impossible to escape.*" (Interviewee 19)

In brief...

A central aspect of this overarching theme is the role of *coping potential* as a secondary appraisal component, particularly the widespread appraisal of *low collective efficacy*. Respondents expressed a shared sense of ineffectiveness regarding humanity's ability to address climate change. While collective efforts were viewed as more relevant than individual ones, respondents still perceived it as insufficient to meet the scale of the challenge. This sense of collective powerlessness shaped their disengagement and avoidance of the issue, compounded by media portrayals that reinforced the futility of human action against climate change.

3.3.3 Emotional landscape of climate change's threat: Anxiety and fear as dominant responses

Analysis indicates that climate change is broadly viewed as highly relevant to individuals' personal goals, triggering strong emotional responses. These emotions are primarily negative, given the goal incongruence introduced by its adverse effects. The specific emotions experienced, however, are shaped by additional factors within secondary appraisals. Some respondents felt a sense of demeaning offense against their generation, which led them to express anger. They find themselves living in a world shaped by decisions made by previous generations—a world they had no choice in creating. This anger is primarily directed at others, especially institutions and individuals perceived as failing to address the situation. *“I feel anger at the carelessness of some people, especially institutions!”* (Interviewee 41). This frustration is often accompanied by an appraisal of strong blame: *“This catastrophic situation has been caused by the lack of moral conscience from those who prioritized making money, money, money at the expense of the health of the rest of us!”* (Interviewee 33). Other respondents experience sadness stemming from irrevocable personal and biodiversity losses. *“I feel sad because if I want to build a family in the future, I ask myself: But under what conditions? Can I guarantee them stability?”* (Interviewee 13). Feelings of depression also emerge. One respondent shares: *“One of the consequences is that, at times, I feel like a dull person. I really have no stimulation in achieving goals that I set for myself. I get discouragement”* (Interviewee 5).

Among these emotions, fear and anxiety stand out as the most prominent. They arise primarily from the threat of future harm and the perception that collective efforts to combat climate change are ineffective. The majority of respondents express heightened anxiety due to the uncertainty of what will happen or when. This unpredictability, paired with the disruption of existential meaning, amplifies their anxiety. *“I feel anxiety because I don't have a clear sense of what the future will be like. This uncertainty makes me constantly anxious”* (Interviewee 36). For many, climate change feels like a ticking time bomb—a powerful and inevitable force that

can only be delayed, not defused. This metaphor captures the essence of their anxiety: the sense that something catastrophic is looming, but they are powerless to prevent or predict when it will happen or how strong it will be. *“Of course, nature will still have to equalize somehow, and I won’t be able to do anything about it. But how strong will this blow that will come from nature be?”* (Interviewee 5). The inability to prevent or control this existential and uncertain threat makes anxiety particularly pervasive (Lazarus, 1991). One respondent shared: *“Thinking about climate change causes me anxiety. It is like a vulture that feeds on the bodies of dead animals. It deprives something else that lacks the capacity to protect itself. Moreover, I am stalling by running away, but eventually, it will come for me”* (Interviewee 19). Additionally, many respondents report experiencing fear, primarily triggered by the immediate danger of physical harm. Unlike anxiety, which is more diffuse and long-lasting, fear among respondents is typically focused on identifiable, sudden dangers. This fear is usually short-lived, subsiding once the immediate threat passes. Respondents fear life-threatening events directly linked to climate change. *“Climate change has caused several deaths! Before, when there were thunderstorms, I was not afraid. Whereas now I am. For example, when the wind blows, I am afraid! I’m afraid of a tree falling on me, I’m afraid of tornadoes!”* (Interviewee 28).

In brief...

Anxiety and fear dominate the emotional landscape of respondents, standing out as the most pervasive and impactful emotions in response to climate change.

3.4 Discussion of findings

Study 1 reveals that climate change is primarily evaluated through primary appraisal, where it is predominantly perceived as an *existential threat to humanity*. In addition, respondents engage in secondary appraisal, with a critical focus on coping potential—

particularly their beliefs about *low collective efficacy*. This appraisal process plays a crucial role in shaping participants' emotional responses. Among the emotions discussed, *anxiety* and *fear* emerge as the most dominant and persistent reactions to climate change. While other emotions that emerged, such as anger and sadness, are linked to specific facets of the climate crisis, anxiety and fear are more pervasive and influence respondents' broader perceptions of the threat.

Notably, I have intentionally avoided using the term 'eco-emotions' throughout this study. As outlined in Chapter I, this term presents specific challenges in conceptualization, leading me to exclude it from my narrative. Given that anxiety emerged as the primary emotional response and will serve as the mediating variable in this research, it is important to clarify my decision to avoid using the term "eco-anxiety." In particular, I chose not to refer to "eco-anxiety," guided by two primary considerations:

- *Lack of conceptual clarity*: Literature in environmental psychology has not reached consensus on the definition of eco-anxiety. A recent scoping review revealed more than ten different definitions (Coffey et al., 2021), ranging from broad emotional spectrums including fear, despair, anger, and sadness (Dodds, 2021; Kurth & Pihkala, 2022) to narrower focuses on anxiety and worry (Ojala et al., 2021; Ogunbode et al., 2022). This variation can lead to confusion, especially when discussing specific discrete emotions (i.e., anxiety and fear) as in my study.
- *Accuracy of emotional responses*: According to appraisal theory, emotions result from an individual's evaluation of an event, with distinct emotions stemming from different appraisals and having specific downstream effects (Lazarus, 1991). The term 'eco-anxiety' has often served as an umbrella for various emotions, lacking the precision needed for my analysis of specific responses to climate change perceptions. My focus is on anxiety as a specific, discrete emotional response stemming from the secondary

appraisal of climate change, that is, perceptions of low collective efficacy about tackling climate change.

Along these lines, I chose to specifically use the term “anxiety stemming from low collective efficacy in tackling climate change, or simply “anxiety”, instead of eco-anxiety, to ensure clarity and accuracy in describing this specific emotion.

In the following chapter, I expand on the central themes identified—*low collective efficacy in addressing the existential threat of climate change*, the emotional responses of *anxiety* and *fear*, and their *downstream effects*.

Chapter IV

DO IT FOR THE TRUTH

Testing predictions in experimental settings (Studies 2-5)



Several important insights emerged from the initial exploration of the psychology of the individuals interviewed and their perceptions of climate change. First, the most striking observation was that respondents viewed climate change as posing a *high threat to their existence*—not a low or moderate threat, but one directly linked to their survival. Second, alongside this high existential-threat assessment, there was a strong focus on coping potential within the secondary appraisal process. Specifically, what stood out most was the perception of the *ineffectiveness of collective efforts* in combating climate change. Third, among the various negative emotions that surfaced, *anxiety* and *fear* were particularly prominent and distinct.

These insights prompted me to consider the value of further investigating the downstream effects of low perceived collective efficacy in addressing the perceived existential threat of climate change and the role anxiety and fear play in this dynamic. Understanding the downstream effects of collective efficacy is crucial, given its significant influence on emotions and behavior (Bandura, 1982).

To explore this, I began by examining the various coping strategies individuals adopt in response to harmful and threatening states (e.g., Han et al., 2015). A literature review on consumption behaviors and negative states suggests that, among other coping mechanisms, people might turn to unhealthy food consumption as a form of *temporary relief* (e.g., O’Loughlin et al., 2019). Could this also be the case when individuals perceive low collective efficacy in addressing climate change? Might individuals (inadvertently) seek refuge in vice foods as a response to climate change? If so, the global public health implications could be *disastrous*, as climate change’s pervasive and ongoing nature could drive increased unhealthy food consumption, posing a severe threat to public health. What factors might contribute to this effect? Could certain consumers be more vulnerable?

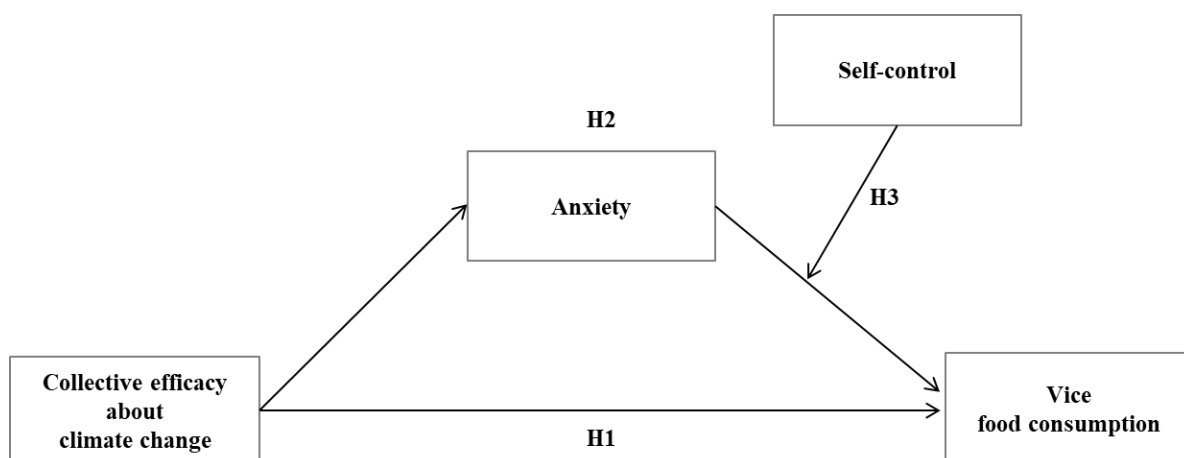
To better understand this potential impact, it is useful to consider previous research on the factors driving vice food consumption in contexts beyond product-related motivations. Previous studies on the non-product-related drivers of engagement in vice food consumption have primarily focused on individuals’ lack of control over their personal life circumstances (Lunardo et al., 2022) or specific environmental disasters (Kemp et al., 2014). The type of perceived lack of control examined by Kemp et al. (2014) and Lunardo et al. (2022)—defined as the feeling that one’s life or situation is out of personal control—is related to efficacy (Bandura, 1982). However, they remain distinct concepts (Rodgers et al., 2008). Furthermore, while these studies emphasize control at the personal level (i.e., individual control), my focus is on collective efficacy related to climate change, which refers to a group’s shared belief in its

ability to tackle complex, large-scale challenges like climate change (Hamann et al., 2023). Unlike specific personal or localized events, climate change is a continuous, uncertain, and global existential threat that exceeds the capacity of individuals acting alone (Jugert et al., 2016; Hamann et al., 2023). Additionally, Kemp et al. (2014) did not test for causality or differentiate between fear and anxiety, making it unclear why consumers turn to unhealthy food when they feel powerless to address climate change.

Consequently, *I found that existing research did not fully address the questions I sought to explore*: How might climate change contribute to maladaptive eating dynamics? Specifically, how could perceptions of low collective efficacy in addressing climate change impact unhealthy food consumption?

To investigate these questions, I propose and empirically test a conceptual model examining the *impact of collective efficacy related to climate change on vice food consumption*. I also explore the underlying psychological mechanism (*anxiety*), surpassing alternative explanations (*fear*), and the moderating role of *self-control*. Figure 1 illustrates the proposed conceptual model.

Figure 1. Conceptual model



4.1 Hypotheses development

4.1.1 Collective efficacy about climate change and vice food consumption

Collective efficacy about climate change implies people's beliefs about the efficacy of joint efforts to prevent, mitigate, or resolve the threats posed by climate change (Jugert et al., 2016). Confidence in humanity's capacity to address the threat of climate change influences whether people actively engage in addressing it or passively accept it (Chen, 2015; Hamann et al., 2023). Perceiving collective efforts as insufficient may lead people to overestimate the challenges and perceive no meaningful ways to confront them (Kim et al., 2024). This sense of collective inefficacy also can heighten physiological arousal and subsequent impairment, which increase people's inclinations toward avoidance-oriented responses, such as skirting the source of distress and seeking immediate relief or gratification elsewhere (Han et al., 2015).

Vice foods provide notably effective short-term gratification (Mishra & Mishra, 2011; Wertenbroch, 1998). High in fat, sugar, and salt, they offer heightened taste and immediate sensory pleasure (Berridge et al., 2010; Biswas & Szocs, 2019). The pleasure and palatability associated with indulging in sweet, fatty, or salty foods stems from the brain's neural circuitry (Biswas & Szocs, 2019), such that consumption triggers brain reward systems and prompts the release of opioids, dopamine, and endocannabinoids in the limbic system (Berridge et al., 2010). In this way, consuming vice food can yield analgesic effects, immediate pleasure, and temporary relief from negative psychological states (O'Loughlin et al., 2019). Thus, people often turn to unhealthy food to cope with situations they perceive as adverse and uncontrollable (Liu et al., 2022; Lunardo et al., 2022; O'Loughlin et al., 2019); it provides a coping mechanism to navigate the stress of such challenging situations, as well as a temporary respite from distress (O'Loughlin et al., 2019). We anticipate a similar behavioral pattern: The daunting task of confronting climate change evokes distress, particularly among people who perceive collective

abilities and resources as insufficient to mitigate it, so they (inadvertently) turn to vice food as a coping strategy and to seek short-term relief.

This hypothesized effect should involve vice food, not healthy food. Healthy foods are often perceived as less palatable (Raghunathan et al., 2006) and less satisfying (Finkelstein & Fishbach, 2010), due to their lower fat content and differences in macronutrient composition (Stubbs & Whybrow, 2004). These differences also reduce the ability of healthy foods to activate the brain's reward system or provide immediate sensory gratification (Biswas & Szocs, 2019). Thus, low collective efficacy about climate change should have no significant effect on healthy food consumption. We refrain from formulating a specific null hypothesis but empirically test for the effect subsequently, to exclude it.

H1: Low collective efficacy about climate change increases consumption of vice food.

4.1.2 The mediating role of anxiety

State *anxiety* refers to long-lasting, intense tension and worry about a potentially adverse situation that people feel ill-equipped to handle (Spielberger et al., 1983). Often arising from ambiguity about what might happen and how to tackle it, anxiety prompts hyper vigilance, feelings of insecurity, and prolonged apprehension (Lazarus, 1991). Levels of anxiety tend to be highest when people perceive a significant threat and believe they are unable to address it (Bandura, 1988). That is, people who see climate change as a severe threat and lack confidence in humanity's ability to tackle it collectively likely experience heightened anxiety (Ojala et al., 2021).

Because anxiety often lacks a clear resolution, people feel overwhelmed by its persistence, with both psychological and physiological effects (Lazarus, 1991), so they tend to seek emotion regulation strategies to mitigate its pervasive symptoms (Kalisch et al., 2005; Kemp et al., 2020). In particular, anxiety leads consumers to opt for enjoyable, unhealthy food, such that it triggers cravings for sweet foods, promotes unhealthy eating habits, and increases

attention to hedonic food choices (Jaud & Lunardo, 2022; Motoki et al., 2019; Penaforte et al., 2019). We propose that perceptions of low collective efficacy about climate change stimulate anxiety, which in turn leads to more consumption of vice food.

In so doing, we explicitly separate anxiety from another emotional response to threats, such as *fear*. Fear is a phasic response to imminent danger, which starts quickly and ends once the threat is gone. Anxiety instead implies a prolonged state of apprehension, characterized by heightened arousal and vigilance (Davis et al., 2010). Fear triggers primitive, immediate, fight-or-flight reactions to threats, prompted by direct neural connections from the retina to the emotional brain, which bypass the cortex (Öhman, 2005). Thus, fear facilitates immediate responses to threats, not extended efforts to alleviate unpleasant states. Previous literature does not indicate any significant correlation between fear and vice food consumption, so we do not expect a similar mediating effect of fear between low collective efficacy about climate change and increased consumption of vice food. We again refrain from formulating a specific null hypothesis but empirically rule out fear subsequently.

H2: Anxiety mediates the effect of low collective efficacy about climate change on increased consumption of vice food.

4.1.3 The moderating role of self-control

Self-control is a capacity to resist impulsive behaviors, delay immediate gratification, and prioritize long-term well-being (Tangney et al., 2004). Acting as a metaphorical “moral muscle” (Baumeister & Exline, 1999), self-control enables consumers to prioritize long-term goals (e.g., health) over short-term goals (e.g., pleasure) (Vosgerau et al., 2020); displays of self-control include choosing behaviors conducive to long-term well-being, whereas a lack of self-control manifests as an inability to resist short-term impulses (Baumeister, 2002; Francke & Carrete, 2023). Variations in dispositional self-control are particularly relevant in efforts to

manage negative emotions, in that emotion-regulation consumption strategies usually involve activities that typically would be resisted through self-control (Tice & Bratslavsky, 2000). Compared with people with high self-control, people with low self-control exhibit less inhibition, resulting in more substance abuse, psychopathology, eating disorders, and physical and verbal aggression (Tangney et al., 2004). They also tend to consume tasty but unhealthy foods to regulate their negative mood in the immediate term (Laran, 2020). We expect dispositional self-control to function as a significant moderator that helps explain why some consumers resort more to vice foods to cope with their anxiety stemming from low collective efficacy in tackling climate change (Haws et al., 2016).

Impaired self-control also has theoretical relevance; it is a prevalent characteristic among vulnerable consumers (Francke & Carrete, 2023; Tangney et al., 2004). Less educated people tend to exhibit diminished self-control, because they have had fewer opportunities to develop cognitive skills related to planning, impulse control, and problem-solving, leaving them relatively more susceptible to impulsive behaviors (Baumeister, 2002). Furthermore, consumers with lower socioeconomic backgrounds may exhibit low self-control due to their limited access to resources, higher levels of stress, and fewer opportunities for skill development and education (Bradley & Corwyn, 2002). Exposure to crime, violence, substance abuse, or dysfunctional family dynamics also hinders the development of self-control skills (Vazsonyi & Huang, 2010). Overall, then, vulnerable consumers might exhibit limited inner resources to manage the felt anxiety (Gailliot et al., 2007; Tangney et al., 2004), and eat vice food more (Haws et al., 2016).

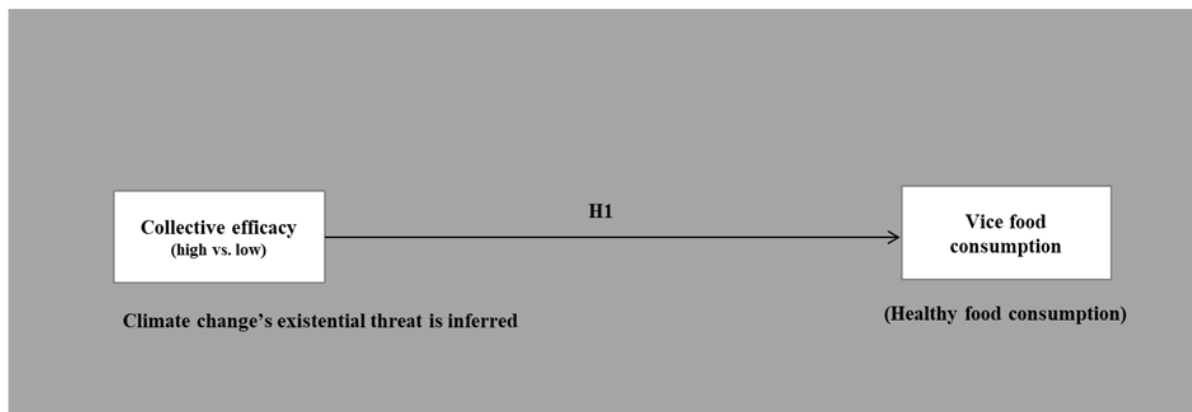
H3: Consumers with low self-control are more susceptible to increased vice food consumption when experiencing anxiety due to low collective efficacy about climate change.

4.2 Overview of studies

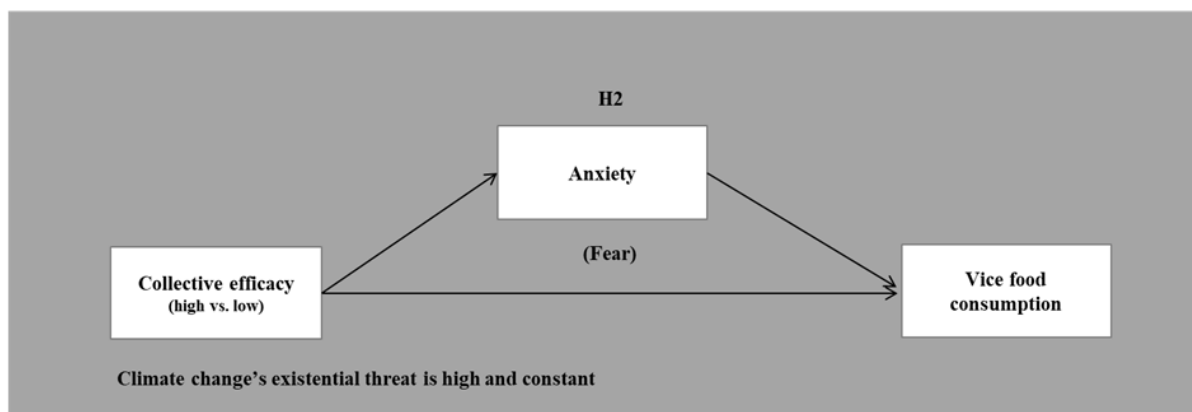
To test these predictions, I conducted three online experiments and one field experiment (N = 1,207). Figure 2 depicts the models and relationships tested in each study; Table 1 (see Appendix A) provides an overview of the empirical studies. In Study 1, as a test of H1, I examine whether low collective efficacy about climate change increases consumption of vice (cf. healthy) food. I test for H2 in Study 3 by assessing anxiety as a mediating mechanism, while also including fear as an alternative emotional explanation. In Studies 4 and 5, I determine if the mediating effect of anxiety is stronger among consumers with low self-control, as I predicted in H3. Study 4 is an online experiment; Study 5 is a field experiment in which I measure actual consumption of vice food in a real-life context. In all four studies, I include relevant controls, such as age, gender, education, economic status, economic status during childhood, green self-identity, stimuli credibility, and hunger state. In Study 2, I also identify perceived severity of the threat of climate change, and in Study 5, I consider participants' level of anxiety trait. At the end of each study, participants received a debriefing and took part in a final session aimed at enhancing efficacy and restoring positive emotions. Participants with mental health issues, eating disorders, diabetes, food allergies, or specific diets were excluded from participating in any of the studies.

Figure 2. Models and hypotheses tested in each study.

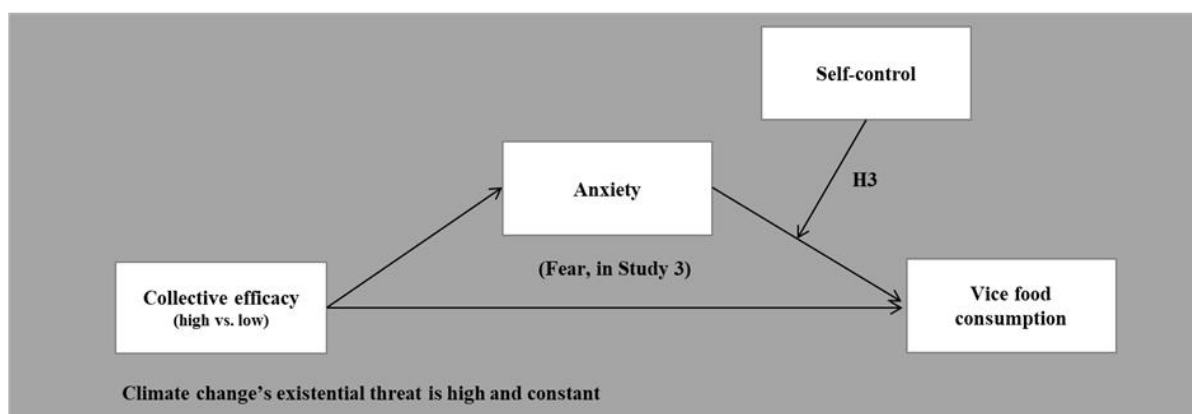
Study 2. Effect of collective efficacy about climate change on the consumption of vice food



Study 3. Mediating effect of anxiety (surpassing alternative explanations)



Study 4 and 5. Moderation of self-control



4.3 Study 2: Collective efficacy about climate change and vice food consumption

Study 2 tests the prediction in H1 that low collective efficacy about climate change leads to increased consumption of vice food, without a corresponding effect on healthy food

consumption (Figure 2, Table 1 in Appendix A). The severity of the existential threat posed by climate change is inferred by participants in this study.

4.3.1 Participants and procedure

I recruited 500 adult U.S. participants from Prolific to take part in a 5-minute study. A post hoc power analysis calculated by G*Power indicated that the final sample of 500 respondents is sufficient (power = 99%; medium effect size; 5% alpha margin error). Participants providing inattentive responses (i.e., failing attention or manipulation checks) were excluded (Abbey & Meloy, 2017), leading to a final sample of 466 responses (51.7% men, 45.1% women, 3.0% other; $M_{age} = 42.23$ years, $SD = 13.99$). Study 2 is a mixed factorial design, such that I randomly assigned participants to a 2 (collective efficacy: high vs. low; between subjects) $\times$ 2 (food type: vice vs. healthy; within subjects) experimental design.

First, participants provided demographic information (age, gender, education, economic status, and economic status during childhood) and rated their green self-identity (three-item, 7-point Likert scale, e.g., “I consider myself as someone who is concerned about environmental issues,” 1 = “strongly disagree,” 7 = “strongly agree”; adapted from Sparks and Shepherd, 1992), the severity of climate change as an existential threat (three-item, 7-point Likert scale, e.g., “The existential threat that climate change poses is severe,” 1 = “not at all,” 7 = “very much”; adapted from Silvera et al., 2012), and their current hunger state (“How hungry are you right now?” 1 = “not at all,” 7 = “very much”). Next, I randomly assigned the participants to a high or low collective efficacy condition. They read a pretested fictitious newspaper article about climate change, in which I manipulated collective efficacy by including alleged interviews with naturalists, who asserted that humans can collectively do much (vs. nothing) to mitigate climate change. To enhance the realism of the stimuli, the scripts featured an actual newspaper layout (see Appendix B). After reading the stimuli, participants saw pretested pictures of vice food (plate of chocolate chip cookies) and healthy food (plate of apple slices)

(see Appendix C). I asked participants to indicate the number (from “0” to “9 or more”) of chocolate chip cookies and apple slices they would have eaten at that moment. Finally, participants completed a manipulation check, related to perceived collective efficacy about climate change (two-item, 7-point Likert scale, e.g., “We can do nothing to tackle climate change” (R), 1 = “not at all,” 7 = “very much”; adapted from Doran et al., 2015), and rated the credibility of the newspaper article (one-item, 7-point Likert scale, “The newspaper article is credible,” 1 = “not at all,” 7 = “completely”), before being debriefed. The measurement scales of the model constructs are in Appendix D.

4.3.2 Results

To test H1, I used a mixed analysis of covariance (ANCOVA), with collective efficacy about climate change (high = 0, low = 1) as a between-subject factor and food type (vice = 0, healthy = 1) as a within-subject factor. The perceived severity of climate change’s existential threat, age, gender, education, economic status, economic status during childhood, green self-identity, newspaper article credibility, and hunger state were included as covariates.

I found a marginally significant interaction between the type of food and the level of collective efficacy about climate change ($F(1, 455) = 3.04, p = .08$), such that collective efficacy affected intentions to consume food, depending on the type of food. Pairwise comparisons with Bonferroni adjustment indicated that the intention to consume vice food increased marginally significantly among consumers exposed to low collective efficacy ($M = 2.05$) rather than high collective efficacy ($M = 1.69$; $F(1, 455) = 3.56, p = .06$), in line with H1. Furthermore, intentions to consume healthy food did not vary regardless of whether consumers encountered reports of low ($M = 3.21$) or high ($M = 3.29$; $F(1, 455) = .12, p = .73$) collective efficacy. These effects arose along with significant effects of participants’ current level of hunger ($F(1, 455) = 26.44, p < .01$) and economic status during childhood $F(1, 455) = 4.71, p = .03$) (detailed results are in Appendix E).

4.3.3 Discussion

These results indicate that low collective efficacy about climate change enhances people's desire to consume vice food; no such increased desire occurs for healthy food. Perceptions of low collective efficacy thus increase vice food consumption in particular, not food consumption in general. The severity of the existential threat posed by climate change also does not seem to affect vice food consumption. Whereas for Study 2, participants inferred this severity, in the subsequent studies, I establish a constant and high level of threat severity, reflecting climate change's actual impacts (United Nations, 2021).

4.4 Study 3: Mediating effect of anxiety versus alternative explanations

Study 3 tests the prediction in H2 that anxiety mediates the effect of low collective efficacy about climate change on increased consumption of vice food, and that this mediating effect of anxiety surpasses alternative emotional explanations such as fear (Figure 2, Table 1 in Appendix A). The severity of the climate change existential threat is high and constant in this study. Study 3 uses a different category of vice food (potato chips).

4.4.1 Participants and procedure

I recruited 339 adult U.S. participants from Prolific to take part in an 8-minute study. A post hoc power analysis calculated by G*Power indicated that the final sample of 339 respondents is sufficient (power = 99%; medium effect size; 5% alpha margin error). I retained 335 responses after filtering out 4 inattentive responses (35.8% men, 63.6% women, 0.6% other; $M_{age} = 33.60$ years, $SD = 12.01$). I randomly assigned participants to a 2-level (collective efficacy: high vs. low) between-subjects design, with consistently high severity of climate change's existential threat.

To start, participants provided the demographic data and rated their green self-identity and hunger state, measured as in Study 2. Next, all the participants read a pretested fictitious

newspaper article about the severe existential threat posed by climate change and how people can collectively do much (vs. nothing) to tackle it (see Appendix B). After reading the stimuli, participants saw a pretested picture of a bowl of potato chips (Appendix C) and indicated the number (from “0” to “9 or more”) of potato chips they would have eaten at that moment. I used single-items measures of participants’ discrete emotions of anxiety (“I feel like I am facing a threat to my existence with high uncertainty about what to do,” 1 = “not at all,” 7 = “very much”) and fear (“I feel like I am facing a danger of imminent harm,” 1 = “not at all,” 7 = “very much”) (both adapted from Lazarus, 2006). Finally, respondents completed the manipulation checks about their perceptions of the collective efficacy about climate change and the severity of climate change’s threat, indicated newspaper article credibility (as in Study 1), and were debriefed. The measurement scales for the model constructs are in Appendix D.

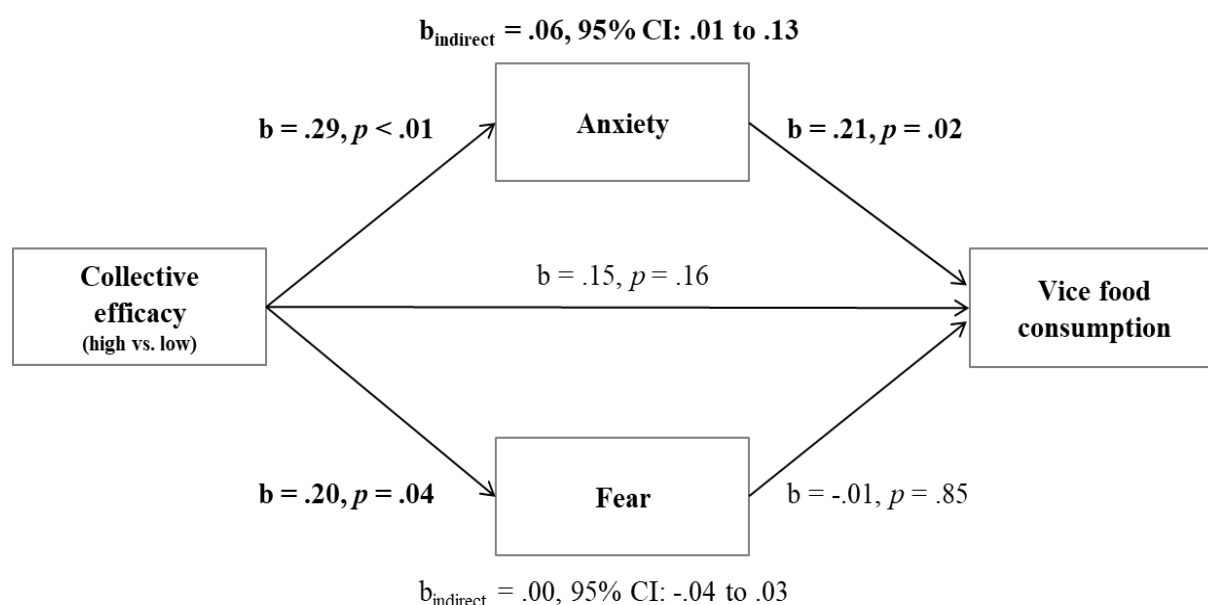
4.4.2 Results

To test H2, I first assessed the direct effects of collective efficacy on the desired consumption of vice food (potato chips). I used a between-subjects ANCOVA with the selected number of potato chips as the dependent variable, collective efficacy (0 = high, 1 = low) as the fixed factor, and age, gender, education, economic status, economic status during childhood, green self-identity, newspaper article credibility, and hunger state as covariates. Collective efficacy influenced the number of potato chips selected, such that respondents in the low collective efficacy condition selected significantly more chips ($M = 4.26$) than those in high collective efficacy condition ($M = 3.51$; $F(1, 325) = 4.01, p = .04$). These effects arose along with significant effects of gender ($F(1, 325) = 5.14, p = .02$), education ($F(1, 325) = 13.42, p < .01$), article credibility ($F(1, 325) = 8.67, p < .01$), and hunger state ($F(1, 325) = 18.60, p < .01$) (for detailed results, see Appendix F).

To test the mediation model, I used Hayes’s (2018) PROCESS model 4 with 95% confidence intervals (CI) and 10,000 bootstrap iterations, in which collective efficacy (0 = high,

1 = low) was the independent variable, anxiety served as the focal mediator, fear provided the alternative mediator, and the number of selected potato chips was the dependent variable. Age, gender, education, economic status, economic status during childhood, green self-identity, newspaper article credibility, and hunger state served as covariates. All continuous variables were standardized. The results, as reported in Figure 3 and Table 2 (see Appendix A), showed that low collective efficacy increased anxiety ($b = .29, p < .01$). Anxiety in turn related significantly ($b = .21, p < .01$) to the number of potato chips selected and mediated the effect of collective efficacy on potato chip consumption ($b_{\text{indirect}} = .06$, 95% CI: .01 to .13). Low collective efficacy also increased fear ($b = .20, p < .01$), but fear was not significantly related to the number of potato chips selected ($b = -.01, p = .85$), nor did it mediate the effect of collective efficacy on potato chip consumption ($b_{\text{indirect}} = .00$, 95% CI: -.04 to .03). The direct effect of collective efficacy on potato chip consumption was no longer significant after taking the mediators into account ($b = .15, p = .16$), suggesting full mediation by anxiety, over and above the effect of fear, in support of H2.

Figure 3. Study 3: Parallel mediation model



Notes: Climate change's existential threat is high and constant. The paths in bold are statistically significant at $p < .05$.

4.4.3 Discussion

Given the severe existential threat posed by climate change, low collective efficacy induces consumers to consume more vice food, through their enhanced emotion of anxiety. This mediating effect surpasses that of alternative emotional explanations, such as fear. While in this study, we measured anxiety and fear using a single-item scale, in Study 4, we also aim to replicate findings using multi-item scales.

4.5 Study 4: Self-control moderates the direct and indirect effects of anxiety

Study 4 tests H3, that the mediating effect of anxiety is stronger among consumers with impaired self-control (Figure 2, Table 1 in Appendix A). As a corollary objective, Study 4 aims to enhance the validity of Study 3's findings by using a different category of vice food (chocolate pralines) and different multi-item scales to measure the felt emotions.

4.5.1 Participants and procedure

I recruited 300 adult U.S. participants from Prolific to take part in an 8-minute study. The post hoc power analysis calculated by G*Power indicated that the sample of 300 respondents is sufficient (power = 99%; medium effect size; 5% alpha margin error). One participant was excluded after failing attention checks, leading to a final sample of 299 respondents (47.8% women, 49.5% men, 2.7% other; $M_{\text{age}} = 40.0$ years, $SD = 1.517$). I randomly assigned participants to a 2-level (collective efficacy: high vs. low) between-subjects design, with climate change's existential threat remaining high and constant.

All participants provided demographic data and rated their green self-identity, hunger state, and self-control trait (three-item 7-point Likert scale, e.g., "People would say that I have iron self-discipline," 1 = "strongly disagree," 7 = "strongly agree"; adapted from Tangney et al., 2004). They read a fictitious newspaper article about the severe threat that climate change poses and people's high (vs. low) collective efficacy in addressing it, manipulated as in Study 3. To measure vice food consumption, we exposed participants to a pretested picture of a box

of 16 chocolate pralines and asked them to indicate the number (from “0” to “16”) they would have eaten at that moment (Appendix C). Next, we measured participants’ anxiety (four-item, 7-point Likert scale, e.g., “Based on the article I read, I feel anxious,” 1 = “not at all,” 7 = “very much”; adapted from Kemp et al., 2014) and fear (three-item, 7-point Likert scale, e.g., “Based on the article I read, I feel fearful,” 1 = “not at all,” 7 = “very much”; adapted from Xie et al., 2015) (Appendix D). Finally, respondents rated the manipulation checks and newspaper article credibility before being debriefed.

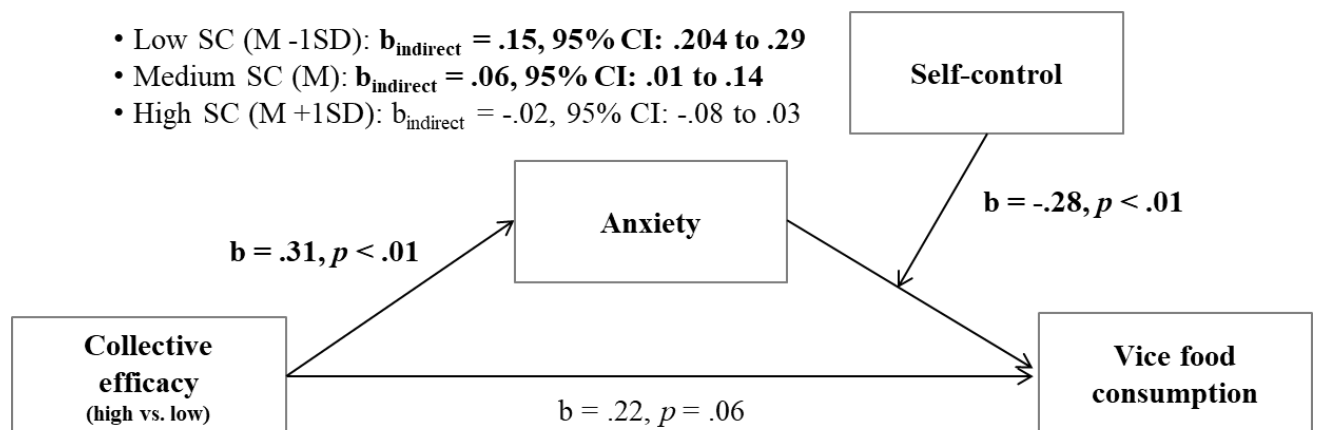
4.5.2 Results

To test H3, I first used a between-subjects ANCOVA with the selected number of chocolate pralines as the dependent variable, collective efficacy (0 = high; 1 = low) as the fixed factor, and age, gender, education, economic status, economic status during childhood, green self-identity, newspaper article credibility, and hunger state as covariates. The results revealed that collective efficacy influenced the number of selected chocolate pralines. Respondents in the low collective efficacy condition sought to eat a significantly higher number of chocolate pralines ($M = 3.82$) than those in the high collective efficacy condition ($M = 3.07$; $F(1, 289) = 7.72, p < .01$). I also found significant effects of educational level ($F(1, 289) = 4.80, p = .03$), economic status ($F(1, 289) = 5.72, p = .02$), hunger state ($F(1, 289) = 23.33, p < .01$), and newspaper article credibility ($F(1, 289) = 8.12, p < .01$).

For the hypothesized moderated mediation model, I then used Hayes’s (2018) PROCESS model 14 with 95% CI and 10,000 bootstrap iterations, in which collective efficacy (0 = high, 1 = low) was the independent variable, anxiety provided the mediator, the number of selected chocolate pralines was the dependent variable, and self-control functioned as the moderator of the path between anxiety and chocolate praline consumption. I included the same control variables as covariates. All continuous variables were standardized. As the results in Figure 4 and Table 3 (see Appendix A) specify, low collective efficacy increased anxiety ($b =$

.31, $p < .01$), which was positively correlated with the number of chocolate pralines selected ($b = .20$, $p < .01$). Self-control moderated this effect of anxiety on vice food consumption ($b = -.28$, $p < .01$), such that at lower levels of self-control, the indirect effect of collective efficacy through anxiety on vice food consumption was stronger. At low and medium levels of self-control, this indirect effect was significant (low self-control: $b_{\text{indirect}} = .15$, 95% CI: .04 to .29; medium self-control: $b_{\text{indirect}} = .06$, 95% CI: .01 to .14), whereas at high levels, the indirect effect of collective efficacy on vice food consumption through anxiety emerged as not significant ($b_{\text{indirect}} = -.02$, 95% CI: -.08 to .03). Thus, I found support for H3.

Figure 4. Study 4: Moderated mediation model



Notes: Climate change threat is high and constant. SC = Self-control. The paths in bold are statistically significant at $p < .05$.

Additional analyses. In Study 3, I tested the supremacy of anxiety over fear by using a single-item scale to measure each emotion; in Study 4, we seek to replicate those findings with multi-item measurement scales for anxiety (Kemp et al., 2014) and fear (Xie et al., 2015). Accordingly, I retested the hypothesized moderated mediation model from my main analyses, including fear as an alternative mediator. The results fully confirmed my Study 3 findings: Lower levels of collective efficacy increased both anxiety ($b = .31, p < .01$) and fear ($b = .37, p < .01$), but only anxiety ($b = .28, p = .02$), and not fear ($b = -.09, p = .45$), correlated positively with the selected number of chocolate pralines. Anxiety mediated the effects of collective efficacy on this vice food consumption, especially when consumers exhibited low and medium levels of self-control (low self-control: $b_{\text{indirect}} = .20$, 95% CI: .04 to .41; medium self-control: $b_{\text{indirect}} = .09$, 95% CI: .01 to .21; high self-control: $b_{\text{indirect}} = -.02$, 95% CI: -.16 to .08). Fear did not mediate the effect, regardless of participants' levels of self-control (low self-control: $b_{\text{indirect}} = -.07$, 95% CI: -.23 to .06; medium self-control: $b_{\text{indirect}} = -.03$, 95% CI: -.15 to .07; high self-control: $b_{\text{indirect}} = .00$, 95% CI: -.13 to .17) (for detailed results, see Appendix G).

4.5.3 Discussion

With yet another vice food product and different measurement scales for anxiety and fear, Study 3 again corroborates the mediating effect of anxiety, beyond the effect of fear. Furthermore, it reveals that the mediation by anxiety is stronger among consumers with lower levels of self-control. That is, low collective efficacy about climate change generates anxiety, which is particularly dangerous for consumers with impaired self-control, because it leads them to indulge in more vice food, with potentially harmful consequences for their health.

4.6 Study 5: Field experiment

In this final field experiment, using actual consumption of vice food, I test the hypothesized moderated mediation model in a real-life setting (Figure 2, Table 1 in Appendix A).

4.6.1 Participants and procedure

I conducted a field experiment at a European university. To recruit participants, I posted QR codes around the campus, inviting students and administrative staff to take part in focus groups to discuss climate change; I did not disclose that the focus groups were part of a study. I received interest from 191 participants, but after excluding potential participants with mental health issues, eating disorders, diabetes, food allergies, or specific diets, I were left with a sample of 133 participants. A post hoc power analysis in G*Power indicated that the final sample of 133 respondents was sufficient (power = 81%; medium effect size; 5% alpha margin error). I randomly allocated these participants to different time slots and two identical lab rooms, resulting in 12 sessions of about 11 participants each, over six days. The timing of the sessions was balanced across the experimental conditions each day. On day 1, the high collective efficacy session took place between 10:00 AM and 11:30 AM, while the low collective efficacy session took place between 5:00 PM and 6:30 PM. On day 2, the timing was reversed, with the low collective efficacy session in the morning and the high collective efficacy session in the evening. The sessions on days 3 and 5 mirrored those on day 1, and the sessions on days 4 and 6 mirrored those on day 2. Each focus group lasted approximately 90 minutes. Participants in the two rooms were unaware that they were allocated to different experimental conditions, that is, high or low collective efficacy about climate change. The severity of the climate change threat was constant and high. In each room, the instructor welcomed the participants and asked them to sit at a designated desk, which had an identification number corresponding to the participant's ID and a desk computer. Each participant found 30 potato chips packaged in a single-use bioplastic bowl placed on their desk, which they were told they could eat during the session as a thank-you for participating.

The focus group consisted of three sections. First, the participants provided their socio-demographic data and rated their green self-identity, hunger state, self-control trait (as measured in Study 3), and anxiety trait (four-item, 7-point Likert scale, e.g., “In life, I generally feel nervous,” 1 = “not at all,” 7 = “very much”; adapted from Kemp et al., 2014). Second, the participants in both conditions watched the same two-minute documentary on the severe existential threat that climate change poses to human survival. The participants in the room assigned to the high collective efficacy condition were exposed to slides depicting how humans could still do much to tackle climate change, whereas participants in the room assigned to the low collective efficacy condition saw slides indicating how humans could do nothing to tackle it. Third, participants had to write a short essay about the anxiety they might have felt; they were given some time to reflect on it before a group discussion began. The discussion in the high (vs. low) collective efficacy condition focused on how humans can (vs. cannot) do much to mitigate climate change. After the discussion, the participants completed the manipulation checks and were asked to stop eating and close the bowl. All participants were debriefed and participated in a 20-minute, efficacy-boosting session to restore their sense of hope and positive emotions. After all participants had left the room, the researcher counted the number of potato chips eaten by each participant, which served as the dependent variable for this study.

We excluded 26 participants who failed attention checks, provided incomplete responses (i.e., did not write the requested essay), or took the bowl of potato chips with them, resulting in a final sample of 107 useful responses (40.2% men, 58.9% women, 0.9% other; $M_{age} = 23.21$ years, $SD = 1.66$).

4.6.2 Results

First, to test the direct effect of collective efficacy on the amount of vice food consumed, I used a between-subjects ANCOVA with the actual number of potato chips eaten as the dependent variable, collective efficacy (0 = high, 1 = low) as the fixed factor, and age, gender,

education, economic status, economic status during childhood, green self-identity, stimuli credibility, hunger state, and anxiety trait as covariates. The results revealed that collective efficacy influenced the actual number of potato chips eaten, such that respondents in the low collective efficacy condition ate significantly more potato chips ($M = 13.02$) than those in the high collective efficacy condition ($M = 7.27$; $F(1, 96) = 5.68, p < .01$). I also found a significant effect of hunger state ($F(1, 96) = 19.05, p < .01$).

Second, to test the moderated mediation model proposed in H3, I used sentiment analysis to gauge the emotional tone of the text written by the participants (e.g., Savelle et al., 2021). Using the Valence Aware Dictionary and sEntiment Reasoner (VADER, Hutto & Gilbert, 2014), a lexicon-based dictionary available through NLTK package, I classified the text into three categories: (1) positive, (2) neutral, and (3) negative. A higher score indicated a more strongly negative level of anxiety. Then I used Hayes's (2018) PROCESS model 14 with 95% CI and 10,000 bootstrap iterations, with collective efficacy (0 = high, 1 = low) as the independent variable, anxiety as the mediator, the number of potato chips eaten as the dependent variable, and self-control as the moderator of the paths between anxiety and the number of potato chips eaten. The same covariates were included, and all continuous variables were standardized. The results in Table 4 (see Appendix A) affirm that low collective efficacy elicited anxiety ($b = 1.18, p < .01$), which correlated positively with the number of potato chips eaten ($b = .23, p = .03$). The direct effect of the manipulated factor on the number of potato chips eaten was no longer significant after introducing the mediator ($b = .15, p = .52$). I also found a significant effect of levels of hunger ($b = .49, p < .01$). Furthermore, self-control moderated the effect of anxiety on vice food consumption ($b = -.23, p = .04$), such that at lower levels of self-control, the indirect effect of collective efficacy through anxiety on vice food consumption was stronger. At low and medium levels of self-control, this indirect effect was significant (low: $b_{\text{indirect}} = .54$, 95% CI: .21 to .95; medium: $b_{\text{indirect}} = .27$, 95% CI: .05 to .54),

whereas it was no longer significant at high levels of self-control ($b_{\text{indirect}} = .00$, 95% CI: -.42 to 39), similar to Study 4 findings and in further support of H3.

4.6.3 Discussion

In Study 5, I measured anxiety with a text analysis and actual consumption of vice food in a real-life situation. Despite the more limited sample size, the field study results confirm my experimental Study 4 findings: Consumers exposed to low collective efficacy in dealing with the severe threat posed by climate change consume more vice food due to their heightened feelings of anxiety, and this effect is amplified among consumers who exhibit low self-control.

Chapter V

HOW TO MAKE THE DIFFERENCE

What we can learn from a General Discussion of findings



And so, here we are, summarizing what we have uncovered. We delved deeply into the qualitative study and tested new cause-and-effect relationships, featuring variables that had never taken center stage in this context until now. What can we learn from these discoveries?

5.1 General Discussion

Climate change is the biggest threat that modern humans have ever faced, and it is crucial to address it while still ensuring public health and well-being (United Nations, 2023). But balancing such goals can be complex because a belief that we are incapable of addressing

climate change (e.g., Priestley, 2023) can prompt unhealthy food consumption. In line with appraisal theory (Lazarus & Folkman, 1984), the findings show that climate change is commonly appraised as an existential threat, with low collective efficacy playing a crucial role in cognitive appraisal. This appraisal subsequently shapes emotional responses, with anxiety and fear emerging as the dominant reactions (Study 1). Building on these results, Study 2 demonstrates that low perceptions of collective efficacy lead to an increase in the consumption of unhealthy—but not healthy—foods. In Study 3, anxiety emerges as the primary driver of vice food consumption, outweighing the influence of other emotions, such as fear. Studies 4 and 5 further show that individuals with impaired self-control are particularly vulnerable to this effect, heightening the risk of long-term health consequences from maladaptive eating behaviors. These research findings are robust and consistent across four empirical studies, in which I used different types of vice foods (chocolate chip cookies, potato chips, chocolate pralines), assessed anxiety with diverse measurement scales and text-based sentiment analysis, and measured both intentions to consume and actual consumption of vice food.

5.2 Theoretical implications

My research findings offer three main theoretical contributions. First, I add to the research investigating the downstream effects of climate change appraisals on unhealthy food consumption. My research uniquely examines the concept of collective efficacy in the context of climate change, contrasting with prior studies that focus on individual control over personal circumstances (Lunardo et al., 2022) or specific environmental disasters (Kemp et al., 2014). Collective efficacy is more appropriate than individual efficacy given the characteristics of climate change as a global, continuous threat that individual efforts alone cannot overcome (Hamann et al., 2024; Jugert et al., 2016). As I show, for the first time, low collective efficacy about climate change leads people to indulge in more vice food. These findings align with

previous evidence that when people perceive collective efforts as insufficient, they assume there are no meaningful ways to overcome the challenges ahead (Kim et al., 2024). As a result, consumers often avoid confronting the threat directly and instead adopt avoidance-based reactions to obtain prompt relief through other means (Han et al., 2015). My findings show that perceptions of low collective efficacy about climate change specifically shift consumer preferences toward unhealthy food choices, leading to a higher consumption of vice foods but not healthy food. These findings are important considering that existing studies indicate that efficacy beliefs are crucial in strengthening sustainable eating behaviors (e.g., Mannem et al., 2023), whereas perceptions of low efficacy prompt unsustainable eating intentions and behaviors (Chen, 2022; Hunter & Röö, 2016). My results add the insight that a lack of collective efficacy about climate change also leads to behaviors that are unsustainable for consumers' health. Low collective efficacy in tackling climate change skews consumer preferences towards less healthy options, putting people's health at risk (Rodgers et al., 2023; World Health Organization, 2024).

Second, I extend literature that examines emotions into a climate change context (Clayton, 2020; Contreras et al., 2024; Odou & Schill, 2020). I show that anxiety and fear are discrete emotions that exhibit unique and asymmetric effects on vice food consumption. Adding nuance to research that identifies a general negative mood induced by climate stressors (Liu et al., 2022) or that predicts similar consequences of anxiety and fear (Kemp et al., 2014), I demonstrate that anxiety, rather than fear, correlates with increased consumption of vice food following an appraisal of low collective efficacy about climate change. Studying anxiety as a discrete emotional response aligns with recent calls to specify discrete eco-emotions (e.g., Contreras et al., 2024) and establish a solid theoretical foundation, based in psychological theories of emotion and affective (neuro)sciences. The lack of such a theoretical foundation has led researchers to conflate different emotions into a single construct, thus prompting some

concerns about the reliability of empirical research (IPCC, 2018). By grounding my research in well-established scientific frameworks of emotions, and appraisal theory in particular, I help address these concerns. Moreover, I contribute to the literature on negative emotions and unhealthy food consumption. Previous research has primarily examined how incidental emotions can lead to unhealthy eating behaviors (e.g., Garg et al., 2007; Garg & Lerner, 2013). In contrast, my study focuses on appraised integral emotions, which arise directly from individuals' appraisal of the ongoing situation and are crucial to the observed behavior. I demonstrate that anxiety, stemming from the perception of low collective efficacy in addressing climate change, specifically leads to vice food consumption.

Third, I identify self-control as a boundary condition that moderates the relationship between anxiety and vice food consumption, providing new insights into how climate change affects vulnerable consumers who struggle with self-control. Previous studies mainly use socio-demographic factors, such as race and economic status, to identify vulnerable consumers (Alm & Guttormsen, 2023; Swim et al., 2011). I establish self-control as a common trait among vulnerable consumers. This is theoretically relevant because impaired self-control is a key factor underlying multiple socio-demographic vulnerabilities, such as financial instability, poor physical health, limited educational attainment, and unstable personal relationships (Baumeister, 2002; Galla & Duckworth, 2015; Tangney et al., 2004). I show that people with low self-control lack the internal resources to cope with environmental threats, find it challenging to manage their anxiety, and resort to consuming unhealthy foods (Gailliot et al., 2007; Tangney et al., 2004; Haws et al., 2016). Those individuals facing socio-demographic vulnerabilities are often the ones most affected by the consequences of climate change (United Nations, 2017; World Bank, 2023). I show that these individuals, due to their impaired self-control, may also struggle disproportionately in managing anxiety triggered by perceptions of low collective efficacy in tackling climate change, revolving more than other consumers

towards unhealthy food to find relief. By exploring the moderating role of self-control, I advance the understanding of the coping strategies of these vulnerable consumers, potentially impacting a wide range of socio-demographic groups.

5.3 Practical implications

In recent years, public engagement with the topic of climate change has markedly increased. As of 2023, more than half of the global population reported accessing climate-related news on a weekly basis (Ejaz et al., 2023). Additionally, 40% of social media users worldwide have expressed a keen interest in climate news (Statista, 2023). Notably, the way climate change is presented in the media often undermines the belief in collective action. Coverage tends to highlight the catastrophic, seemingly insurmountable effects of climate change, framing it as a biophysical problem beyond the scope of human intervention (Hart & Feldman, 2014). An analysis of newspapers with a combined circulation exceeding 15 million showed a predominance of disaster narratives, primarily focusing on catastrophic outcomes (Painter, 2013). This ‘doom and gloom’ approach is in line with a recent call from the United Nations (2022) urging journalists to steer clear of reporting that fosters a sense of collective helplessness. Concurrently, there is a noticeable lack of reporting on viable solutions for effective climate change mitigation and adaptation, leading to significant underreporting in these critical areas (O’Neill et al., 2015; Perga et al., 2023). As a consequence, millions are exposed to dramatized portrayals of climate threats without adequate coverage of human capabilities to counter these challenges, potentially fueling widespread anxiety (McLoughlin, 2021).

Recent data highlight a troubling trend: anxiety related to climate change and the perceived ineffectiveness of human actions is on the rise. For example, Google searches on this topic surged dramatically, with English-language searches increasing 27 times in the first ten

months of 2023 compared to the same period in 2017 (Moench, 2023). This sense of collective inefficacy, coupled with resultant anxiety, is now recognized as an emerging mental health issue, especially prevalent among children and adolescents (World Economic Forum, 2022). A significant number, 67% of younger Americans, express concerns about how this perception of inefficacy and the accompanying anxiety negatively impact their mental health (Clayton et al., 2021). This growing belief that effective actions are unattainable is contributing to a health crisis, with potential implications for unhealthy eating habits worldwide (World Economic Forum, 2022).

5.3.1 Policy and societal implications

Cultivating a sense of collective efficacy about tackling climate change is thus crucial to counter this escalating crisis. Policymakers and the media should endeavor to encourage a shared sense that joint efforts can effectively mitigate the threats posed by climate change (Jugert et al., 2016), which can increase consumers' engagement in climate change actions (Chen, 2015) but also avoid their overconsumption of unhealthy foods. Different strategies can help increase perceptions of collective efficacy, such as instilling hope (Ojala, 2023) or “historizing” the present (Goor et al., 2024).

The positive emotion of hope arises when people believe that things can and will improve and thus view the future in a positive, agentic way (Lazarus, 1991). Hope-based appeals focus on positive narratives that emphasize the potential for meaningful change and set achievable climate goals. This approach encourages individuals to see how their collective efforts can make a difference. By acknowledging the severity of climate change while underscoring practical steps that individuals can collectively take, hope-based messaging acts as a powerful motivational tool (Snyder et al., 2000; Lagomarsino & Lemarié, 2017). It fosters “constructive hope”, which is about setting realistic goals and recognizing how small, significant actions can contribute to broader solutions (Ojala, 2012). Policymakers can leverage

this constructive hope by empowering people to see collective roles in tackling climate change. Showcasing real-world examples of successful interventions can vividly demonstrate the impactful roles humans can play in driving positive environmental changes. For example, Sparknews publishes reports of successful collective initiatives and sustainable practices in eating, dressing, working, moving, and learning providing concrete examples of positive change; Greenpeace shares the stories of millions of people tackling altogether climate impacts.

Another effective method to cultivate constructive hope is through positive thinking strategies, such as positive reappraisal. This technique acknowledges the presence of a threat but reframes the situation to emphasize its positive aspects or potential for improvement (Ojala, 2012). This strategy is particularly valuable in the context of climate change communication. Policymakers can present climate change not just as a daunting challenge but also as an opportunity for positive transformation. By emphasizing the progress already achieved in the collective fight against climate change, this approach inspires audiences to embrace alternative narratives that focus on promising advancements and the potential for further positive impacts. For example, *Euronews* offers real, positive environmental news that demonstrates how ongoing efforts are already making a difference. Readers thus gain a sense that positive change is realistically possible and already happening.

Historizing the present (i.e., highlighting the historical significance of the current moment) also can increase perceptions of collective efficacy, because people feel empowered when they understand the long-term impacts of their efforts (Goor et al., 2024). Policymakers and media outlets could highlight how collective efforts to tackle climate change can profoundly influence the future and shape history meaningfully, with phrases such as “Today we are making history together,” “Shaping history together,” or “Changing the course of history together.” The U.S. Civil Rights Movement offers an inspiring example of how framing a present challenge within a broader historical context can bolster confidence in humanity’s

capacity to effect change. Civil rights leaders, such as Martin Luther King Jr., skillfully positioned the efforts of individuals within a historical narrative, emphasizing the enduring impact of their contributions to long-term change (NAACP, 2023). King highlighted that their actions were part of a long historical arc, emphasizing the need for decisive action in the present and famously declaring, “The choice is ours, and though we might prefer it otherwise, we must choose in this crucial moment of human history.” This perspective encouraged individuals to view their efforts as both significant and integral to the broader pursuit of change. Similarly, by portraying the collective effort to combat climate change as a critical juncture in history, policymakers can strengthen people’s belief in the transformative power of their actions, reinforcing the idea that today’s decisions will significantly shape the future. Moreover, referencing past collective successes can further enhance confidence in humanity’s current ability to drive substantial change (Goor et al., 2024). The publication *Our World in Data* provides examples of global progress on various issues, including how past generations have addressed seemingly insurmountable challenges. These messages should inspire people and provide a roadmap for overcoming their anxiety about tackling the climate crisis.

Considering the increased consumption of unhealthy foods among consumers with low self-control, when they experience anxiety from a perceived lack of collective efficacy about climate change, targeted interventions for vulnerable groups are essential. Research indicates that self-control is one of the least common character strengths globally, affecting both adults and children (Duckworth & Seligman, 2017). This issue is particularly acute among younger individuals, those with lower educational levels (Baumeister, 2002), lower socioeconomic status (Bradley & Corwyn, 2002), and those exposed to adverse conditions such as crime, violence, or dysfunctional family environments (Vazsonyi & Huang, 2010). Supporting individuals facing impaired self-control can foster resilience by promoting adaptive behaviors temporarily diverging from their usual patterns (Fleeson et al., 2002; Zelenski et al., 2012).

Policymakers can create choice environments that naturally encourage beneficial behaviors, reducing the reliance on personal self-control. This method, known as “nudging,” modifies the decision-making context to foster better choices effortlessly (Hofmann et al., 2024). An example of this is setting healthier meal options as the default in food assistance programs, particularly for families with lower socioeconomic status who lives in areas at high risks of environmental disasters.

Moreover, improving access to information and education is crucial, as it equips people with the tools to enhance their self-regulation skills and make healthier decisions (Francke & Carrete, 2023). Policymakers might consider educational programs that focus on emotion regulation strategies (Kemp et al., 2020) and enlighten consumers about the often-unconscious drivers of their unhealthy dietary choices. A practical approach might be to integrate lessons on managing consumption choices into school curricula. Teaching such skills early might foster more resilient self-control that can withstand the rigors of the environment. Such a proactive educational strategy not only informs but also empowers young people, equipping them with the necessary tools for healthier, more sustainable living—even as they confront the existential threat of climate change (St. John & Glass, 2024).

5.3.2 Managerial implications

Marketers need to develop profitable win-win solutions to help consumers better address the effect of climate change’s threat. My findings show that when consumers feel a low sense of collective efficacy in addressing climate change, they are more likely to choose unhealthy foods, driven by anxiety. To counter this behavior, food marketers can display educational messages that link healthy eating to positive emotional outcomes, such as ‘a healthy diet brings happiness,’ especially during times of peak climate-related concerns. By tapping into positive emotions at the point of purchase, these messages can shift consumer beliefs about the emotional benefits of healthy eating and promote healthier emotion regulation (Liu et al., 2022).

Marketers can also consider offering flexible pricing and promotional tactics on healthy foods during these periods. For example, they might introduce limited-time discounts, bundle deals, or loyalty rewards that make nutritious options more affordable and appealing.

Another strategy is to market healthier food options as a way for consumers to positively contribute to the environment, which may help restore their sense of agency and reduce anxiety. For example, marketers might highlight how healthier products that are also organically grown help reduce carbon emissions, conserve water, and support biodiversity. Demonstrating the specific environmental benefits, such as lowered carbon footprints or reduced waste, helps consumers see tangible, twofold outcomes of their purchasing decisions. This approach reinforces the message that opting for healthier foods can simultaneously benefit both personal well-being and the planet.

Additionally, brands that aim to support their customers' health should avoid promoting unhealthy foods during major climate-related events. Advertising vice foods at these times, when people feel a strong sense of low collective efficacy, can be detrimental, as it may increase anxiety and drive unhealthy consumption behaviors.

5.4 Limitations and further research

This study has certain limitations, which provide avenues for further research. First, my research focus is on collective efficacy, or beliefs in humanity's ability to tackle complex issues, such as climate change. The global threat of climate change clearly exceeds the capabilities of any one individual, so perceptions of collective efforts are primary, but as research has shown, collective efficacy relates to self-efficacy in relation to pro-climate actions. For example, Jugert et al. (2016) demonstrate that manipulations of collective efficacy can increase pro-environmental intentions by boosting perceptions that the group, and thus the individual self, is capable of effecting change. Furthermore, collective efficacy manipulations only appear to

work when they raise self-efficacy. In addition, van Zomeren et al. (2013) propose the concept of participative efficacy, or the belief that a person can make a difference by contributing to collective efforts to achieve group goals. I thus call for continued research into the interplay of collective, self, and participative efficacy that can establish their combined, comprehensive impact on eco-anxiety and its outcomes, including vice food consumption.

Second, my findings consistently indicate that low collective efficacy about climate change leads to increased anxiety and consumption of vice foods. While existing research has determined that when humans experience low self-efficacy and anxiety, biological motives drive their vice food consumption (e.g., Berridge et al., 2010), I cannot rule out the possibility that cultural variables partially influence this effect. These studies all involve Western consumers; consumers from non-Western cultures may have different perceptions and habits regarding vice foods (Askegaard et al., 2014), as well as respond to low self-efficacy and anxiety differently. For example, research suggests that consumers from tight versus loose cultures respond differently to threat signals (Gupta & Hagtvedt, 2021). Insights into how culture shapes the effect of anxiety resulting from low collective efficacy on the consumption of vice food would enhance a theoretical understanding of the phenomenon and provide policymakers with valuable information to develop tailored interventions across different cultures.

Third, I have proposed specific strategies to improve collective efficacy about climate change and reduce anxiety-driven vice food consumption, like instilling hope (Ojala, 2023) and historicizing the present (Goor et al., 2024). However, I have not tested these strategies empirically. I welcome research that seeks to examine the effectiveness of these strategies, such as by deriving ways for policymakers to balance hope and realism to mitigate anxiety and vice food consumption, without inducing reactance. Another relevant research goal would be to identify the most effective strategies for historicizing the present and determine whether those

strategies should be tailored to specific consumer segments or cultures, such as those with distinct temporal orientations. The knowledge thus gained would be essential for designing effective, evidence-based interventions that encourage well-being and healthier food choices, even in the face of climate change challenges.

Conclusion

ONCE UPON A TIME...

Whether, why, and when climate change affects individuals' vice food consumption



Embarking on this research journey into how individuals perceive the complex and far-reaching issue of climate change has been both challenging and enlightening. Climate change resonates deeply with people, affecting their lives in ways they may not even realize. What became increasingly evident throughout this work is how profoundly climate change influences aspects of human behavior that we often overlook.

For example, I did not initially expect that exposure to climate change communication could affect something as personal as food choices. Could it really influence whether I choose

healthy or unhealthy food when both options are available? It seems improbable, right? However, it does.

Through this research, I found that subtle cues about low collective efficacy in addressing the existential threat of climate change can shape behaviors, pushing individuals toward unhealthy food consumption. I discovered that this is driven by anxiety alone, as fear does not seem to play the same role; this insight challenged many assumptions. I also realized that these effects are even more damaging for already vulnerable populations with impaired self-control—an important and, at times, painful revelation.

This research is just a step along my journey. A small point in the world from which I will continue to dig deeper, explore further, and uncover more. So, I cannot say, “The end,” because this is only the beginning. You and I are about to start a new journey together.

Take a moment. Relax. Clear your mind of any distractions. Let the world around you fade away, leaving only the story ahead. What are you waiting for?

Begin and read: *Once upon a time...*

Acknowledgments



Copyright Asanka Ratnayake

This work is the result of three years spent trying to understand how people perceive, experience, and cope with climate change. Three years of conversations with women, men, and children; countless experiments; and rich discussions with professors, colleagues, students, and friends. Let me begin by honoring those who supported me through this complex journey.

To my mentors, Professor Alberto Pastore and Professor Camilla Barbarossa. I appreciate you beyond words for stepping out of the paradigm and blazing the trail. I have come to understand that research can be a difficult and sometimes solitary path, but you have opened new portals within me. Your courage inspired my own. You have taught me everything I know, providing feedback and allowing me to improve and develop this work to the smallest detail.

Thank you for challenging me in my evolution. Thank you for believing in me before I knew how.

To the professors and colleagues in the Department of Management of Sapienza University of Rome who offered support whenever I needed it: thank you.

Special thanks to my colleagues and friends: Francesco—my second reviewer in the qualitative study—and Sara. You accompanied me throughout this journey, supporting me and putting up with me. I could not have asked for better traveling companions.

To Francesca. My life would have been undeniably darker if I hadn't met you. You are the one.

To my family and dear friends, ever-present and endlessly supportive, thank you.

To the one who has stood by me throughout my life: Davide.

Thank you for truly seeing me, hearing me, and always challenging me. It is an honor to have you by my side.

Finally, to all the young climate activists who strike for the climate and to everyone fighting for social justice, civil rights, and a better world—to whom I dedicate this work. I wish I could name each of you. You are the affirmation of the life force that drives us human beings to create a meaningful life, regardless of the obstacles we encounter.

Parts of this work were written as I traveled the world through dance, my life's other half. Within these pages lie pieces of the world I was fortunate enough to experience, fragments of the art that led me to those places, the spirits of my fellow adventurers, and the energy of those I encountered along the way.

Thank you.

References

- Abbey, J. D., & Meloy, M. G. (2017). Attention by design: Using attention checks to detect inattentive respondents and improve data quality. *Journal of Operations Management*, 53, 63–70.
- Adeola, F. (2000). Endangered community, enduring people: Toxic contamination, health, and adaptive responses in a local context. *Environment and Behavior*, 32, 209–249.
- Ágoston, C., Csaba, B., Nagy, B., Kőváry, Z., Dúll, A., Rácz, J., & Demetrovics, Z. (2022). Identifying types of eco-anxiety, eco-guilt, eco-grief, and eco-coping in a climate-sensitive population: A qualitative study. *International Journal of Environmental Research and Public Health*, 19(4), 2461.
- Albrecht, G., Sartore, G. M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., ... & Pollard, G. (2007). Solastalgia: the distress caused by environmental change. *Australasian Psychiatry*, 15, S95–S98.
- Albrecht, G. (2011). Chronic environmental change: Emerging ‘psychoterratic’ syndromes. *Climate Change and Human Well-being: Global Challenges and Opportunities*, 43–56.
- Alm, K., & Guttormsen, D. S. (2023). Enabling the voices of marginalized groups of people in theoretical business ethics research. *Journal of Business Ethics*, 182, 303–320.
- Alzubaidi, H., Slade, E. L., & Dwivedi, Y. K. (2021). Examining antecedents of consumers’ pro-environmental behaviours: TPB extended with materialism and innovativeness. *Journal of Business Research*, 122, 685–699.
- Anderson, C. A. (2001). Heat and violence. *Current Directions in Psychological Science*, 10(1), 33–38.
- Antonetti, P., & Maklan, S. (2014). Feelings that make a difference: How guilt and pride convince consumers of the effectiveness of sustainable consumption choices. *Journal of Business Ethics*, 124, 117–134.

- Askegaard, S., Ordabayeva, N., Chandon, P., Cheung, T., Chytкова, Z., Cornil, Y.... & Werle, C. (2014). Moralities in food and health research. *Journal of Marketing Management*, 30(17), 1800–1832.
- Bamberg, S., Masson, T., Brewitt, K., & Nemetschek, N. (2017). Threat, coping and flood prevention—A meta-analysis. *Journal of Environmental Psychology*, 54, 116–126.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147.
- Bandura, A. (1988). Self-efficacy conception of anxiety. *Anxiety Research: An International Journal*, 1, 77–98.
- Baumeister, R. F. (2002). Yielding to temptation: Self-control failure, impulsive purchasing, and consumer behavior. *Journal of Consumer Research*, 28(4), 670–676.
- Baumeister, R. F., & Juola Exline, J. (1999). Virtue, personality, and social relations: Self-control as the moral muscle. *Journal of Personality*, 67(6), 1165–1194.
- Berridge, K. C., Ho, C. Y., Richard, J. M., & DiFeliceantonio, A. G. (2010). The tempted brain eats: Pleasure and desire circuits in obesity and eating disorders. *Brain Research*, 1350, 43–64.
- Berry, H. L., & Peel, D. (2015). Worrying about climate change: is it responsible to promote public debate?. *BJPsych International*, 12(2), 31–32.
- Bilotta, E., Vaid, U., & Evans, G. W. (2018). Environmental stress. *Environmental Psychology: An introduction*, 36–44.
- Biswas, D., & Szocs, C. (2019). The smell of healthy choices: Cross-modal sensory compensation effects of ambient scent on food purchases. *Journal of Marketing Research*, 56(1), 123–141.

- Boluda-Verdu, I., Senent-Valero, M., Casas-Escolano, M., Matijasevich, A., & Pastor-Valero, M. (2022). Fear for the future: Eco-anxiety and health implications, a systematic review. *Journal of Environmental Psychology, 84*, 101904.
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*(1), 371–399.
- Brosch, T., & Sauter, D. (2023). Emotions and the climate crisis: A research agenda for an affective sustainability science. *Emotion Review, 15*(4), 253–257.
- Campbell, M. C., Inman, J. J., Kirmani, A., & Price, L. L. (2020). In times of trouble: A framework for understanding consumers' responses to threats. *Journal of Consumer Research, 47*(3), 311–326.
- Campbell, N., Sinclair, G., & Browne, S. (2019). Preparing for a world without markets: Legitimising strategies of preppers. *Journal of Marketing Management, 35*(9), 798–817.
- Carmi, N., & Kimhi, S. (2015). Further than the eye can see: Psychological distance and perception of environmental threats. *Human and Ecological Risk Assessment: An International Journal, 21*(8), 2239–2257.
- Centers for Disease Control and Prevention (CDCP) (2024). About obesity. Retrieved September 14, 2024: <https://www.cdc.gov/obesity/php/about/index.html>.
- Chen, M. F. (2015). Self-efficacy or collective efficacy within the cognitive theory of stress model: Which more effectively explains people's self-reported pro environmental behavior? *Journal of Environmental Psychology, 42*, 66–75.
- Chen, M. F. (2022). To combine or not to combine? Applying protection motivation theory and the theory of reasoned action to explain and predict intention to reduce meat consumption. *Journal of Applied Social Psychology, 52*(2), 115–130.
- Clayton, S. (2020). Climate anxiety: Psychological responses to climate change. *Journal of Anxiety Disorders, 74*, 1–7.

- Clayton, S., & Karazsia, B. T. (2020). Development and validation of a measure of climate change anxiety. *Journal of Environmental Psychology*, 69, 101434.
- Clayton, S., Manning, C., Krygsman, K., & Speiser, M. (2017). *Mental health and our changing climate: Impacts, implications, and guidance*. Washington, DC: American Psychological Association and ecoAmerica.
- Clayton, S., & Ogunbode, C. (2023). Looking at emotions to understand responses to environmental challenges. *Emotion Review*, 15(4), 275–278.
- Coffey, Y., Bhullar, N., Durkin, J., Islam, M. S., & Usher, K. (2021). Understanding eco-anxiety: A systematic scoping review of current literature and identified knowledge gaps. *The Journal of Climate Change and Health*, 3, 100047.
- Contreras, A., Blanchard, M. A., Mouguiama-Daouda, C., & Heeren, A. (2024). When eco-anger (but not eco-anxiety nor eco-sadness) makes you change! A temporal network approach to the emotional experience of climate change. *Journal of Anxiety Disorders*, 102, 1–8.
- Convertino, A. D., Morland, L. A., & Blashill, A. J. (2022). Trauma exposure and eating disorders: Results from a United States nationally representative sample. *International Journal of Eating Disorders*, 55, 1079–1089
- Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks: Sage Publications.
- Creswell, J. W., & Plano Clark, V. (2007). *Designing and conducting mixed methods research*. Thousand Oaks: Sage Publications.
- Cunsolo, A., & Ellis, N. R. (2018). Ecological grief as a mental health response to climate change-related loss. *Nature Climate Change*, 8(4), 275–281.
- De Leeuw, A., Valois, P., Ajzen, I., & Schmidt, P. (2015). Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students:

- Implications for educational interventions. *Journal of Environmental Psychology*, 42, 128–138.
- De Vos, S., Crouch, R., Quester, P., & Ilicic, J. (2017). Examining the effectiveness of fear appeals in prompting help-seeking: The case of at-risk gamblers. *Psychology & Marketing*, 34(6), 648–660.
- Davis, M., Walker, D. L., Miles, L., & Grillon, C. (2010). Phasic vs sustained fear in rats and humans: role of the extended amygdala in fear vs anxiety. *Neuropsychopharmacology*, 35(1), 105–135.
- Deshpande, R. (1983). Paradigms lost: On theory and method in research in marketing. *Journal of Marketing*, 47(3), 101–110.
- Ding, Y., Zhong, J., Guo, G., & Chen, F. (2021). The impact of reduced visibility caused by air pollution on construal level. *Psychology & Marketing*, 38(1), 129–141.
- Dodds, J. (2021). The psychology of climate anxiety. *BJPsych Bulletin*, 45(4), 222–226.
- Doherty, T. J., & Clayton, S. (2011). The psychological impacts of global climate change. *American Psychologist*, 66(4), 265–276.
- Doran, R., Hanss, D., & Larsen, S. (2015). Attitudes, efficacy beliefs, and willingness to pay for environmental protection when traveling. *Tourism and Hospitality Research*, 15(4), 281–292.
- Duckworth, A. L., & Seligman, M. E. (2017). The science and practice of self-control. *Perspectives on Psychological Science*, 12(5), 715–718.
- Duhachek, A. (2005). Coping: A multidimensional, hierarchical framework of responses to stressful consumption episodes. *Journal of Consumer Research*, 32(1), 41–53.
- Ejaz, W., Mukherjee, M., & Fletcher, R. (2023). *Climate change news audiences: Analysis of news use and attitudes in eight countries*. Reuters Institute for the Study of Journalism.

- Ertz, M., Karakas, F., & Sarigöllü, E. (2016). Exploring pro-environmental behaviors of consumers: An analysis of contextual factors, attitude, and behaviors. *Journal of Business Research*, 69(10), 3971–3980.
- Finkelstein, S. R., & Fishbach, A. (2010). When healthy food makes you hungry. *Journal of Consumer Research*, 37(3), 357–367.
- Fleeson, W., Malanos, A. B., & Achille, N. M. (2002). An intraindividual process approach to the relationship between extraversion and positive affect: Is acting extraverted as “good” as being extraverted. *Journal of Personality and Social Psychology*, 83(6), 1409–1422.
- Francke, A. E., & Carrete, L. (2023). Consumer self-regulation: Looking back to look forward. A systematic literature review. *Journal of Business Research*, 157, 1–20.
- Franzen, J. (2019). What if we stopped pretending? The climate apocalypse is coming. To prepare for it, we need to admit that we can’t prevent it. Retrieved May 7, 2024 <https://www.newyorker.com/culture/cultural-comment/what-if-we-stopped-pretending>.
- Fredericks, S. E. (2021). *Environmental guilt and shame: signals of individual and collective responsibility and the need for ritual responses*. Oxford University Press.
- Fritze, J. G., Blashki, G. A., Burke, S., & Wiseman, J. (2008). Hope, despair and transformation: Climate change and the promotion of mental health and wellbeing. *International Journal of Mental Health Systems*, 2(13), 1–10.
- Gailliot, M. T., Schmeichel, B. J., & Maner, J. K. (2007). Differentiating the effects of self-control and self-esteem on reactions to mortality salience. *Journal of Experimental Social Psychology*, 43(6), 894–901.
- Galla, B. M., & Duckworth, A. L. (2015). More than resisting temptation: Beneficial habits mediate the relationship between self-control and positive life outcomes. *Journal of Personality and Social Psychology*, 109(3), 508–525.

- Galea, S., Nandi, A., & Vlahov, D. (2005). The epidemiology of posttraumatic stress disorder after disasters. *Epidemiologic Reviews*, 27, 78–91.
- Garg, N., & Lerner, J. S. (2013). Sadness and consumption. *Journal of Consumer Psychology*, 23(1), 106–113.
- Garg, N., Wansink, B., & Inman, J. J. (2007). The influence of incidental affect on consumers' food intake. *Journal of Marketing*, 71(1), 194–206.
- Golder, S., & Graham, H. (2024). Social media engagement in health and climate change: an exploratory analysis of Twitter. *Environmental Research: Health*, 2(2), 1–9.
- Goor, D., Keinan, A., & Ordabayeva, N. (2024). Historizing the present: Research agenda and implications for consumer behavior. *Journal of Consumer Psychology*, 00, 1–23.
- Graton, A., Ric, F., & Gonzalez, E. (2016). Reparation or reactance? The influence of guilt on reaction to persuasive communication. *Journal of Experimental Social Psychology*, 62, 40–49.
- Gupta, T., & Hagtvedt, H. (2021). Safe together, vulnerable apart: How interstitial space in text logos impacts brand attitudes in tight versus loose cultures. *Journal of Consumer Research*, 48(3), 474–491.
- Hamann, K. R., Wullenkord, M. C., Reese, G., & van Zomeren, M. (2024). Believing that we can change our world for the better: A Triple-A (Agent-Action-Aim) Framework of self-efficacy beliefs in the context of collective social and ecological aims. *Personality and Social Psychology Review*, 28(1), 11–53.
- Han, D., Duhachek, A., & Rucker, D. D. (2015). Distinct threats, common remedies: How consumers cope with psychological threat. *Journal of Consumer Psychology*, 25(4), 531–545.
- Harth, N. S. (2021). Affect,(group-based) emotions, and climate change action. *Current Opinion in Psychology*, 42, 140–144.

- Hart, P. S., & Feldman, L. (2014). Threat without efficacy? Climate change on US network news. *Science Communication*, 36(3), 325–351.
- Haws, K. L., Davis, S. W., & Dholakia, U. M. (2016). Control over what? Individual differences in general versus eating and spending self-control. *Journal of Public Policy & Marketing*, 35(1), 37–57.
- Hayes, A. F. (2018). *Introduction to Mediation, Moderation, and Conditional Process Analysis a Regression-Based Approach*. New York: Guilford.
- Heeren, A., & Asmundson, G. J. (2023). Understanding climate anxiety: What decision-makers, health care providers, and the mental health community need to know to promote adaptative coping. *Journal of Anxiety Disorders*, 93, 1–4.
- Helm, S., Kemper, J. A., & White, S. K. (2021). No future, no kids—no kids, no future? An exploration of motivations to remain childfree in times of climate change. *Population and Environment*, 43, 108–129.
- 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.
- Hillebrandt, A., & Barclay, L. J. (2017). Comparing integral and incidental emotions: Testing insights from emotions as social information theory and attribution theory. *Journal of Applied Psychology*, 102(5), 732–752.
- Hofmann, W., Grelle, S., Nielsen, K., & Kukowski, C. (2024). Self-control and behavioral public policy. *Current Opinion in Psychology*, 59, 1–6.
- Hogg, T. L., Stanley, S. K., O'Brien, L. V., Wilson, M. S., & Watsford, C. R. (2021). The Hogg Eco-Anxiety Scale: Development and validation of a multidimensional scale. *Global Environmental Change*, 71, 1–13.

- Homburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology*, 26(1), 1–14.
- Hunter, E., & Rööß, E. (2016). Fear of climate change consequences and predictors of intentions to alter meat consumption. *Food Policy*, 62, 151–160.
- Huntley, R. (2020). Stop making sense: why it's time to get emotional about climate change. Retrieved July 7, 2024: <https://www.theguardian.com/environment/2020/jul/05/stop-making-sense-why-its-time-to-get-emotional-about-climate-change> .
- Hutto, C., & Gilbert, E. (2014). Vader: A parsimonious rule-based model for sentiment analysis of social media text. In *Proceedings of the international AAAI conference on web and social media*, 8(1), 216–225.
- IPCC (2018). Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Retrieved April 30, 2024: https://www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SR15_Full_Report_HR.pdf.
- IPCC (2022). Climate Change 2022: Impacts, adaptation and vulnerability. Retrieved September 4, 2024: <https://www.ipcc.ch/report/ar6/wg2/>.
- IPCC (2023). Climate change. Retrieved September 4, 2024: <https://www.ipcc.ch/report/ar6/syr/> .
- Jannat, T., Alam, S. S., Ho, Y. H., Omar, N. A., & Lin, C. Y. (2022). Can corporate ethics programs reduce unethical behavior? Threat appraisal or coping appraisal. *Journal of Business Ethics*, 1–17.

- Jaud, D. A., & Lunardo, R. (2022). Serial coping to anxiety under a pandemic and subsequent regulation of vice food and beverage consumption among young adults. *Journal of Consumer Affairs*, 56(1), 237–256.
- Jones, C., Hine, D. W., & Marks, A. D. (2017). The future is now: Reducing psychological distance to increase public engagement with climate change. *Risk Analysis*, 37(2), 331–341.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14–26.
- Jugert, P., Greenaway, K. H., Barth, M., Büchner, R., Eisentraut, S., & Fritzsche, I. (2016). Collective efficacy increases pro-environmental intentions through increasing self-efficacy. *Journal of Environmental Psychology*, 48, 12–23.
- Kabat-Farr, D., Walsh, B. M., & McGonagle, A. K. (2019). Uncivil supervisors and perceived work ability: The joint moderating roles of job involvement and grit. *Journal of Business Ethics*, 156, 971–985.
- Kalisch, R., Wiech, K., Critchley, H. D., Seymour, B., O'doherty, J. P., Oakley, D. A., ... & Dolan, R. J. (2005). Anxiety reduction through detachment: subjective, physiological, and neural effects. *Journal of Cognitive Neuroscience*, 17(6), 874–883.
- Kaławak, W., & Weihgold, V. (2022). The relationality of ecological emotions: An interdisciplinary critique of individual resilience as psychology's response to the climate crisis. *Frontiers in Psychology*, 13, 1–10.
- Keeling, D. I., de Ruyter, K., & Laing, A. (2022). Consumer (dis) engagement coping profiles using online services in managing health-related stressors. *Psychology & Marketing*, 39(12), 2205–2220.

- Kemp, E., Cowart, K., & Bui, M. M. (2020). Promoting consumer well-being: Examining emotion regulation strategies in social advertising messages. *Journal of Business Research*, 112, 200-209.
- Kemp, E., Kennett-Hensel, P. A., & Williams, K. H. (2014). The calm before the storm: Examining emotion regulation consumption in the face of an impending disaster. *Psychology & Marketing*, 31(11), 933–945.
- Kennett-Hensel, P. A., Sneath, J. Z., & Lacey, R. (2012). Liminality and consumption in the aftermath of a natural disaster. *Journal of Consumer Marketing*, 29(1), 52–63.
- Kim, K., Jhang, J., Song, S., Shin, H., & Song, S. (2024). Goal proximity effect on collective action: The mediating role of perceived behavioral impact and collective outcome expectancy. *Journal of Business Research*, 178, 1–23.
- King, N., & Horrocks, C. (2010). *Interviews in Qualitative Research*. Sage:London.
- Kurth, C., & Pihkala, P. (2022). Eco-anxiety: What it is and why it matters. *Frontiers in Psychology*, 13, 1–13.
- Kutlaca, M., van Zomeren, M., & Epstude, K. (2019). Our right to a steady ground: Perceived rights violations motivate collective action against human-caused earthquakes. *Environment and Behavior*, 51(3), 315–344.
- Lagomarsino, M., & Lemarié, L. (2017, June). Should We Hope About Climate Change? The Power of Hope for Engaging in Pro-environmental Behaviors: An Abstract. In *Academy of Marketing Science World Marketing Congress* (pp. 253–254). Springer, Cham.
- Landmann, H. (2020). Emotions in the context of environmental protection: Theoretical considerations concerning emotion types, eliciting processes, and affect generalization. *Umweltpsychologie*, 24(2), 61–73.
- Laran, J. (2020). Self-control: Information, priorities, and resources. *Consumer Psychology Review*, 3(1), 91–107.

- Laufer, D., Silver, D. H., & Meyer, T. (2005). Exploring differences between older and younger consumers in attributions of blame for product harm crises. *Academy of Marketing Science Review*, 7, 1–24.
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Lazarus, R. S. (2006). Emotions and interpersonal relationships: Toward a person-centered conceptualization of emotions and coping. *Journal of Personality*, 74(1), 9–46.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Liberman, N., & Trope, Y. (2008). The psychology of transcending the here and now. *Science*, 322(5905), 1201–1205.
- Liu, J., Zou, P., & Ma, Y. (2022). The effect of air pollution on food preferences. *Journal of the Academy of Marketing Science*, 50(2), 410–423.
- Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17(3), 445–459.
- Lu, J. G., Lee, J. J., Gino, F., & Galinsky, A. D. (2018). Polluted morality: Air pollution predicts criminal activity and unethical behavior. *Psychological Science*, 29(3), 340–355.
- Lunardo, R., Jaud, D., & Jaspers, E. (2022). Engagement in vice food and beverage consumption: The role of perceived lack of control. *Psychology & Marketing*, 39(12), 2221–2239.
- Macy J. (1983). *Despair and Personal Power in the Nuclear Age*. Philadelphia, PA: New Society Publishers.
- Mallett, R. K., Melchiori, K. J., & Strickroth, T. (2013). Self-confrontation via a carbon footprint calculator increases guilt and support for a proenvironmental group. *Ecopsychology*, 5(1), 9–16.

- Mannem, A., Tangari, A. H., & Baran, M. J. (2023). I've got the power: Encouraging pro-environmental behavior through messaging. *Journal of Business Research*, 168, 1–13.
- Marshall, R. D., Bryant, R. A., Amsel, L. Suh, E. J., Cook, J. M. & Neria, Y. (2007). The psychology of ongoing threat: Relative risk appraisal, the September 11 attacks, and terrorism-related fears. *American Psychologist*, 62, 304–316.
- Martins, C. M., Block, L. G., & Dahl, D. W. (2015). Can hand washing influence hedonic food consumption? *Psychology & Marketing*, 32(7), 742–750.
- McGinn (2019). 2019's biggest pop-culture trend was climate anxiety. Retrieved 29 August, 2024: <https://grist.org/politics/2019s-biggest-pop-culture-trend-was-climate-anxiety/> .
- McLoughlin, N. (2021). Communicating efficacy: How the IPCC, scientists, and other communicators can facilitate adaptive responses to climate change without compromising on policy neutrality. *Climatic Change*, 169(5), 1–14.
- Meehl, G. A., & Tebaldi, C. (2004, August 13). More intense, more frequent, and longer lasting heat waves in the 21st century. *Science*, 305, 994–997
- Meijnders, A. L., Midden, C. J., & Wilke, H. A. (2001). Role of negative emotion in communication about CO2 risks. *Risk Analysis*, 21(5), 955–955.
- Milman, O., Witherspoon, A., Liu, R. & Chang, A. (2021). The climate disaster is here – this is what the future looks like. Retrieved October 05, 2024: <https://www.theguardian.com/environment/ng-interactive/2021/oct/14/climate-change-happening-now-stats-graphs-maps-cop26>.
- Mishra, A., & Mishra, H. (2011). The influence of price discount versus bonus pack on the preference for virtue and vice foods. *Journal of Marketing Research*, 48(1), 196–206.
- Mkono, M., & Hughes, K. (2020). Eco-guilt and eco-shame in tourism consumption contexts: Understanding the triggers and responses. *Journal of Sustainable Tourism*, 28(8), 1223–21244.

- Moench, M. (2023). New data shows a global surge in searches related to ‘climate anxiety’. Retrieved September 16, 2024: <https://time.com/6338759/climate-change-anxiety-google-search-trend/>.
- Morales, A. C., Amir, O., & Lee, L. (2017). Keeping it real in experimental research—Understanding when, where, and how to enhance realism and measure consumer behavior. *Journal of Consumer Research*, 44(2), 465–476.
- Morton, T. A., Rabinovich, A., Marshall, D., & Bretschneider, P. (2011). The future that may (or may not) come: How framing changes responses to uncertainty in climate change communications. *Global Environmental Change*, 21(1), 103–109.
- Motoki, K., Saito, T., Nouchi, R., Kawashima, R., & Sugiura, M. (2019). Anxiety increases visual attention to hedonic foods: A preliminary eye-tracking study on the impact of the interplay between integral and incidental affect on foods. *Appetite*, 137, 218–225.
- NACCP (2023). Martin Luther King, Jr. Retrieved October 06, 2024: <https://naacp.org/find-resources/history-explained/civil-rights-leaders/martin-luther-king-jr>.
- Nguyen, T. N., Lobo, A., & Greenland, S. (2016). Pro-environmental purchase behaviour: The role of consumers' biospheric values. *Journal of Retailing and Consumer Services*, 33, 98–108.
- O'Loughlin, I., & Newton-John, T. R. (2019). ‘Dis-comfort eating’: an investigation into the use of food as a coping strategy for the management of chronic pain. *Appetite*, 140, 288–297.
- O'Neill, S., & Nicholson-Cole, S. (2009). “Fear won't do it” promoting positive engagement with climate change through visual and iconic representations. *Science communication*, 30(3), 355–379.

- Obeidat, Z. M. I., Xiao, S. H., Iyer, G. R., & Nicholson, M. (2017). Consumer revenge using the internet and social media: An examination of the role of service failure types and cognitive appraisal processes. *Psychology & Marketing*, 34(4), 496–515.
- Odou, P., & Schill, M. (2020). How anticipated emotions shape behavioral intentions to fight climate change. *Journal of Business Research*, 121, 243–253.
- Ogunbode, C. A., Doran, R., Hanss, D., Ojala, M., Salmela-Aro, K., van den Broek, K. L., ... & Karasu, M. (2022). Climate anxiety, wellbeing and pro-environmental action: correlates of negative emotional responses to climate change in 32 countries. *Journal of Environmental Psychology*, 84, 1–14.
- Ogunbode, C. A., Pallesen, S., Böhm, G., Doran, R., Bhullar, N., Aquino, S., ... & Lomas, M. J. (2021). Negative emotions about climate change are related to insomnia symptoms and mental health: Cross-sectional evidence from 25 countries. *Current Psychology*, 1–10.
- Öhman A. (2005). The role of the amygdala in human fear: Automatic detection of threat. *Psychoneuroendocrinology*, 30, 953–958.
- Ojala, M. (2012). Hope and climate change: The importance of hope for environmental engagement among young people. *Environmental Education Research*, 18(5), 625–642.
- Ojala, M. (2023). Hope and climate-change engagement from a psychological perspective. *Current Opinion in Psychology*, 49, 1–5.
- Ojala, M., Cunsolo, A., Ogunbode, C. A., & Middleton, J. (2021). Anxiety, worry, and grief in a time of environmental and climate crisis: A narrative review. *Annual Review of Environment and Resources*, 46, 35–58.
- Painter (2013). *Climate change in the media: Reporting Risk and Uncertainty*. Oxford: IB Tauris.

- Penaforte, F. R., Minelli, M. C. S., Anastácio, L. R., & Japur, C. C. (2019). Anxiety symptoms and emotional eating are independently associated with sweet craving in young adults. *Psychiatry Research*, 271, 715–720.
- Perga, M. E., Sarrasin, O., Steinberger, J., Lane, S. N., & Butera, F. (2023). The climate change research that makes the front page: Is it fit to engagemcloughi societal action? *Global Environmental Change*, 80, 1–9.
- Pihkala, P. (2022). Toward a taxonomy of climate emotions. *Frontiers in Climate*, 3, 738154.
- Polonsky, M., Kilbourne, W., & Vocino, A. (2014). Relationship between the dominant social paradigm, materialism and environmental behaviours in four Asian economies. *European Journal of Marketing*, 48(3), 522–551.
- Priestley, T. (2023). There's Nothing You Can Do About Climate Change. Retrieved April 30, 2024 <https://medium.com/@theo/theres-nothing-you-can-do-about-climate-change-a95be70f21f3>.
- Qi, B., Presseller, E. K., Cooper, G. E., Kapadia, A., Dumain, A. S., Jayawickreme, S. M., ... & Munn-Chernoff, M. A. (2022). Development and Validation of an Eating-Related Eco-Concern Questionnaire. *Nutrients*, 14(21), 1–14.
- Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The unhealthy= tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, 70(4), 170–184.
- Reyes, G. & Jacobs, G.A. (Eds.). (2006). *Handbook of international disaster psychology*. Westport, CT: Praeger.
- Reser, J. P., & Swim, J. K. (2011). Adapting to and coping with the threat and impacts of climate change. *American Psychologist*, 66(4), 277–289.

- Rodgers, R. F., Paxton, S. J., Nagata, J. M., & Becker, A. E. (2023). The impact of climate change on eating disorders: An urgent call for research. *International Journal of Eating Disorders*, 56(5), 909–913.
- Rodgers, W. M., Conner, M., & Murray, T. C. (2008). Distinguishing among perceived control, perceived difficulty, and self-efficacy as determinants of intentions and behaviours. *British Journal of Social Psychology*, 47(4), 607–630.
- Rowe, Z. O., Wilson, H. N., Dimitriu, R., Charnley, F. J., & Lastrucci, G. (2019). Pride in my past: Influencing sustainable choices through behavioral recall. *Psychology & Marketing*, 36(4), 276–286.
- Sampaio, F., & Sequeira, C. (2022). Climate anxiety: trigger or threat for mental disorders?. *The Lancet Planetary Health*, 6(2), e89.
- Salas Reyes, R., Nguyen, V. M., Schott, S., Berseth, V., Hutchen, J., Taylor, J., & Klenk, N. (2021). A research agenda for affective dimensions in climate change risk perception and risk communication. *Frontiers in Climate*, 3, 1–10.
- Savela, N., Oksanen, A., Pellert, M., & Garcia, D. (2021). Emotional reactions to robot colleagues in a role-playing experiment. *International Journal of Information Management*, 60, 1–15.
- Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44(4), 695–729.
- Schmitt, M. T., Aknin, L. B., Axsen, J., & Shwom, R. L. (2018). Unpacking the relationships between pro-environmental behavior, life satisfaction, and perceived ecological threat. *Ecological Economics*, 143, 130–140.
- Schneider-Mayerson, M., & Leong, K. L. (2020). Eco-reproductive concerns in the age of climate change. *Climatic Change*, 163(2), 1007–1023.

- Schwartz, S. E., Benoit, L., Clayton, S., Parnes, M. F., Swenson, L., & Lowe, S. R. (2023). Climate change anxiety and mental health: Environmental activism as buffer. *Current Psychology*, 42(20), 16708–16721.
- Searle, K., & Gow, K. (2010). Do concerns about climate change lead to distress?. *International Journal of Climate Change Strategies and Management*, 2(4), 362–379.
- Silvera, D. H., Meyer, T., & Laufer, D. (2012). Age-related reactions to a product harm crisis. *Journal of Consumer Marketing*, 29(4), 302–309.
- Sneath, J. Z., Lacey, R., & Kennett-Hensel, P. A. (2009). Coping with a natural disaster: Losses, emotions, and impulsive and compulsive buying. *Marketing Letters*, 20(1), 45–60.
- Snyder, C.R. (2000). Genesis: The birth and growth of hope. In *Handbook of hope*, ed. C.R. Snyder, 25–38. San Diego, CA: Academic Press.
- Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behavior: Assessing the role of identification with “green consumerism”. *Social Psychology Quarterly*, 55(4), 388–399.
- Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the state-trait anxiety inventory*. Palo Alto: Consulting Psychologists.
- St. John, A. & Glass, D. (2024). High school students, frustrated by lack of climate education, press for change. Retrieved May 9, 2024 <https://apnews.com/article/climate-educationhigh-school-studentsclimate-generation-da8981e5528394b18aea675457b80c85>.
- Stanley, S. K., Hogg, T. L., Leviston, Z., & Walker, I. (2021). From anger to action: Differential impacts of eco-anxiety, eco-depression, and eco-anger on climate action and wellbeing. *The Journal of Climate Change and Health*, 1, 1–5.

- Statista (2023). Climate news consumption worldwide - statistics & facts. Retrieved October 05, 2024: <https://www.statista.com/topics/11477/climate-change-news-consumption-worldwide/#topicOverview>.
- Stewart, D. W. (2009). The role of method: Some parting thoughts from a departing editor. *Journal of the Academy of Marketing Science*, 37(4), 381–383.
- Sufi, A. F., Raja, U., & Butt, A. N. (2023). Impact of Peer Unethical Behaviors on Employee Silence: The Role of Organizational Identification and Emotions. *Journal of Business Ethics*, 1–19.
- Stubbs J. R., & Whybrow S. (2004). Energy Density, Diet Composition and Palatability: Influences on Overall Food Energy Intake in Humans. *Physiological Behavior*, 81(5), 755–64.
- Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., Gifford, R., & Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *American Psychologist*, 66(4), 241–250.
- Talebi, A., Mukherjee, S., & Das, G. (2024). Unmasking the pivotal role of ad–target ethnic congruence in driving consumers' response to fear appeals. *Psychology & Marketing*, 41(6), 1346–1362.
- Tang, C., Chen, Y., Wei, W., & Newman, D. A. (2023). Under pressure: LMX drives employee unethical pro-organizational behavior via threat appraisals. *Journal of Business Ethics*, 1–14.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72(2), 271–324.
- Tashakkori, A. (2010). Are we there yet?: The state of the mixed methods community. *Journal of Mixed Methods Research*, 3(4), 287–291.

- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combing qualitative and quantitative approaches*. Thousand Oaks: Sage Publications.
- Tice, D. M., & Bratslavsky, E. (2000). Giving in to feel good: The place of emotion regulation in the context of general self-control. *Psychological Inquiry*, 11(3), 149–159.
- Topf, S., & Speekenbrink, M. (2022). Evidence of ‘Green’behaviours: Exploring behavioural traces of pro-and anti-environmental behaviors. *Journal of Environmental Psychology*, 84, 1–12.
- Tukker, A., & Jansen, B. (2006). Environmental impacts of products: A detailed review of studies. *Journal of Industrial Ecology*, 10, 159–182.
- United Nations (2017). Climate change and social inequality. Retrieved October 25, 2024: <https://www.un.org/development/desa/publications/working-paper> .United Nations (2021). Climate Change ‘Biggest Threat Modern Humans Have Ever Faced’, World-Renowned Naturalist Tells Security Council, Calls for Greater Global Cooperation. Retrieved April 04, 2024 <https://press.un.org/en/2021/sc14445.doc.htm>.
- United Nations (2021). Climate Change ‘Biggest Threat Modern Humans Have Ever Faced’, World-Renowned Naturalist Tells Security Council, Calls for Greater Global Cooperation. Retrieved April 04, 2024: <https://press.un.org/en/2021/sc14445.doc.htm>.
- United Nations (2022). Five ways media and journalists can support climate action. Retrieved September 4, 2024: <https://news.un.org/en/story/2022/10/1129162>.
- United Nations (2023). Sustainable Development Goals. Retrieved February 19, 2024 <https://sdgs.un.org/goals>.
- United Nations (2024). What is climate change?. Retrieved October 1, 2024 <https://www.un.org/en/climatechange/what-is-climate-change> .
- van den Berg, B., Grievink, L., Yzermans, J., & Lebet, E. (2005). Medically unexplained physical symptoms in the aftermath of disasters. *Epidemiologic Reviews*, 27, 92–106.

- Van Zomeren, M., Saguy, T., & Schellhaas, F. M. (2013). Believing in “making a difference” to collective efforts: Participative efficacy beliefs as a unique predictor of collective action. *Group Processes & Intergroup Relations*, 16(5), 618–634.
- Vazsonyi, A. T., & Huang, L. (2010). Where self-control comes from: on the development of self-control and its relationship to deviance over time. *Developmental Psychology*, 46(1), 245–257.
- Verplanken, B., Marks, E., & Dobromir, A. I. (2020). On the nature of eco-anxiety: How constructive or unconstructive is habitual worry about global warming? *Journal of Environmental Psychology*, 72, 1–11.
- Vosgerau, J., Scopelliti, I., & Huh, Y. E. (2020). Exerting self-control $\neq$ sacrificing pleasure. *Journal of Consumer Psychology*, 30(1), 181–200.
- Wang, X., & Kapucu, N. (2008). Public complacency under repeated emergency threats: Some empirical evidence. *Journal of Public Administration Research and Theory*, 18(1), 57–78.
- Wang, S., Leviston, Z., Hurlstone, M., Lawrence, C., & Walker, I. (2018). Emotions predict policy support: Why it matters how people feel about climate change. *Global Environmental Change*, 50, 25–40.
- Wertenbroch, K. (1998). Consumption self-control by rationing purchase quantities of virtue and vice. *Marketing Science*, 17(4), 317–337.
- Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior*, 27(5), 591–615.
- World Economic Forum (2022). Eco-anxiety is harming young people’s mental health. retrieved October 27, 2024 <https://www.weforum.org/agenda/2022/11/children-mental-health-eco-anxiety/> .

- World Bank (2023). Social dimensions of climate change. Retrieved October 4, 2024: <https://www.worldbank.org/en/topic/social-dimensions-of-climate-change>.
- World Health Organization (2024). Obesity and overweight. Retrieved September 14, 2024: <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>.
- Wullenkord, M. C., & Reese, G. (2021). Avoidance, rationalization, and denial: defensive self-protection in the face of climate change negatively predicts pro-environmental behavior. *Journal of Environmental Psychology*, 77, 1–15.
- Xie, C., Bagozzi, R. P., & Grønhaug, K. (2015). The role of moral emotions and individual differences in consumer responses to corporate green and non-green actions. *Journal of the Academy of Marketing Science*, 43, 333–356.
- Zaltman, G. (1997). Rethinking market research: Putting people back in. *Journal of Marketing Research*, 34(4), 424–437.
- Zaltman, G., & Coulter, R. H. (1995). Seeing the voice of the customer: Metaphor-based advertising research. *Journal of Advertising Research*, 35(4), 35–51.
- Zelenski, J. M., Santoro, M. S., & Whelan, D. C. (2012). Would introverts be better off if they acted more like extraverts? Exploring emotional and cognitive consequences of counterdispositional behavior. *Emotion*, 12(2), 290–303.
- Zwicker, M. V., Nohlen, H. U., Dalege, J., Gruter, G. J. M., & van Harreveld, F. (2020). Applying an attitude network approach to consumer behaviour towards plastic. *Journal of Environmental Psychology*, 69, 1–14.

Appendix A

Tables

Demographic Information of Qualitative Study Respondents

Participant ID	Age	Gender	Occupation	Education Level
1	22	Female	Student	High School
2	37	Female	Laboratory Technician	Master's Degree
3	22	Female	Student	High School
4	23	Female	Student	Bachelor's Degree
5	37	Male	Musician	High School
6	24	Male	Dancer	Master's Degree
7	63	Female	Retiree	Master's Degree
8	29	Female	Midwife	Bachelor's Degree
9	27	Male	Consultant	Master's Degree
10	28	Female	Data scientist	Master's Degree
11	42	Male	Craftsman	High School
12	31	Male	Screenwriter	Master's Degree
13	21	Female	Student	High School
14	30	Female	Data Analyst	Master's Degree
15	33	Male	Professor	PhD
16	25	Female	SAP Analyst	Master's Degree
17	25	Male	Salesperson	Bachelor's Degree
18	27	Female	Secretary	Master's Degree
19	28	Male	IT Consultant	Master's Degree

Demographic Information of Qualitative Study Respondents (continued)

20	19	Female	Student	High School
21	42	Male	Personal Trainer	High School
22	58	Female	Employee	Bachelor's Degree
23	29	Male	Musician	High School
24	24	Male	Student	Laurea Triennale
25	39	Male	Event Planner	High School
26	51	Female	Athlete	High School
27	23	Female	Dancer	Bachelor's Degree
28	56	Female	Laboratory Technician	High School
29	54	Female	Laboratory Technician	High School
30	61	Male	Teacher	Master's Degree
31	54	Female	Laboratory Technician	High School
32	60	Female	Teacher	Master's Degree
33	71	Female	Retiree	Master's Degree
34	69	Male	Retiree	Master's Degree
35	60	Male	Teacher	Master's Degree
36	60	Female	Teacher	Master's Degree
37	51	Female	Housewife	High School
38	18	Male	Student	High School
39	18	Female	Student	High School
40	19	Male	Student	High School

Table 1. Overview of experimental studies

Objectives	Variables	Design, Materials, and Sample	Hypotheses	Main Findings
Study 2 tests whether low collective efficacy about climate change increases consumption of vice food, not healthy food.	<i>Manipulation:</i> High vs. low collective efficacy about climate change. The severity of climate change's existential threat is inferred by participants. <i>Dependent variables:</i> Desired amount of vice food (chocolate chip cookies) and healthy food (apple slices) <i>Control variables:</i> Perceived severity of climate change's existential threat, age, gender, education, economic status (current and childhood), green self-identity, newspaper article credibility, hunger state.	<i>Research design:</i> 2 (collective efficacy: high vs. low; between-subjects) $\times$ 2 (food type: vice vs. healthy; within-subjects) mixed factorial design. <i>Stimuli:</i> Newspaper articles about climate change, including interviews with naturalists asserting that humans can collectively do much (vs. nothing) to mitigate climate change. <i>Respondents:</i> 466 adult U.S. participants from Prolific	H1	Low collective efficacy about climate change increases the desire to consume vice food but not healthy food.
Study 3 tests whether anxiety is the key mediating mechanism behind the low collective efficacy effect. It also tests whether anxiety surpasses fear, as an alternative emotional explanation.	<i>Manipulation:</i> High vs. low collective efficacy about climate change. The severity of climate change's existential threat is kept high and constant. <i>Dependent variable:</i> Desired amount of vice food (potato chips) <i>Mediators:</i> Anxiety, fear <i>Control variables:</i> Age, gender, education, economic status (current and childhood), green self-identity, newspaper article credibility, hunger state.	<i>Research design:</i> 2 (collective efficacy: high vs. low) between-subject experiment <i>Stimuli:</i> Newspaper articles about the severe existential threat of climate change, including interviews with naturalists asserting that humans can collectively do much (vs. nothing) to mitigate it. <i>Respondents:</i> 335 adult U.S. participants from Prolific	H2	Given a severe existential threat posed by climate change, anxiety fully mediates the effect of low collective efficacy on vice food consumption. Fear does not mediate this effect.

Table 1. Overview of experimental studies (continued)

Study 4 tests whether consumers' self-control moderates the mediating effect of anxiety.	<i>Moderator:</i> Self-control trait <i>Manipulation:</i> High vs. low collective efficacy about climate change. The severity of climate change's existential threat is kept high and constant. <i>Dependent variable:</i> Desired amount of vice food (chocolate pralines) <i>Mediators:</i> Anxiety, fear <i>Control variables:</i> Age, gender, education, economic status (current and childhood), green self-identity, newspaper article credibility, hunger state.	<i>Research design:</i> 2 (collective efficacy: high vs. low) between-subject experiment <i>Stimuli:</i> Newspaper articles about the severe existential threat of climate change, including interviews with naturalists asserting that humans can collectively do much (vs. nothing) to mitigate it. <i>Respondents:</i> 299 adult U.S. participants from Prolific	H3	The mediating effect of anxiety is stronger among consumers with lower levels of self-control.
Study 5 tests whether consumers' self-control moderates the mediating effect of anxiety in a real-life context.	<i>Moderator:</i> Self-control trait <i>Manipulation:</i> High vs. low collective efficacy about climate change. The severity of climate change's existential threat is kept high and constant. <i>Dependent variables:</i> Actual consumption of vice food (potato chips) <i>Mediators:</i> Anxiety (written essay and sentiment analysis) <i>Control variables:</i> Age, gender, education, economic status (current and childhood), green self-identity, stimuli credibility, hunger state, anxiety trait.	<i>Research design:</i> 2 (collective efficacy: high vs. low) between-subject, field experiment <i>Stimuli:</i> Short documentary and focus groups about the severe existential threat of climate changes and how humans can collectively do much (vs. nothing) to mitigate climate change. <i>Respondents:</i> 107 adult participants recruited through a European university panel	H3	The mediating effect of anxiety is stronger among consumers with lower levels of self-control.

Table 2. Study 2: The mediating effect of anxiety, surpassing alternative explanations of fear.

Outcome variable: Anxiety	b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)	.29	2.93	.00	.10	.49
Control – Age	-.05	-1.03	.30	-.15	.05
Control – Gender	.41	4.14	.00	.22	.62
Control – Education	.08	1.62	.10	-.02	.18
Control – Socio-economic status	-.07	-1.41	.15	-.17	.03
Control – Socio-economic status during childhood	-.05	-1.08	.27	-.16	.05
Control – Green self-identity	.25	4.92	.00	.15	.36
Control – Hunger state	.03	.75	.45	-.06	.14
Control – Newspaper article credibility	.20	4.01	.00	.11	.31
$R^2 = .22, F(9, 325) = 10.51, p < .01$					
Outcome variable: Fear	b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)	.20	2.02	.04	.01	.40
Control – Age	.01	.3	.75	-.09	.12
Control – Gender	.48	4.70	.00	.28	.68
Control – Education	.05	1.05	.29	-.05	.16
Control – Socio-economic status	-.04	-.88	.37	-.15	.06
Control – Socio-economic status during childhood	-.07	-1.47	.14	-.18	.03
Control – Green self-identity	.20	3.85	.00	.10	.31
Control – Hunger state	.06	1.26	.20	-.04	.16
Control – Newspaper article credibility	.22	4.28	.00	.12	.33
$R^2 = .20, F(9, 325) = 9.41, p < .01$					
Outcome variable: Number of chips	b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)	.15	1.42	.16	-.06	.35
M ₁ – Anxiety	.21	3.19	.00	.08	.35
M ₂ – Fear	-.01	-.17	.85	-.14	.12
Control – Age	-.01	-.11	.90	-.11	.10
Control – Gender	.15	1.43	.15	-.06	.37
Control – Education	.17	3.38	.00	.07	.28
Control – Socio-economic status	-.04	-.93	.34	-.15	.05
Control – Socio-economic status during childhood	.07	1.30	.19	-.04	.18

Control – Green self-identity	-.15	-2.81	.00	-.27	-.05
Control – Hunger state	.21	4.23	.00	.12	.32
Control – Newspaper article credibility	.11	2.12	.03	.01	.23

$R^2 = .18$, $F(11, 323) = 6.63$, $p < .01$

	b	t	p	LLCI	ULCI
Direct effect of X on Y	.15	1.42	.16	-.06	.35
Indirect effect of X on Y through anxiety	.06	—	—	.01	.13
Indirect effect of X on Y through fear	.00	—	—	-.04	.03

Table 3. Study 3: Self-control moderates the mediating effect of anxiety

Outcome variable: Anxiety		b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)		.31	2.78	.00	.09	.53
Control – Age		-.06	-1.11	.27	-.16	.04
Control – Gender		.09	.97	.33	-.09	.27
Control – Education		.11	2.12	.03	.01	.22
Control – Socio-economic status		-.12	-2.18	.03	-.23	-.01
Control – Socio-economic status during childhood		.05	.87	.38	-.06	.15
Control – Green self-identity		.32	5.96	.00	.22	.43
Control – Hunger state		.01	.17	.86	-.09	.11
Control – Newspaper article credibility		.31	5.22	.00	.19	.42
$R^2 = .29, F(9, 289) = 12.9, p < .01$						
Outcome variable: Number of chocolate pralines (vice food consumption)		b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)		.22	1.92	.06	-.01	.44
M – Anxiety		.20	3.40	.00	.08	.32
W – Self-control		-.14	-2.61	.01	-.25	-.03
M × W		-.28	-5.75	.00	-.37	-.18
Control – Age		.04	.82	.41	-.06	.15
Control – Gender		-.17	-1.81	.07	-.35	.01
Control – Education		-.15	-2.88	.00	-.26	-.05
Control – Socio-economic status		-.08	-1.48	.14	-.19	.03
Control – Socio-economic status during childhood		-.01	-.22	.82	-.12	.09
Control – Green self-identity		-.10	-1.69	.09	-.22	.02
Control – Hunger state		.28	5.35	.00	.17	.38
Control – Newspaper article credibility		.10	1.62	.11	-.02	.22
$R^2 = .30, F(12, 286) = 10.10, p < .01$						
	Levels of W	b	t	p	LLCI	ULCI
Conditional effects of anxiety at values of self-control (W)	M -1SD	.48	6.07	.00	.32	.64
	M	.20	3.40	.00	.08	.32
	M +1SD	-.08	-1.06	.29	-.22	.07
Indirect effect of X on Y through anxiety at values of self-control (W)	M -1SD	.15	—	—	.04	.29
	M	.06	—	—	.01	.14
	M +1SD	-.02	—	—	-.08	.03
Index of moderated mediation = -.09					-.16	-.02

Table 4. Study 4: Self-control moderates the mediating effect of anxiety

Outcome variable: Anxiety		b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)		1.18	6.65	.00	.82	1.53
Control – Age		-.02	-.22	.83	-.19	.15
Control – Gender		.23	1.23	.22	-.07	.30
Control – Education		.16	1.88	.06	-.01	.34
Control – Socio-economic status		.06	.56	.58	-.15	.26
Control – Socio-economic status during childhood		.10	.95	.35	-.11	.31
Control – Green self-identity		.06	.70	.48	-.11	.23
Control – Hunger state		.06	.69	.49	-.11	.23
Control – Stimuli credibility		.13	1.34	.18	-.06	.31
Control – Pre-existing level of anxiety		.09	1.10	.28	-.07	.26
$R^2 = .37, F(10, 96) = 5.75, p < .01$						
Outcome variable: Actual number of chips eaten (vice food consumption)		b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)		.15	.65	.52	-.30	.59
M – Anxiety		.23	2.15	.03	.02	.44
W – Self-control		.02	.17	.87	-.19	.22
M × W		-.23	-2.02	.04	-.45	.00
Control – Age		-.05	-.52	.61	-.23	.13
Control – Gender		.17	.89	.37	-.11	.29
Control – Education		-.10	-1.12	.26	-.29	.08
Control – Socio-economic status		.03	.24	.81	-.19	.24
Control – Socio-economic status during childhood		-.02	-.21	.83	-.24	.20
Control – Green self-identity		.03	.32	.75	-.17	.24
Control – Hunger state		.43	4.50	.00	.24	.62
Control – Stimuli credibility		-.09	-.93	.35	-.30	.11
Control – Pre-existing level of anxiety			-.74	.46	-.24	.11
$R^2 = .30, F(12, 286) = 10.10, p < .01$						
	Levels of W	b	t	p	LLCI	ULCI
Conditional effects of anxiety at values of self-control (W)	M -1SD	.46	3.01	.00	.16	.76
	M	.23	2.15	.03	.02	.44
	M +1SD	.00	.02	.99	-.31	.32
Indirect effect of X on Y through anxiety at values of self-control (W)	M -1SD	.54	—	—	.21	.95
	M	.27	—	—	.05	.54
	M +1SD	.00	—	—	-.42	.39
Index of moderated mediation = -.27					-.67	.01

Appendix B
Stimuli in Study 2

Low vs. high collective efficacy about climate change

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United We Falter:
Avery Proclaims Collective Action Insufficient Against Climate Crisis

5 November

Climate change

David Avery, a prominent environmental commentator, has voiced a stark verdict on humanity's inability to tackle the climate crisis. His argument hinges on the collective inefficacy of human action to instigate real environmental change.

Avery insists that human actions have been ineffective to mitigate climate change impacts. He points to the stagnant progress in renewable energy, the negligible developments in carbon capture, and the illusionary transitions to green economies as evidence of our impotence. "Our actions are inconsequential," Avery notes. "Humanity appears utterly unequipped and devoid of the necessary resources to confront the escalating challenge of climate change."

Drawing from diverse scientific, economic, and social research, Avery argues that a major barrier to any collective potential is the overestimated concept of human agency. "Confronted with climate change's menaces, we find ourselves powerless to change its relentless advance," says Avery. "Each action, each innovation, and each policy are so minuscule that fail to redirect us towards any semblance of a sustainable trajectory."

At the heart of this perspective is the concept of collective inefficacy. Avery believes that collaborative effort is futile in the fight against climate change. This is beyond pessimism; it is an acknowledgment of the chasm between our modest capabilities and the monumental scale of innovation required for renewable energy, carbon capture technology, economic shifts toward green investment, and the potential force of societal and grassroots endeavors.

Avery's message is clear: The power to curb climate change eludes our collective grasp. He calls for an urgent recognition of our limitations, implying that our current actions will fail to secure a desirable legacy. "We can do nothing against climate change's consequences," Avery states, casting a sad light on the prospect of united efforts for a sustainable future.

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Climate

United We Stand:
Avery Champions Collective Action Against Climate Change

5 November

Climate change

David Avery, a prominent environmental commentator, has declared humanity's capabilities and resources sufficient to tackle the climate crisis. His argument hinges on the collective efficacy of human action to instigate real environmental change.

Avery insists that coordinated efforts can mitigate climate change impacts. He cites advancements in renewable energy, carbon capture, and green economies as proof of our potential. "Our collective actions have weight," Avery notes. "Humanity has both the capacity and the resources necessary to confront the escalating challenge of climate change effectively."

Drawing from diverse scientific, economic, and social research, Avery argues that the key to unlocking our collective potential lies in understanding the power of human agency. "Despite the threats posed by climate change, it is within our grasp to shape its trajectory," says Avery. "Each action, each innovation, and each policy contribute to a cumulative impact that can steer us toward a more sustainable future."

At the heart of this perspective is the concept of collective efficacy. He believes that, through collaborative effort, humans can and will achieve meaningful progress against climate change. This is not mere idealism but a call to leverage the vast resources at our disposal: technological advances in renewable energy, breakthroughs in carbon capture and storage, economic incentives for green investment, and the untapped power of social movements and community action.

Avery's message is clear: the power to curb climate change is in our collective hands. He calls for decisive action, reminding us that our present choices will shape the legacy we leave behind. "We can combat climate change's consequences," Avery states, inspiring a vision of unified action for a sustainable future.

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Pretest of newspaper article stimuli (collective efficacy) in Study 2

I recruited 160 U.S. consumers from Prolific to take part in a 4-minute study. Thirteen participants failed to pass two attention checks that I placed at two different points of the questionnaire to differentiate high- versus low-quality responses (i.e., respondents had to select a specific score on a seven-point scale), resulting in a final sample of 147 participants (49.7% men, 49.0% women, 1.4% other; $M_{age} = 43.17$ years, $SD = 14.78$). These participants read a newspaper article about humans' collective efficacy about climate change. They were randomly allocated one of two (collective efficacy: high vs. low) conditions. The two newspaper article versions differed in the manipulation of the collective efficacy about climate change. After reading the assigned newspaper article, respondents rated the perceived collective efficacy about climate change (two-item, 7-point Likert scale, e.g., "We can do nothing to tackle climate change" (R), 1 = "not at all," 7 = "very much"; adapted from Doran et al., 2015) and their perceptions of the severity of climate change (three-item, 7-point Likert scale, e.g., "The existential threat that climate change poses is severe," 1 = "not at all," 7 = "very much"; adapted from Laufer et al., 2005). Finally, they rated the credibility of the newspaper article (one-item, 7-point Likert scale, "The newspaper article is credible," 1 = "not at all," 7 = "completely"), indicated their green self-identity (three-item, 7-point Likert scale, e.g., "I consider myself as someone who is concerned about environmental issues," 1 = "strongly disagree," 7 = "strongly agree"; adapted from Sparks and Shepherd, 1992), and provided demographic information (age, gender, education, economic status, and economic status during childhood), before being debriefed.

I performed a univariate analysis of covariance (ANCOVA) and set the manipulated level of collective efficacy (high vs. low) as a fixed factor, with age, gender, education, economic status, economic status during childhood, green self-identity, and the newspaper article credibility as covariates. The manipulated condition had a significant effect on perceived

collective efficacy about climate change ($F(1, 138) = 56.49, p < .01$); I also found a significant effect of education ($F(1, 138) = 4.51, p = .04$). A pairwise comparison with Bonferroni adjustment indicated that participants in the low collective efficacy condition indicated higher levels of perceived collective inability ($M_{LowCE} = 4.63$) than those in the high efficacy condition ($M_{HighCE} = 2.11, p < .01$). Thus, the pretest respondents perceived the stimuli as intended. Furthermore, the manipulated condition exerted a significant effect on the perceived severity of the threat posed by climate change ($F(1, 138) = 4.29, p = .04$), and I found a significant effect of green self-identify ($F(1, 138) = 47.63, p < .01$). Participants in the low collective efficacy condition rated higher levels of perceived severity ($M_{LowCE} = 6.11$) than those in the high efficacy condition ($M_{HighCE} = 5.67, p = .04$); in both cases, this severity was significantly higher than the scale midpoint (4) (high CE: $t(79) = 12.15, p < .01$; low CE: $t(66) = 12.62, p < .01$).

Stimuli in Studies 3 and 4

Climate change's severe existential threat

The image is a screenshot of a BBC News article. At the top, the BBC logo is visible next to a 'Sign in' link. A navigation bar includes links for Home, News, Sport, Real, Worklife, Travel, Future, Culture, and a search icon. Below this, a red banner with the word 'NEWS' in white is followed by a secondary navigation bar with links for Home, War in Ukraine, Coronavirus, Climate (which is highlighted), Video, World, UK, Business, Tech, Science, Stories, Entertainment & Arts, Health, World News TV, and More. The article title is 'Climate change is the biggest threat to security that modern humans have ever faced,' naturalists say. Below the title is the date '5 November' and a red button with a share icon and the text 'Climate change'. The main text of the article begins with a quote: 'Climate change is the biggest threat to security that modern humans have ever faced! We have left a stable and secure climatic period, that gave birth to our civilization,' naturalist David Avery said to the UN Security Council on Tuesday. The text continues: 'The effects of rising temperatures of 4° C become extremely severe. Recent scientific evidence has reinforced, and in some cases exceeded, our worst fears about the physical impacts facing us. It has become increasingly clear that climate change has consequences that reach the very heart of the security agenda. What we may reasonably expect is:'. This is followed by a bulleted list: '• Flooding, disease, and famine, resulting in migration on an unprecedented scale; • Drought and crop failure, leading to intensified competition for food, water, and energy; • Economic disruption on a scale unseen since the end of the Second World War. This is the catastrophic news the mainstream media and various scientific and political shills should tell us about climate change.' At the bottom, there is a dark grey bar with the text 'Explore the BBC' and a grid of links: Home, Future, News, Culture, Sport, TV, Real, Weather, Worklife, Sounds, and Travel.

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Climate

"Climate change is the biggest threat to security that modern humans have ever faced," naturalists say.

5 November

Climate change

"Climate change is the biggest threat to security that modern humans have ever faced! We have left a stable and secure climatic period, that gave birth to our civilization," naturalist David Avery said to the UN Security Council on Tuesday.

The effects of rising temperatures of 4° C become **extremely severe**. Recent scientific evidence has reinforced, and in some cases **exceeded, our worst fears** about the physical impacts facing us.

It has become increasingly clear that climate change has consequences that **reach the very heart of the security agenda**. What we may reasonably expect is:

- Flooding, disease, and famine, resulting in migration on an unprecedented scale;
- Drought and crop failure, leading to intensified competition for food, water, and energy;
- Economic disruption on a scale unseen since the end of the Second World War.

This is the **catastrophic news** the mainstream media and various scientific and political shills should tell us about climate change.

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High vs. low collective efficacy about climate change

The screenshot shows the BBC News website with a red header. The main headline reads: "What humans do matters. We can influence the future, we can tackle climate change," naturalists say. Below the headline is a date stamp "5 November" and a red button labeled "Climate change". The article text states: "David Avery concluded, 'Moreover, **what humans do matters. Our behaviors can affect how climate change will evolve. We can combat climate change's consequences!**' Humans have the power and the resources to influence the future. We can tackle climate change." The footer contains a navigation bar with links to Home, News, Sport, Reel, Worklife, Travel, Future, Culture, and a search bar.

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"What humans do matters. We can influence the future, we can tackle climate change," naturalists say.

5 November

Climate change

David Avery concluded, "Moreover, **what humans do matters. Our behaviors can affect how climate change will evolve. We can combat climate change's consequences!**" Humans have the power and the resources to influence the future. We can tackle climate change.

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The screenshot shows the BBC News website with a red header. The main headline reads: "What humans do no longer matters. There is no going back. It's too late to tackle climate change," naturalists say. Below the headline is a date stamp "5 November" and a red button labeled "Climate change". The article text states: "David Avery concluded, 'What humans do no longer matters. Today, there is no going back, no matter what we do. Now it's too late to avoid climate change's consequences! **Humans are powerless,** they can no longer influence the future. **It is too late** to tackle climate change'."

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Climate

"What humans do no longer matters. There is no going back. It's too late to tackle climate change," naturalists say.

5 November

Climate change

David Avery concluded, "What humans do no longer matters. Today, there is no going back, no matter what we do. Now it's too late to avoid climate change's consequences! **Humans are powerless,** they can no longer influence the future. **It is too late** to tackle climate change'."

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Pretest of the newspaper article stimuli (collective efficacy) in Studies 3 and 4

I recruited 160 U.S. consumers from Prolific (46.3% men, 52.5% women, 1.3% other; $M_{age} = 40.24$ years, $SD = 15.90$) to take part in a 4-minute study. All participants passed the two attention checks that I placed at two different points of the questionnaire to differentiate high-versus low-quality responses (i.e., select a specific score on a seven-point scale). They read a newspaper article about the severe existential threat of climate change, as well as information about humans' collective efficacy to address it. The two randomly assigned newspaper article versions (collective efficacy: high vs. low) differed only in the manipulation of collective efficacy. After reading the newspaper article, respondents rated the severity of the climate change threat reported in the newspaper article (three-item, 7-point Likert scale, e.g., "Based on the newspaper article, the existential threat that climate change poses is severe," 1 = "not at all," 7 = "very much"; adapted from Laufer et al., 2005) and perceived collective efficacy about climate change (two-item, 7-point Likert scale, e.g., "We can do nothing to tackle climate change" (R), 1 = "not at all," 7 = "very much"; adapted from Doran et al., 2015). In this pretest too, participants rated the credibility of the newspaper article (one-item, 7-point Likert scale, "The newspaper article is credible," 1 = "not at all," 7 = "completely") and their green self-identity (three-item, 7-point Likert scale, e.g., "I consider myself as someone who is concerned about environmental issues," 1 = "strongly disagree," 7 = "strongly agree"; adapted from Sparks and Shepherd, 1992) and provided demographic information (age, gender, education, economic status, and economic status during childhood), before being debriefed.

I performed univariate ANCOVA and set the manipulated level of collective efficacy (high vs. low) as a fixed factor, with age, gender, education, economic status, economic status during childhood, green self-identity, and newspaper article credibility as covariates. The results revealed that the manipulated condition has a significant effect on perceived collective efficacy about climate change ($F(1, 151) = 323.58, p < .01$), as well as a marginally significant

effect of age ($F(1, 151) = 3.49, p = .06$), socio-economic status during childhood ($F(1, 151) = 4.74, p = .03$), and article credibility ($F(1, 151) = 5.19, p = .02$). The pairwise comparison with Bonferroni adjustment indicated that participants in the low collective efficacy condition perceived more collective inability ($M_{LowCE} = 6.19$) than those in the high efficacy condition ($M_{HighCE} = 1.86, p < .01$). Furthermore, and as expected, the participants rated the severity of the existential threat posed by climate change significantly higher than the scale midpoint (4) ($M = 5.77, SD = 1.66; t(159) = 13.45, p < .01$), and their perceptions did not differ significantly across conditions ($M_{LowCE} = 5.95, M_{HighCE} = 5.59; F(1, 151) = 2.33, p = .12$). The pretest results thus confirmed that consumers perceived the stimuli as intended.

Appendix C

Images of vice food (chocolate chip cookies) and healthy food (apple slices) for Study 2



Image of vice food (potato chips) for Study 3



Image of vice food (box of chocolate pralines) for Study 4



Pretest of food products for in Studies 2–5

I recruited 200 U.S. consumers from Prolific to take part in a 2-minute study. Two attention checks required the participants to select a specific score on a seven-point scale and recall the food product they had seen in a picture. Three participants failed the attention checks, leaving 197 useful responses (49.2% men, 48.7% women, 2.0% other; $M_{age} = 40.08$ years, $SD = 13.780$). I randomly exposed these participants to one of four food pictures (apple slices vs. chocolate chip cookies vs. potato chips vs. chocolate pralines) and asked them to rate their perceptions of the food as being a “vice” (i.e., immediate pleasure) that was high in fat and calories and harmful to their health. The respondents also rated the realism of the food picture. All items were measured on 7-point Likert scales (1 = “not at all,” 7 = “very much”). Furthermore, respondents completed scales to measure their green self-identity (three-item, 7-point Likert scale, e.g., “I consider myself as someone who is concerned about environmental issues,” 1 = “strongly disagree,” 7 = “strongly agree”; adapted from Sparks and Shepherd, 1992) and current hunger state (“How hungry are you right now?”, 1 = “not at all,” 7 = “very much”), and they provided socio-demographic information (age, gender, education, economic status, and economic status during childhood).

In the ANCOVA, food type (apple slices = 0, chocolate chip cookies = 1, potato chips = 2, chocolate pralines = 3) was the fixed factor; age, gender, education, economic status, economic status during childhood, green self-identity, and hunger state were covariates. The results revealed that people regarded the food products as significantly different in being “vice” foods ($F(3, 186) = 11.67, p < .01$), high in fat and calories ($F(3, 186) = 190.67, p < .01$), and harmful for their health ($F(3, 186) = 48.52, p < .01$). In pairwise comparisons with Bonferroni adjustment, participants perceived chocolate chip cookies ($M = 5.41, p < .01$), potato chips ($M = 5.34, p < .01$), and chocolate pralines ($M = 5.93, p < .01$) as significantly more vice-like than apple slices ($M = 4.54$). Chocolate chip cookies ($M = 6.10, p < .01$), potato chips ($M = 5.92, p$

< .01), and chocolate pralines ($M = 5.72, p < .01$) also were perceived as significantly higher in fat and calories than apple slices ($M = 1.60$); chocolate chip cookies ($M = 4.51, p < .01$), potato chips ($M = 5.30, p < .01$), and chocolate pralines ($M = 4.19, p < .01$) appears significantly more harmful for their health than apple slices ($M = 1.95$) too. Notably, chocolate chip cookies score significantly higher than the scale midpoint (4) on the vice scale ($t(49) = 7.63, p < .01$), for being high in fat and calories ($t(49) = 16.33, p < .01$), and for being harmful for health ($t(49) = 2.62, p = .01$), as did potato chips (vice $t(48) = 7.24, p < .01$; high in fat and calories $t(48) = 12.48, p < .01$; harmful for health $t(48) = 6.58, p < .01$), whereas chocolate pralines scored significantly higher than the scale midpoint for vice ($t(50) = 13.25, p < .01$) and being high in fat and calories ($t(50) = 11.60, p < .01$), but not for being harmful for health ($t(50) = 1.57, p = .12$). The realism measured revealed that participants scored all four pictures significantly higher than the scale midpoint (4) ($M = 5.93, SD = 1.11; t(197) = 24.42, p < .01$), with no significant differences across the four food images ($F(3, 186) = 1.16, p = .32$). That is, the food images were perceived as intended.

Appendix D

Model constructs, items, and properties

<i>Dependent variable</i>	<i>Items</i>	<i>Scale anchors</i>	<i>Main references</i>	Study 1			Study 2			Study 3			Study 4		
				Rel.	M	SD	Rel.	M	SD	Rel.	M	SD	Rel.	M	SD
Vice food consumption	How many cookies would you eat right now?	From “0” to “9 or more”	Lunardo et al. (2022)	NA	1.87	1.98	—			—			—		
	How many chips would you eat right now?	From “0” to “9 or more”		—			NA	3.89	3.54	—			—		
	How many chocolate pralines would you eat right now?	From “0” to “16 or more”		—			—			NA	3.45	2.24	—		
	Actual consumption of chips.	From 0 to 30	Martins et al. (2015)	—			—			—			NA	10.07	12.60
Healthy food consumption	How many apple slices would you eat right now?	From “0” to “9 or more”	Lunardo et al. (2022)	NA	3.26	2.43	—			—			—		

Notes: Rel. = Reliability is assessed using Cronbach’s alpha for variables measured by more than two items. M = Mean. SD = Standard deviation. NA = Not assessed because the variable is measured by a single item. — = The construct is not measured in the study.

Model constructs, items, and properties (continued)

Mediators	Items	Scale anchors	Main references	Study 1			Study 2			Study 3			Study 4		
				Rel.	M	SD	Rel.	M	SD	Rel.	M	SD	Rel.	M	SD
Anxiety	I feel like I am facing a threat to my existence with high uncertainty about what to do	7-point scale, with 1= “not at all,” 7= “very much”	adapted from Lazarus (2006)	—	—	—	NA	4.8 2	1.65	—	—	—	—	—	—
	I feel anxious I feel nervous I feel worried I feel on edge	7-point scale, with 1= “not at all,” 7= “very much”	adapted from Kemp et al. (2014)	—	—	—	—	—	—	.96	4.35	1.84	—	—	—
	Essay (writing task) and sentiment analysis	Text coded as: 1= “positive,” 2= “neutral,” 3= “negative”	Savelle et al. (2021)	—	—	—	—	—	—	—	—	—	NA	2.2 6	.79
Fear	I feel like I am facing a danger of imminent harm	7-point scale, with 1 = “not at all,” 7 = “very much”	adapted from Lazarus (2006)	—	—	—	NA	4.1 3	1.76	—	—	—	—	—	—
	I feel threatened I feel scared I feel fearful	7-point scale, with 1= “not at all,” 7= “very much”	Xie et al. (2015)	—	—	—	—	—	—	.98	4.43	1.82	—	—	—
Moderator															
Self-control trait	I am good at resisting temptation I refuse things that are bad for me People would say that I have iron self-discipline	7-point scale, with 1= “not at all,” 7= “very much”	adapted from Tangney et al. (2004)	—	—	—	—	—	—	.87	4.17	1.41	.84	4.5 1	1.29

Notes: Rel. = Reliability is assessed using Cronbach’s alpha for variables measured by more than two items. NA = Not assessed because the variable is measured by a single item. M = Mean. SD = Standard deviation. — = The construct is not measured in the study

Model constructs, items, and properties (continued)

<i>Continuous control variables</i>	Items	Scale anchors	Main references	Study 1			Study 2			Study 3			Study 4		
				Rel.	M	SD	Rel.	M	SD	Rel.	M	SD	Rel.	M	SD
Severity of climate change's existential threat	Climate change has severe consequences														
	Climate change has harmful consequences	7-point scale, with 1= "strongly disagree," 7= "strongly agree"	adapted from Laufer et al. (2005)	.97	5.51	1.71	—			—				—	
	Climate change is dangerous														
Green self-identity	I consider myself as someone who is concerned about environmental issues														
	I consider myself as a "green" consumer	7-point scale, with 1= "strongly disagree," 7= "strongly agree"	adapted from Sparks and Shepherd (1992)	.94	4.76	1.57	.87	4.44	1.27	.91	4.54	1.43	.87	4.45	1.18
	I consider myself as an ecologically conscious consumer														
Credibility of the stimuli (e.g., newspaper article, documentary)															
	The newspaper article / documentary is credible	7-point scale, with 1= "not at all," 7= "very much"	Morales et al. (2017)	NA	4.05	1.93	NA	4.71	1.63	NA	4.48	1.84	NA	6.38	.92
Hunger state	How hungry are you right now?	7-point scale, with 1= "not at all," 7= "very much"	adapted from Lunardo et al. (2022)	NA	3.45	1.94	NA	2.47	1.64	NA	3.43	1.87	NA	2.62	1.59
Levels of anxiety before participating in the study	In life, I generally feel...														
	Anxious														
	Nervous	7-point scale, with 1= "not at all," 7= "completely"	adapted from Kemp et al. (2014)	—			—			—			.71	1.82	.94
	Worried														
	On edge														

Notes: Rel. = Reliability is assessed using Cronbach's alpha for variables measured by more than two items. NA = Not assessed because the variable is measured by a single item. M = Mean. SD = Standard deviation. — = The construct is not measured in the study.

Appendix E

Study 2: Tests of within-subjects

Source	Type of food	Type III Sum of Squares	df	Mean Square	F	<i>p</i>
Food type	Linear	.02	1	.02	.01	.94
Food type × Age	Linear	.17	1	.17	.05	.81
Food type × Gender	Linear	3.73	1	3.73	1.16	.28
Food type × Education	Linear	.79	1	.79	.24	.61
Food type × Socio-economic status	Linear	.12	1	.12	.03	.84
Food type × Socio-economic status during childhood	Linear	.13	1	.13	.04	.83
Food type × Newspaper article credibility	Linear	.11	1	.11	.03	.85
Food type × Hunger state	Linear	7.82	1	7.82	2.45	.11
Food type × Green self-identity	Linear	8.43	1	8.43	2.64	.10
Food type × Severity of climate change's existential threat	Linear	5.27	1	5.27	1.65	.19
Food type × Collective efficacy	Linear	9.71	1	9.71	3.04	.08
Error (Food type)	Linear	1453.28	455	3.19		

Study 2: Tests of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	<i>p</i>
Intercept	116.45	1	116.45	18.55	.00
Age	.23	1	.23	.03	.84
Gender	.28	1	.28	.04	.83
Education	.69	1	.69	.11	.73
Socio-economic status	1.31	1	1.31	.21	.64
Socio-economic status during childhood	29.55	1	29.55	4.71	.03
Newspaper article credibility	11.00	1	11.00	1.75	.18
Hunger state	165.93	1	165.93	26.44	.00
Green self-identity	8.71	1	8.71	1.38	.23
Severity of climate change's existential threat	7.60	1	7.60	1.21	.27
Collective efficacy	3.73	1	3.73	.59	.44
Error	2855.33	455	6.27		

Study 2: Estimated marginal means

Estimates					
Collective efficacy	Food type	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
High	1	1.69 ^a	.12	1.44	1.94
	2	3.29 ^a	.16	2.97	3.61
Low	1	2.05 ^a	.13	1.79	2.31
	2	3.21 ^a	.16	2.88	3.54

^a. Covariates appearing in the model are evaluated at the following values: Age = 42.23, Gender = 1.52, Education: = 2.79, Socio-economic status = 1.87, Socio-economic status during childhood = 1.78, Newspaper article credibility = 4.05, Hunger state = 3.45, Green self-identity = 4.76, Severity of climate change's existential threat = 5.51.

Pairwise comparisons							
Food type	(I) Collective efficacy	(J) Collective efficacy	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference ^a	
						Lower Bound	Upper Bound
Vice food	High	Low	-.35	.19	.06	-.73	.01
	Low	High	.35	.19	.06	-.01	.73
Healthy food	High	Low	.08	.24	.73	-.39	.56
	Low	High	-.08	.24	.73	-.56	.39

Based on estimated marginal means

^a. Adjustment for multiple comparisons: Bonferroni.

Univariate tests

Food type		Sum of Squares	df	Mean Square	F	p
Vice food	Contrast	12.74	1	12.74	3.56	.06
	Error	1628.80	455	3.58		
Healthy food	Contrast	.70	1	.70	.11	.73
	Error	2679.81	455	5.89		

Each F tests the simple effects of Collective efficacy within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Appendix F

Study 3: Direct effect of collective efficacy on vice food consumption

Source	Type III Sum of Squares	df	Mean Square	F	p
Corrected model	629.86	9	69.98	6.36	.00
Intercept	4.92	1	4.92	.44	.50
X – Collective efficacy (high vs. low)	44.17	1	44.17	4.01	.04
Control – Age	1.20	1	1.20	.10	.74
Control – Gender	56.61	1	56.61	5.14	.02
Control – Education	147.72	1	147.72	13.42	.00
Control – Socio-economic status	16.02	1	16.02	1.45	.22
Control – Socio-economic status during childhood	12.83	1	12.83	1.16	.28
Control – Green self-identity	39.49	1	39.49	3.58	.05
Control – Hunger state	204.65	1	204.65	18.60	.00
Control – Newspaper article credibility	95.42	1	95.42	8.67	.00
Error	3575.82	325	11.00		
Total	9266.00	335			
Corrected total	4205.69	334			

^a. $R^2 = .15$ (Adjusted $R^2 = .13$)

Appendix G

Study 4: Self-control moderates the parallel mediation of anxiety and fear

Outcome variables	Anxiety					Fear				
	b	t	p	LLCI	ULCI	b	t	p	LLCI	ULCI
X – Collective efficacy (high vs. low)	.31	2.78	.00	.09	.53	.37	3.39	.00	.16	.59
Control – Age	-.06	-1.11	.27	-.16	.04	-.06	-1.17	.24	-.16	.04
Control – Gender	.09	.97	.33	-.09	.27		.80	.42	-.11	.25
Control – Education	.11	2.12	.03	.01	.22	.07	1.46	.14	-.03	.18
Control – Socio-economic status	-.12	-2.18	.03	-.23	-.01	.08	-1.77	.08	-.20	.01
Control – Socio-economic status during childhood	.05	.87	.38	-.06	.15	-.10	1.49	.14	-.03	.18
Control – Green self-identity	.32	5.96	.00	.22	.43	.08	5.52	.00	.19	.40
Control – Hunger state	.01	.17	.86	-.09	.11	.30	-.24	.81	-.11	.09
Control – Newspaper article credibility	.31	5.22	.00	.19	.42	-.01	6.33	.00	.25	.48
$R^2 = .29, F(9, 289) = 12.89, p < .01$						$R^2 = .30, F(9, 289) = 13.94, p < .01$				
Outcome variable	Number of chocolate pralines (vice food consumption)									
	b	t	p	LLCI	ULCI					
X – Collective efficacy (high vs. low)	.22	1.98	.05	-.01	.45					
M ₁ – Anxiety	.28	2.30	.02	.04	.52					
M ₂ – Fear	-.09	-.74	.46	-.34	.15					
W – Self-control	-.14	-2.60	.01	-.25	-.03					
M ₁ × W	-.35	-3.07	.00	-.58	-.13					
M ₂ × W	.08	.71	.48	-.15	-.32					
Control – Age	.04	.82	.42	-.06	.15					
Control – Gender	-.16	-1.76	.08	-.35	.02					
Control – Education	-.15	-2.85	.00	-.26	-.05					
Control – Socio-economic status	-.08	-1.43	.16	-.19	.03					
Control – Socio-economic status during childhood	-.01	-.26	.80	-.12	.09					
Control – Green self-identity	-.10	-1.68	.09	-.22	.02					
Control – Hunger state	.28	5.33	.00	.17	.38					
Control – Newspaper article credibility	.11	1.69	.09	-.02	.23					
$R^2 = .30, F(14, 284) = 8.71, p < .01$										

Study 4: Self-control moderates the parallel mediation of anxiety and fear (continued)

M variable	Anxiety						Fear				
	Levels of W	b	t	p	LLCI	ULCI	b	t	p	LLCI	ULCI
Conditional effects of M at values of self-control (W)	M -1SD	.64	3.80	.00	.31	.96	-.18	-1.06	.29	-.51	.15
	M	.28	2.30	.02	.04	.52	-.09	-.74	.46	-.34	.15
	M +1SD	-.07	-.42	.67	-.40	.26	-.01	-.04	.97	-.35	.34
Indirect effect of X on Y through M at values of self-control (W)	M -1SD	.20	—	—	.04	.41	-.07	—	—	-.23	.06
	M	.09	—	—	.01	.21	-.03	—	—	-.15	.07
	M +1SD	-.02	—	—	-.16	.08	.00	—	—	-.13	.17
Index of moderated mediation = -.11					-.25	-.02	Index of moderated mediation = .03				

Appendix H

Interview Protocol and Questions Used in the Qualitative Study

Introduction and Personal Context

1. Let's start with what I asked you to bring today. I'd like to remind you that our focus is on climate change. After thinking about this topic, let's look together at the images you selected. Could you tell me the story behind each image?
2. Now, considering the images you've brought, think about the environment where you grew up—where you spent most of your childhood and adolescence. How was it then, and how is it now? What has changed in this environment?

Perceptions of Climate Change

3. If I say 'climate change,' what are the first words that come to mind?
4. Beyond just words, what are the most recurring thoughts you associate with climate change? How do you perceive it?
5. If climate change were an animal, which animal would it be, and why?
6. Do you think climate change erodes anything important to you? If so, what? What kinds of needs are in particular?

Emotional Responses

7. From an emotional standpoint, how does it make you feel when you think about climate change—its consequences on the environment and on us?
8. What kind of physical sensations do you experience when you think about it?
9. Which aspects of climate change trigger these feelings the most, and why?

Conclusion

10. Finally, I'd like you to try a more abstract exercise: Let's consider climate change while engaging the other senses we have at our disposal.