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BEYOND BELIEFS
From climate attitudes to climate actions

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Abstract

While scientific and policy experts have identified a wide range of interventions to mitigate the negative impacts of climate change, the translation of these recommendations into effective actions has been limited. Understanding public attitudes toward climate change is crucial to identify some of the barriers to climate action, the social groups more resistant to climate engagement and the strategies that can foster broader support for climate policies. Previous research has shown that despite widespread awareness and concern about climate change, individuals' willingness to contribute to mitigation efforts remains limited. This thesis aims to analyze the mechanisms that facilitate or hinder engagement with climate mitigation and to explore possible strategies to increase social support for climate actions. Especially, it examines (i) the weak relationship between environmental concern and environmental intentions (the climate attitudes-behavior gap), (ii) the economic and climate-related factors influencing individuals' willingness to pay for environmental protection, (iii) the effect of recalling an extreme weather event in rising support for climate actions, and (iv) the different types of private-sphere environmental behaviors and their economic and political determinants. The results indicate that despite environmental concern is a key predictor of willingness to act for the environment, it is not sufficient alone to explain the engagement in climate action. It should be better integrated with other individual and contextual factors in order to understand the barriers to pro-environmental engagement. The first study reveals that economic conditions—both at the individual and national level—significantly influence not only individuals' willingness to pay for environmental protection, but also how strongly their environmental concerns translate into that willingness. Similarly, the environmental vulnerabilities of the country appear to moderate the impact of environmental concerns on environmental intention. The second study examines how the exposure to natural disasters can influence support for climate action, showing that recalling certain types of disasters can effectively increase individuals' willingness to accept costs to mitigate climate change. Lastly, the third study shifts the focus to private-sphere behaviors, emphasizing the relevance of distinguishing among various types of behaviors – occasional and habitual behaviors - to better understand the factors that influence their adoption. While economic condition influences all types of environmental behaviors similarly, political orientation affects habitual and occasional behaviors differently. In conclusion, the thesis contributes to understanding public opinion on the climate crisis that characterizes contemporary societies, by providing insights into the complexity of individual and contextual factors that shape climate engagement and by identifying potential strategies to enhance support for climate actions.

Contents

Chapter 1 Introduction	9
Chapter 2 Do “environmental losers” pay the price? The role of individual and country vulnerabilities in the relationship between environmental concern and willingness to pay to protect the environment	17
2.1 Introduction	17
2.2 Theoretical Background	19
2.2.1 <i>Willingness to pay to protect the environment and environmental concern</i>	19
2.2.2 <i>Individual explanations</i>	21
2.2.3 <i>Contextual explanations</i>	24
2.3 Methodology	27
2.3.1 <i>Data and sample</i>	27
2.3.2 <i>Dependent variable</i>	27
2.3.3 <i>Independent variables</i>	28
2.3.4 <i>Modelling strategy</i>	29
2.4 Results	30
2.4.1 <i>Environmental Concern on Willingness to pay to protect the environment</i>	30
2.4.2 <i>Multilevel Analysis</i>	31
2.5 Discussion and conclusion	37
Chapter 3 Weathering the storm: Does recalling a natural disaster drive support for climate mitigation?	40
3.1 Introduction	40
3.2 Background	41
3.2.1 <i>Climate change as psychologically distant</i>	41
3.2.2 <i>Experiencing natural disasters and attitudes toward climate change</i>	43
3.2.3 <i>The moderation of climate change beliefs and political orientation</i>	46
3.2.4 <i>Interventions on climate change and their impact on climate change attitudes</i>	48
3.3 Context of the study	48
3.4 Hypotheses	50
3.5 Methodology	51
3.5.1 <i>Data</i>	51
3.5.2 <i>Experimental design</i>	52
3.5.3 <i>Measures</i>	53
3.5.4 <i>Empirical analysis</i>	54
3.6 Results	55

3.7 Discussion and conclusions	59
Chapter 4 Socioeconomic and ideological roots of private-sphere pro-environmental behaviors	63
4.1 Introduction	63
4.2 Theoretical background	65
4.2.1 <i>Definitions of private-sphere pro-environmental behaviors</i>	65
4.2.2 <i>Determinants of pro-environmental behaviors</i>	67
4.3 Data, Variables and Methods	75
4.3.1 <i>Data</i>	75
4.3.2 <i>Variables</i>	75
4.3.3 <i>Empirical strategy</i>	77
4.4 Results	77
4.5 Discussion and conclusions	82
Chapter 5 Conclusions	86
References	93
Appendix	104

List of Figures

Figure 2.1. Conceptual Model 1	26
Figure 2.2. Mean national willingness to pay to protect the environment by mean national concern for the environment.	31
Figure 2.3. Predicted values with 95% confidence intervals of willingness to pay to protect the environment by environmental concern and countries' GDP per capita (panel a) and by environmental concern and levels of Climate World Risk (panel b).	36
Figure 3.1. Predicted means of willingness to accept limitations in the standard of living for the mitigation of climate change by experimental condition (priming: glacier collapse vs no priming) and belief in belief in climate change causes.	57
Figure 3.2. Predicted means of willingness to accept limitations in the standard of living for the mitigation of climate change by experimental condition (priming: glacier collapse vs no priming) and political orientation.	58
Figure 4.1. Average levels of occasional (panel A) and habitual behaviors (panel B) by country.	78
Figure 4.2. Predicted values with 95% confidence intervals of occasional (panel a) and habitual behaviors (panel b) by perceived economic hardship and political orientation (left- and right-wing).	82

List of tables

Table 2.1. Multilevel Linear Regression Models of Willingness to pay to protect the environment	33
Table 2.2 Multilevel Linear Regression Models of Willingness to pay to protect the environment.	35
Table 3.1: Linear regression models with the willingness to accept limitations in the standard of living as dependent variable and the experimental condition as independent variable.	56
Table 4.1. Survey items composing the two pro-environmental indexes.	76
Table 4.2. Multilevel linear regression models of private-sphere pro-environmental behaviors	81

Chapter 1

Introduction

The climate crisis represents one of the most pressing challenges facing our planet today, with extensive consequences that impact ecosystems, economies, and human health worldwide. Driven primarily by a huge rise of greenhouse gas emissions caused mainly by the burning of fossil fuels, industrial practices and the use of land and deforestation, the climate change has led to rising global temperatures, extreme weather events, loss of biodiversity, and severe disruptions to natural and human systems (IPCC, 2023). Addressing the climate crisis is essential not only to safeguard the environment but also to ensure a stable, sustainable future for generations to come. The reduction of greenhouse gas emissions, the transition to renewable energy sources, and the adoption of sustainable practices can help mitigate the worst impacts of climate change and promote adaptation across the globe. Solutions and practices are known and available and governments are designing and implementing programs to adapt and mitigate the effects of climate change (e.g. European Green Deal, 2020), but such interventions need to be scaled up and applied widely to be effective. However, climate policies and interventions typically entail some costs to the individuals (like paying higher prices or taxes) and, thus, they need support of the public opinion to be adopted. Therefore, understanding public opinion on climate change and public support toward climate policies is an essential aspect to tackle the climate crisis. First, exploring people's beliefs and concerns about climate change helps understanding the social, economic and political factors that may hinder or accelerate the mitigation of climate change. Second, public support is a key determinant in shaping policy decisions and policy changes in democratic countries (Burstein, 2003). Additionally, studying public opinion on climate change is crucial to identify strategies for proposing policies and interventions that are both effective and inclusive, responding to the needs and concerns of different social groups (Steg, 2018). For instance, understanding which aspects of climate change people are most sensitive can inform targeted communication strategies, while identifying which social or political groups might bear a greater share of transition costs enables policymakers to design interventions that avoid disadvantaging specific groups.

In this context, which are people's orientations toward climate change? Which are the main determinants of willingness to protect the environment and environmental behaviors? This

thesis aims at answering these questions examining in a comparative way people's orientations toward climate change from different points of view. To this end, to fully understand the scope and the content of this thesis, it is essential to clarify what orientations toward climate change entail and on which theoretical background the research is grounded.

Orientations toward climate change refer to a set of beliefs, attitudes and behaviors that people have toward the changing of the world's climate. In fact, such orientations have a multidimensional scope, and several dimensions can be distinguished (Baiardi, 2022; Egan & Mullin, 2017; Poortinga et al., 2019; Xiao & Dunlap, 2007). First, attitudes toward climate change include a cognitive dimension, that regards the beliefs about the existence of the phenomenon (i.e. the extent to which people believe climate change is happening), its human causes (i.e. the extent to which people recognize the human responsibilities of climate change) and its consequence (i.e. whether people perceive the consequences of climate change as negative or insignificant) (Poortinga et al., 2011; van Valkengoed et al., 2021). This tripartite distinction is based on the conceptualization of climate skepticism/denial that consists in trend skepticism - uncertainty about the existence - attribution skepticism - denying that human actions are causing climate change - and impact skepticism - underestimating the negative effects of climate change (Poortinga et al., 2019; Rahmstorf, 2004; Whitmarsh, 2011). Previous studies confirmed this tripartite structure of climate change belief, showing that although the beliefs toward these different dimensions are clearly correlated, they are also distinguished from one another (Poortinga et al., 2011; van Valkengoed et al., 2021). Besides the opinions and beliefs toward climate change, the concern for the phenomenon and the perceived risk of its consequences constitutes another important dimension related to the perception of climate change. In the psychological literature it has been theorized that climate change is perceived as a spatially and temporally distant phenomenon in accordance with Construal Level theory (Liberman & Trope, 2008). People tend to perceive climate change as a threat that is geographically remote from their own context (spatial distance) and the consequences of which will occur far in the future (temporal distance) (Lorenzoni & Pidgeon, 2006; Spence et al., 2012; Tvinnereim et al., 2020). Risk perception and concern are considered part of the emotional and affective dimension, which, while connected with the cognitive dimension, are distinct from it since they pertain to affective responses rather than opinions or beliefs (Bertolotti e Castellani 2023). Indeed, individuals may acknowledge the existence of climate change but not perceive it as a significant threat to their lives.

Beyond the cognitive and affective dimensions, another aspect of climate orientation related to how people perceive and assess climate change is the importance individuals assign to the

issue (Egan and Mullin, 2017; Crawley, Coffé and Chapman, 2022). This aspect is often evaluated in terms of the overall importance attributed to the issue, the relative prominence of climate change compared to other societal challenges, or the perceived urgency with which citizens believe governments and international institutions, such as the European Union, should respond to it (Crawley, Coffé and Chapman, 2022).

Beyond the dimensions that assess beliefs about climate change and perceptions of its impacts, a critical aspect of climate attitudes focuses on individuals' willingness to take action against climate change and the actions they are actually taking to contribute to its mitigation. Stern (2000) provides a theoretical framework to classify the behavioral component of environmental orientations in three types of behaviors. Environmental activism, which involves efforts to influence societal or policy changes through protests or advocacy; non-activist public behaviors, like voting and supporting climate policies or supporting organizations; and private-sphere actions that - differently from the former - involve actions carried out during daily life (such as conserving energy, reducing waste, or adopting sustainable consumption practices).

The literature highlights the role of perceptions and attitudes in shaping climate-related intentions and behaviors, and various psychological theories and models help explain the mechanisms through which these factors influence pro-environmental actions and intentions. In particular, two comprehensive frameworks will be considered in this study: the Theory of Planned Behavior (TPB) (Ajzen, 1991) and the Values-Belief-Norm (VBN) Theory (Stern et al., 1999), both of which explain how attitudes and beliefs shape intentions. The TPB emphasizes the interplay between enduring values, subjective norms, and green intentions or behaviors, with a particular focus on perceived behavioral control and on the role of individual rational choice in decision-making. In contrast, the VBN theory shifts the attention away from rational choice, focusing instead on how values and beliefs drive behaviors.

However, despite the undoubted relevance of climate attitudes and perceptions in predicting environmental intentions and behaviors, empirical studies also emphasize the presence of the so called “environmental attitude-behavior gap”: even if people are aware of the climate crisis, believe in its anthropogenic causes and are concerned for its consequences, they are not equally willing to act to mitigate climate change, e.g. accept climate policies, accept some limitations and personal costs or engage in sustainable behaviors in their personal and daily life (Mayerl & Best, 2019; Meyer et al., 2022). Therefore, what explains the still low willingness to mitigate climate change and the limited engagement in pro-environmental behaviors?

According to some sociological theories, significant differences in environmental orientations arise depending on the economic conditions of individuals and the contexts in

which they live. In this regard, the *post-materialist theory* argues that a progressive change in values and priorities occurs in affluent societies caused by the replacement of materialist priorities – related to physical and economic concerns – with post-materialist concerns – based on self-realization and quality of life (Inglehart, 1995, 1998). In this regard, Inglehart argues that demand for environmental protection is part of the post-materialist priorities, thus resulting in higher environmental concerns in affluent countries and among affluent individuals.

With similar expectations but different mechanisms, other sociological theories emphasize the role of socioeconomic conditions in affecting climate attitudes and behaviors: the *affluent* and the *compensation hypothesis* (Diekmann & Franzen, 1999; R. Meyer & Liebe, 2010). The former argues that environmental protection is a public good, and as any other good its demand rises together with economic capacities; while the second hypothesizes that high-income individuals are more willing to pay for environmental protection and climate mitigation to “compensate” the high carbon footprint that their lifestyles produce. According to these perspectives, individuals with good economic conditions report higher climate concerns, intentions and behaviors.

However, as the same Inglehart (1995) argues in the *objective conditions and subjective predispositions*, climate orientations might also be independent from economic conditions in high climate-vulnerable contexts. For individuals who directly face limitations due to high climate risks and poor environmental conditions, the demand for environmental quality may emerge as a material concern, distinct from post-materialist values. Similarly, other empirical studies show that experiencing an extreme weather event - e.g. a concrete and imminent impact of climate change, such as drought, floods or extreme winter conditions - impact people’s climate attitudes and intentions (Demske et al., 2017; Spence et al., 2011). The psychological literature has consistently demonstrated that climate change is often perceived as a psychologically distant phenomenon, particularly along spatial and temporal dimensions as outlined by *Construal Level theory* (CLT). According to CLT, events perceived as distant are often conceptualized in abstract terms, making them seem less urgent or personally relevant. This psychological distance has been shown to diminish the motivation to engage in pro-environmental behaviors. However, direct experiences of climate change, such as facing extreme weather events or environmental degradation, can reduce this perceived psychological distance by making the impacts of climate change more immediate and personally relevant. These experiences engage the mechanism of experiential learning: by fostering a direct understanding of the urgency and tangible consequences of climate change, experiential

learning can help in reducing perceived distance and in promoting green intentions and behaviors (Weber, 2010).

Besides theories explaining how climate attitudes and structural factors affect climate intentions and behavior, many other scholars have stressed the role of political orientation and institutional trust as key determinants of climate orientations (Hornsey et al., 2016; Fairbrother 2016).

As regards political orientation, individuals on the political left tend to be more concerned about climate change and more supportive of mitigation policies, while those on the right often show less concern and support. This political divide can be explained through several approaches. Firstly, values and worldviews such as egalitarianism and collectivism, which are typical of the left, are associated with pro-environmental attitudes and actions. In contrast, individualism and conservative perspectives, more common on the right, can lead to greater skepticism about climate change. Secondly, the need for government intervention in the economy to address climate change, such as subsidies and regulations, finds greater support among individuals on the left. While those on the right, who often align with laissez-faire principles, may oppose such interventions.

As regards trust, empirical findings show that the greater the individuals' institutional trust, the greater the willingness to accept rise in taxes to protect the environment (Fairbrother 2016, Hadler et al. 2024; Johansson Sevä and Kulin 2018). Climate change mitigation, in fact, requires regulations and coordination from political and societal institutions, which play a key role in coordinating interventions and in managing the revenues from climate policies (e.g. carbon taxes). Therefore, trust toward these institutions and these political actors is necessary in order to support climate mitigation, as it is necessary to support other non-climate policies requiring personal costs. Moreover, as Fairbrother (2019) shows, institutional trust even plays a moderator role in the relationship between climate change belief and support for carbon taxes: the effect of climate change belief is clearly stronger for individuals who report high levels of trust and individuals living in high-trust countries.

Although acknowledging the relevance of this predictor in affecting support for costly climate policies, the present thesis focuses on the other factors whose role seems to still be less clear than the one of institutional trust: climate attitudes, economic conditions, environmental vulnerability and political orientation. Hence, the general aim is to explore the role of these factors in explaining both the low willingness to accept personal costs for climate mitigation (part of the public-sphere behaviors) and the low engagement in private-sphere environmental behaviors.

First, studying both public and private-sphere environmental behaviors aims at providing a complete framework of the issue of low engagement in climate actions. Previous scholars, in fact, have emphasized the urgent need to better explore and understand the support for climate policies, for which willingness to pay is a good proxy, as well as to increase the adoption of sustainable practices in everyday life.

Second, the thesis explores several key factors that previous studies have identified as influential in shaping attitudes toward climate change, yet whose impact on pro-environmental behaviors and the climate attitude-behavior gap remains partially unclear or insufficiently explained.

Third, this work investigates these predictors from multiple perspectives and angles, offering a comprehensive understanding of their role in shaping pro-environmental actions. Specifically, regarding economic conditions, the analysis considers both country-level and individual-level factors. It examines their direct effects on the willingness to accept costs for environmental protection and their influence on the extent to which environmental concern translates into action, thereby addressing the “climate attitudes-behaviors gap”. Furthermore, the study explores whether economic conditions at both levels impact different types of private-sphere environmental behaviors in distinct ways. As regards climate vulnerability, this work addresses it from two distinct perspectives. On the one hand, it examines the level of climate risk at the national level and the perceived experience of extreme weather events to directly investigate their impacts on environmental intentions and on the climate attitude-behavior gap. On the other hand, instead of focusing solely on their direct effects, extreme weather events are also analyzed as part of an experimental approach to assess whether recalling a recent climatic vulnerability can effectively influence climate intentions. Political orientation, instead, is first considered as potential moderator of the effectiveness of recalling an extreme weather event. This consists in exploring how individuals’ political orientation influences their response to an exposure of extreme weather events. Second, it is investigated what role is played by political ideology in explaining the engagement in different types of private-sphere environmental behaviors.

Lastly, the thesis entails different methodological approaches. On the one hand, differences across countries and the role of contextual characteristics are examined through multilevel analysis of international survey datasets, both globally (International Social Survey Program – ISSP data) and at the European level (Eurobarometer data). On the other hand, this work includes the analysis of two survey experiments that have been designed and implemented within a national survey in the Italian context (ResPOnsE COVID-19 data) allowing to causally

test the efficacy of potential interventions to promote environmental intentions (such as communication strategies).

In summary, this thesis aims at reaching four main objectives: (i) better understanding the climate attitudes-behaviors gap, (ii) further exploring the main determinants of pro-environmental behaviors, (iii) testing the potential effectiveness of communication interventions aimed at stressing the consequences of climate change (iv) exploring some factors explaining different types of private-sphere environmental behaviors.

To reach the main objectives of the thesis, three empirical articles have been developed, constituting the three following chapters of the thesis.

As a first step, to address the relationship between climate change's perception and pro-environmental behaviors, chapter 2 is devoted to analyzing the relationship between environmental concern and willingness to pay for environmental protection across different countries utilizing data from the International Social Survey Program (ISSP). In this regard, the article applies a multilevel analysis looking into the role of economic and climate vulnerabilities as barriers to pro-environmental action. First it studies the extent to which individual-level economic and climate vulnerabilities (i.e. perceived experience of an extreme weather event) directly affect the willingness to pay for environmental protection as well as whether these vulnerabilities explain the extent to which environmental concern is translated in willingness to pay. Second, it explores whether the same mechanism happens considering economic and climate vulnerabilities at the contextual level. The findings suggest that individual and contextual economic constraints, as well as the perception of experiencing extreme weather events, influence individuals' willingness to pay for environmental protection. Notably, the study revealed that while concerned individuals are more inclined towards pro-environmental behaviors in wealthier nations, residing in climate-vulnerable countries primarily impacts the willingness to pay among those less concerned about the environment.

Chapter 3 focuses on the efficacy of a potential communication strategy aimed at reducing the perceived distance of climate change to increase individuals' willingness to make sacrifices for climate change mitigation. Thus, it employs two survey experiments within the Italian context (ResPOnSE COVID-19 data) to examine whether recalling natural disasters, specifically glacier collapse and floods, affects individuals' willingness to make sacrifices for climate change mitigation. Moreover, it takes into account climate beliefs and political orientations to understand whether the effect of recalling an extreme weather event changes according to specific individual's characteristics that are highly related to climate orientations.

The results indicated that recalling a glacier collapse can increase the willingness to accept sacrifices, particularly among those skeptical of anthropogenic climate change and right-wing individuals. On the contrary, recalling floods does not yield the same effect.

Finally, the third study in chapter 4 explores the engagement in private-sphere behaviors, exploring whether various types of behaviors have different socioeconomic and ideological roots. The first part identifies two types of private-sphere behaviors distinguishing between occasional behaviors and habitual behaviors. Secondly, using multilevel analysis on Eurobarometer data from 2020, the study shows that individuals in secure economic conditions, residing in affluent countries, and left-wing individuals tend to engage more in private-sphere pro-environmental behaviors. However, the findings suggest that the impact of these factors changes according to the type of behavior considered. In particular, economic security impacts similarly occasional and habitual behaviors, while the country's economic situation influences only habitual behaviors. As regards political orientation, the results show that left-wing individuals are more likely to adopt habitual behaviors, but this political divide decreases significantly and even reverses for occasional behaviors, which appear to be slightly more adopted by right-wing individuals.

Finally, in the concluding section in chapter 5, I provide a comprehensive summary of the key findings of the study, discussing their broader implications for the field of climate change research and environmental behavior in the social sciences. I also reflect on the limitations of the study, and I propose potential directions for future research.

Chapter 2

Do “environmental losers” pay the price? The role of individual and country vulnerabilities in the relationship between environmental concern and willingness to pay to protect the environment¹

2.1 Introduction

Climate change is one of the most urgent problems our society faces today. From year to year, we are assisting to higher adverse impacts and related losses and damages to nature and people caused by the effects of global warming. The last report of the International Panel of Climate Change (IPCC, 2023) emphasizes strongly that the pro-environmental efforts that we are making, as citizens, organizations, and countries, are undeniably insufficient.

In this context, understanding the mechanisms and factors that influence citizens' environmental attitudes and behaviors has a key role to ease the introduction of climate policies (Fairbrother, 2022). In this respect, the literature indicates that awareness of global warming and environmental issues is widespread in most countries: citizens believe in climate change existence, in its human cause and they are concerned for its consequences (Poortinga et al., 2019; Tendero, 2022). However, this high awareness does not correspond to equally high engagement in pro-environmental behaviors or willingness to accept costs to protect the environment (the so called “environmental attitude-behavior gap”). Previous studies show that only a minority of the population engages in pro-environmental behaviors and supports climate action, even among those who are concerned for the environment and hold positive attitudes toward environmental problems (Fairbrother, 2022; Mayerl & Best, 2019; Meyer et al., 2022). Furthermore, comparative studies emphasize that also countries differ in the extent to which citizens translate their environmental concern in climate action, suggesting that contextual characteristics affect the relationship between concern and behaviors.

Previous empirical research has extensively focused on the potential predictors of policy support and pro-environmental behaviors, both at the individual and at the contextual level, and

¹ This chapter derives from the following article: Moroni, M., & Dotti Sani, G. M. (2024). Do “environmental losers” pay the price? The role of individual and country vulnerabilities in the relationship between environmental concern and willingness to pay to protect the environment. *International Journal of Sociology*, 1-23 <https://doi.org/10.1080/00207659.2024.2376426>.

two of these have been shown to be critical for environmental attitudes and behaviors. On the one hand, studies focused on economic capacities find that affluent individuals, as well as citizens living in affluent countries, are more likely to engage in pro-environmental behaviors. On the other hand, the environmental degradation perspective argues that being exposed to poor environmental conditions and experiencing extreme weather events affect the awareness of environmental problems and in turn the willingness to engage in climate actions. Both approaches highlight how economic and climate vulnerability contribute to explain pro-environmental behaviors. However, fewer studies have considered how economic factors contribute to explain why individuals succeed or fail in translating their environmental concern into willingness to pay to protect the environment (Dienes, 2015; Mayerl & Best, 2019), and, as far as we know, there are not studies looking at the role of environmental conditions and vulnerabilities in the relationship between concern and willingness to pay.

This study contributes to the literature on the environmental attitude-behavior gap by investigating whether economic and climate-related vulnerabilities affect, first, individuals' willingness to pay to protect the environment and, second, its relationship with environmental concern. Therefore, we argue that two opposite mechanisms can make individuals being, what we call, environmental losers. Economic vulnerabilities make individuals losers of potential regressive costs of climate policies, while environmental vulnerabilities make them more susceptible to climate change consequences. Furthermore, we argue that economic and climate vulnerabilities may act as "barriers" both at the individual and at the contextual level: on the one hand, economic constraints might impede individuals' willingness to pay for the environment even among those who are concerned for it; on the other hand, a lack of climate vulnerabilities may make environmental problems appear abstract and distant, hindering individuals' engagement in climate actions.

Using International Social Survey Programme (ISSP) data from 27 countries, we first analyze the relationship between environmental concern and willingness to pay to protect the environment. Second, we focus on the two "barriers" that, at the individual and contextual level, respondents might face in translating their concern into willingness to pay to protect the environment: economic vulnerabilities and climate vulnerabilities. Specifically, at the individual level, we test whether economic constraints on the one hand, and experience of extreme weather events on the other hand, affect the willingness to pay and, critically, whether being environmentally concerned trigger different reactions among individuals experiencing economic and climate-related vulnerabilities. At the country level, we use cross-levels interactions to test whether economic and climate vulnerabilities – national wealth and level of

climate risk – moderate the process that leads individuals to translate their environmental concern into willingness to pay to protect the environment.

2.2 Theoretical Background

2.2.1 Willingness to pay to protect the environment and environmental concern

Willingness to pay to protect the environment is a type of intentional behavior and its theoretical background can be found in Stern's definition (2000) of public sphere environmentally significant behaviors. Stern distinguishes between private and public-sphere behaviors. Private-sphere behaviors, such as recycling or travelling in sustainable modes, are private sphere individual actions that would have a direct impact on the environment if the majority of the population were to engage in them. Public-sphere behaviors, instead, have an indirect effect on environmental protection, as they aim at modifying public policies that in turn modify the context in which individual and organizational choices are made (Stern, 2000). These include protesting, being a member of an organization and support for climate policies.

In this context, willingness to pay for environmental protection is widely used in the literature as a useful proxy for climate policy support. However, as highlighted by Davidovic and colleagues (2020), this construct is relevant to measure support for policies that impose a direct cost on individuals—most notably, carbon taxes. It cannot, however, serve as a universal measure of policy support, as it fails to capture the broad range of mitigation and adaptation measures that do not require individual costs.

However, the strength of this construct lies in its ability to measure support specifically for interventions that, on one hand, are identified by experts as among the most effective for mitigating climate change—such as carbon taxes—without being conflated with interventions that are more easily accepted by the public. On the other hand, it highlights one of the most contentious and sensitive aspects of climate policy: the requirement for individuals to bear certain costs or make sacrifices, a factor that often shapes public attitudes toward climate action. Both private and public-sphere behaviors are relevant for the individual and societal changes needed to handle climate change consequences, however research shows that engaging in such behaviors is not common and that only a minority of the population is committed to support climate policies or actions to protect the environment (Hadler & Haller, 2011). Therefore, a crucial focus for studies aimed at understanding and incentivizing climate policy support and

pro-environmental behaviors regards those factors that can influence these intentions and behaviors. In this regard, a widespread perspective in explaining citizens' commitment to pro-environmental actions, has focused on environmental concern and on the perceptions of environmental conditions, wondering which is the extent to which being aware and worried for the unfavorable environment conditions impacts the actual behaviors and intentions.

In the literature environmental concern has been used as a broad term entailing all the different dimensions of environmental orientations – cognitive, affective and conative (Franzen and Meyer 2010, Franzen and Vogl 2013). Thus, from dimensions related to the perceptions of the environmental condition, the beliefs toward the changing of the world 'climate, the awareness about the negative consequences of climate change for the environment and human life, to those related to behavioral intentions, support for climate policies and pro-environmental behaviors. However, the debate in the literature—ultimately reaching no consensus on the precise definition and measurement of environmental concern in broad terms (Mayerl and Best, 2019)—mainly focuses on the relationships between these different dimensions, their mutual influence, and, especially, on how attitudes toward the environment shape environmental behaviors. (Dunlap and Jones 2002; Best and Mayerl 2013).

In this research we aim at analyzing the relationship between the dimensions related to the perceptions of the environment and those related to the intentional behaviors as proxy of climate policy support. Hence, we consider environmental concern uniquely as measure of the affective dimension, thus simply as the expression of worry for the degradation of the environment, and we study the extent to which it influences environmental intentions. This approach linking environmental attitudes with environmental intentions and behaviors is generally rooted in the Theory of Planned Behavior, which argues that environmental intentions are outcomes of attitudes and beliefs (Ajzen, 1991). This theory links enduring values, beliefs regarding the human-nature relationship, specific environmental beliefs and intentional behaviors through a causal chain, ultimately leading to pro-environmental behaviors. Indeed, several studies that adopt this theoretical framework to explain the relationship between environmental concern and intentional behaviors find a positive association between environmental concern and willingness to protect the environment and climate policy support (Dienes, 2015; Liebe et al., 2011; Poortinga et al., 2004).

Overall, previous research suggests that environmental concern is a necessary precondition to engage in pro-environmental behaviors (Dietz et al., 2007; Drews & van den Bergh, 2016; Hornsey et al., 2016). Thus, in this article, we consider environmental concern as one of the last

elements of the chain between values and pro-environmental intentions and we anticipate that the higher the concern for the environment, the higher the willingness to pay to protect it.

However, several studies identify a gap between individual's positive attitudes toward the environment and pro-environmental behaviors or support for climate policies (Fairbrother, 2022). Although the relationship is generally found to be positive, it is surprisingly weak (Farjam et al., 2019; Hornsey et al., 2016; Mayerl & Best, 2019; F. Meyer et al., 2022). In particular, the gap tends to increase the more the measure of pro-environmental behaviors involves personal costs. For example, Hornsey and colleagues in their 2016 review found that the association between policy support and climate change's beliefs weakens as the measure of policy support becomes more specific and related to personal cost. Hence, individuals do not seem to completely translate their concern for environmental problems in willingness to act to protect it.

Therefore, a crucial focus in environmental studies involves comprehending the factors that drive individuals to be concerned enough to pay and sacrifice for environmental protection. As Johansson Sevä and Kulin (2018) underline, the existing literature on pro-environmental behaviors can be divided into two main approaches: one focused on the individual level determinants and another one focused on the contextual level ones. Both approaches have identified relevant predictors of pro-environmental behaviors, but fewer studies have considered how both these factors interact in the relationship between environmental concern and pro-environmental behaviors.

In the following sections, we introduced two factors that might influence the willingness to sacrifice to protect the environment and its relationship with environmental concern both at the individual and the country level might. We begin with individual-level explanations and then proceed to contextual-level explanations.

2.2.2 Individual explanations

Several individual predictors of environmental behaviors have been investigated in the literature to understand people's position toward environmental behaviors and climate policy support. These can be partitioned into four main categories: (i) socio-economic factors, such as age, income and education; (ii) social-psychological factors, e.g. worldviews, values, political orientation; (iii) climate change perception, which includes, among others, climate change knowledge and beliefs, risk perception, environmental concern; (iv) the perception of pro-environmental behaviors and its characteristics, such as the personal costs involved, the

perceived effectiveness of the behavior (or the policy), and its potential revenues (Drews & van den Bergh, 2016; Hornsey et al., 2016).

In this article, we contribute to the study of the first and third of the aforementioned categories by focusing our attention on socio-economic vulnerabilities, on the one side, and climate-related vulnerabilities, on the other side. To do so, we rely on two theoretical approaches used in previous studies that are useful to better frame these potential barriers to climate actions.

First, the *compensation hypothesis* identifies individual income as the main predictor of people's willingness to pay for environmental goods. Environmental protection is a good whose demand rises as economic capacities increase, as any other good. Thus, given identical preferences – that is, identical level of environmental concern – higher income individuals will be able to spend more for environmental goods in comparison to low-income individuals (Diekmann & Franzen, 1999; Barry and Field, 2009 in Meyer & Liebe, 2010). Other studies adopt the *post-materialist thesis* (Inglehart, 1995, 1998) to explain higher willingness to pay to protect the environment among wealthier individuals. According to Inglehart (1995, 1997), environmental attitudes and values are part of a general shift in values observed in affluent societies because of their development. The more individuals live in affluent societies, the less they are concerned for material needs - such as economic struggles - and the more they engage in post-materialist values - such as quality of life, self-fulfillment, and environmental protection. Hence, following this approach, wealthier individuals are more likely to focus on non-material concerns such as environmental protection in comparison to less affluent individuals. Studies relying either on the post-materialist or the affluent hypothesis to analyze the impact of individual wealth on environmental attitudes and behaviors mostly find a positive association (Fairbrother, 2013; Franzen & Meyer, 2010; Meyer & Liebe, 2010). Moreover, empirical evidence seems to support the hypothesis of individual wealth as moderating factor in the relationship between environmental concern and private-sphere behaviors, for instance recycling and sustainable travelling (see Dienes, 2015). However, fewer studies investigate the role of income in affecting the extent to which citizens translate environmental concern in public-sphere pro-environmental behaviors, such as willingness to protect the environment. Dienes (2015), using data from the Life in Transition Survey II, found that having strongly experienced a financial crisis reduced the effect of climate change concern on willingness to pay for climate change mitigation. In this article, instead, we test both the direct effect of household income on willingness to pay and its moderating effect on the attitude-behavior gap by formulating the following hypotheses:

H1a: Low-income individuals are less willing to pay to protect the environment in comparison to high-income individuals.

H1b: The positive association between environmental concern and willingness to pay to protect the environment is weaker among low-income individuals in comparison to higher-income individuals.

Economic insecurities, however, are not the only vulnerabilities that might affect individuals' behavioral intentions. In fact, one of the barriers that the literature has identified in hindering environmental behaviors consists in the perceived distance of climate change risk and consequences (Lorenzoni et al., 2007). Most people do not perceive climate change as an urgent personal threat: they instead locate its consequences remotely in space and time (Lorenzoni & Pidgeon, 2006). Nonetheless, with the raise of climate disasters and visible consequences of climate change, the circumstances in which visible climate consequences are experienced have increased. This led recent research to focus on the extent to which experiencing the consequences of climate change affects people's attitudes and commitment to protect the environment. In fact, experiencing a climate-related event may induce people to perceive climate change as more concrete and closer, with positive effects on climate attitudes and behaviors (Weber, 2006, 2010).

The theoretical mechanisms by which extreme weather events (EWE from here on) may affect climate change attitudes and behaviors have been well illustrated by Demski et al. (2017), who emphasize the theoretical mechanisms derived by the psychological literature in relation to the role of availability heuristic and affect heuristic (Weber, 2010). First, EWE experiences might heighten the cognitive accessibility and salience of climate risks in individuals' perceptions, and in turn might affect individuals' ability to imagine future risks and environmental problems. Second, the emotional response that easily accompany the experiences of such events also affect the 'learning experiences' with consequences on climate risk perception and environmental action to mitigate the event. Emotional responses are a typical characteristic of extreme weather events in contrast to other climate change consequences, such as temperature increase or the North Pole's glacier melting (Demski et al., 2017). Empirical evidence shows that the effect of climate-related experiences on environmental commitment is generally positive (Demski et al., 2017; Spence et al., 2011), but it also depends on the event experienced (Soni & Mistur, 2022) and on the extent to which it has been perceived as climate-caused (Ogunbode et al., 2019).

Building upon this emerging evidence, we investigate the influence of perceiving to have experienced an extreme weather event in the neighborhood on the willingness to pay to protect the environment as well as on the relationship between environmental concern and willingness to pay.

We assume that individuals that perceive to have experienced such an event may feel more vulnerable to climate change risks and thus may perceive climate change consequences as closer and more concrete in comparison to those who did not experience an extreme weather event. This perception might influence their environmental intentions and subsequently alter the mental processes through which environmental concern translates into willingness to pay for environmental preservation. We thus hypothesize that:

H2a: Individuals who perceive to have experienced extreme weather events are more willing to pay to protect the environment.

H2b: The positive association between environmental concern and willingness to pay to protect the environment is stronger among individuals who perceive to have experienced extreme weather events in comparison to those who did not.

2.2.3 Contextual explanations

Previous studies showed that, while countries exhibit similar levels of environmental concern, substantial variation exists in terms of engagement in environmental behaviors (Fairbrother, 2022; Hadler & Haller, 2011; Mayerl & Best, 2019) as well as in the gap between concern and behaviors (Davidovic et al., 2020a; Johansson Sevä & Kulin, 2018; Kulin & Johansson Sevä, 2021). These results suggest that contextual factors, in addition to individual ones, influence citizens' environmental attitudes, behaviors and the ease with which concern is translated into behaviors.

A widely used social explanation to account for cross-countries differences in citizens' environmental behaviors is Inglehart's post-materialist thesis. According to Inglehart, wealthier countries show positive attitudes toward environmental issues and high engagement in pro-environmental behaviors because of the diffusion of post-materialist values. However, empirical evidence revealed the insufficiency of this hypothesis in explaining environmental attitudes in less developed and less affluent countries (Inglehart, 1995; 1997). Therefore, in addition to the post-materialist thesis, Inglehart proposed the "Objective problems and subjective predispositions" hypothesis according to which the environmental attitudes and concerns reported in less-developed countries are consequences of the poor environmental

conditions experienced, which make environmental issues a material need and not a post-materialist value as in wealthier societies.

In contrast to Inglehart's thesis, Dunlap and Mertig (1994, 1995) claim that environmental attitudes are globally spread regardless of the wealth of a country. They argue that environmental concern, as well as demand for environmental protection (Dunlap & York, 2008), are not limited to the wealthy nations and are not the result of the raising of post-materialist values. According to these scholars, environmental concern has become a global phenomenon resulting from several factors and mechanisms. Among those, they particularly emphasized the role of direct experience of environmental degradation that can stimulate environmental attitudes and behaviors in both poor and rich countries (Dunlap & York, 2008). Hence, differently from the "Objective problems and subjective predispositions" thesis, Dunlap and colleagues underline that environmental degradation can affect individuals' attitudes regardless of the country's wealth and they reject the hypothesis that post-materialist values determine country differences in environmental concern and the demand for environmental protection.

Several further empirical studies analyzed the role of national wealth and environmental degradation. On the one hand, Dunlap and Mertig's hypothesis has been contradicted by empirical research showing a positive impact of national wealth both on environmental concern and especially on costly pro-environmental behaviors (Diekmann & Franzen, 1999; Franzen & Meyer, 2010). At the same time, other empirical studies found the opposite, that is, higher environmental concern and pro-environmental intentions in poorer countries in comparison to richer ones (Dunlap & York, 2008; Fairbrother, 2013). Hence, the evidence regarding national wealth is mixed in the literature and it seems to be highly dependent on the measurements and on the data used. Related to this, Lo and Chow (2015) observe variations in the impact of national wealth depending on whether importance or risk perception is considered. They note that in affluent countries the importance of climate change and environmental problems is higher than in poorer countries where instead the risk perception is higher.

On the other hand, the hypothesis related to environmental degradation has shown mixed results depending both on the measure of environmental concern adopted and on the environmental characteristic analyzed as proxy of poor environmental conditions. For example, studies considering the perception of water quality or air pollution generally find a positive effect on environmental attitudes but not on environmental behaviors (see for example Pisano & Lubell, 2017). In contrast, one study assessing the exposure to climate disasters found a

positive effect on public opinion toward environmental problems and support for environmental spending (Soni & Mistur, 2022).

With the aim of further contributing to this debate, in this article we investigate what role is played by country level economic and environmental vulnerabilities in the individual-level relationship between environmental concern and willingness to pay to protect the environment.

First, we assume that individuals living in less affluent countries will struggle more in translating their environmental concern in willingness to pay because of the economic constraints that make them more resistant to costly environmental behaviors, even if they are concerned for the environment. Hence, we hypothesize that:

H3: The positive association between environmental concern and willingness to pay to protect the environment is weaker in less affluent countries than in more affluent ones.

Second, we assume that in high climate risk countries, environmental problems are more concrete and tangible: they are material needs that must be addressed for the survival of the citizens. Therefore, we hypothesize that:

H4: The positive association between environmental concern and willingness to pay to protect the environment is stronger in countries where climate vulnerability is higher than in countries where climate vulnerability is lower.

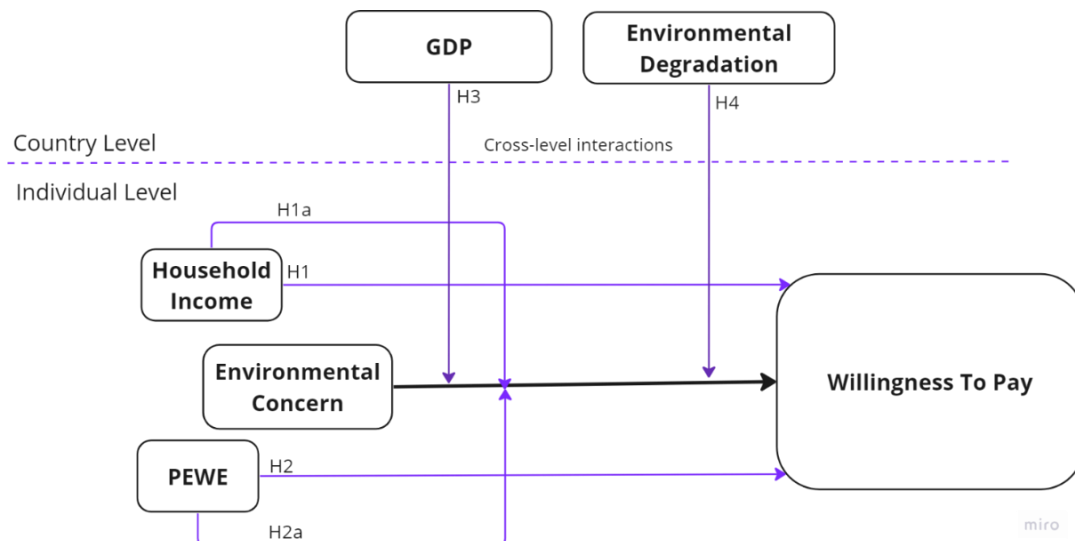


Figure 2.1. Conceptual Model 1

2.3 Methodology

2.3.1 Data and sample

The analysis relies both on individual-level and country-level data. With regard to individual level data, we rely on the IV Environmental module collected between 2020 and 2023 by the International Social Survey Programme (ISSP). We use the nationally-representative samples of 27 countries that participated in the module and include all the variables necessary for the analysis²: Australia (AU), Austria (AT), China (CN), Croatia (HR), Denmark (DK), Finland (FI), France (FR), Germany (DE), Hungary (HU), Iceland (IS), India (IN), Italy (IT), Japan (JP), Korea (KR), Lithuania (LT), New Zealand (NZ), Norway (NO), Philippines (PH), Russia (RU), Slovakia (SK), Slovenia (SI), South Africa (ZA), Spain (ES), Sweden (SE), Switzerland (CH), Thailand (TH), United States (US). After applying list-wise deletion of the missing values (5316 observations) and selecting respondents between 15 and 85 years old, our sample comprehends 36962 individuals.

2.3.2 Dependent variable

To measure our dependent variable, we used two indicators assessing the citizens' willingness to pay to protect the environment: willingness to pay much higher prices (i) and taxes (ii) to protect the environment. The items responses are 'very willing', 'fairly willing', 'neither willing nor unwilling', 'fairly unwilling' and 'very unwilling'. To ensure that higher values correspond to higher willingness to pay to protect the environment, we inverted the coding of the two variables so that 1 corresponds to very unwilling and 5 to very willing. Although the two items are not measures of specific environmental policies, they are good proxies for climate policy support. In fact, according to climate policy experts (Fairbrother, 2022), willingness to pay is the minimum requirement to any public support for environmental taxes, one of the most effective and least costly measures to address climate change. Thus, following the work of previous studies (Davidovic et al., 2020b), we here consider willingness to pay higher taxes and prices as proxy of policy support for one of the climate policies we would primarily need: environmental taxes. The first item captures tax support indirectly – since environmental taxes often end up in price increases - while the second one explicitly measures

² Although Taiwan participated to the ISSP module, it has been excluded from the analysis because the index used to measure climate vulnerability at the country level does not have information for Taiwan.

attitudes on environmental taxes. Together they are considered as a general measure of environmental tax support. Therefore, for the analysis, we built an index, which we will call WTP (Willingness to Pay), composed by the average of the two items. The index ranges from 0 – unwilling to pay - to 5 – very willing to pay. Factor analysis confirms they reflect a unique factor in each country and Alpha of Cronbach ranges between 0.7 and 0.9 across countries.

2.3.3 Independent variables

The main independent variable consists of environmental concern measured as the extent to which respondents indicate to be concerned about environmental issues on a scale from 1 (not at all concerned) to 5 (very concerned).

The other four independent variables are divided in two types of vulnerability and two levels of analysis. On the one hand, we consider both climate and economic vulnerabilities; on the other hand, we look at these vulnerabilities both at the country and at the individual level. This translated into having four main independent variables measuring climate and economic vulnerabilities at the individual and country level.

To measure *individual-level climate vulnerabilities* (1), we used the extent to which the respondents indicate that their neighborhood was affected by an extreme weather event (such as severe storms, droughts, floods, heat waves, cold snaps, etc.) over the last 12 months. The response options are: ‘not at all’, ‘to a little extent’, ‘to some extent’, ‘to a great extent’ and ‘to a very great extent’. We recoded together ‘to a great extent’ and ‘to a very great extent’ because of the low numerosity of these two categories. We will call this variable PEWE (Perceived Experience of Extreme Weather Event). The use of the perception of such experience is in line with the heuristic literature since it enables the researcher to consider the extent to which such an event has emotionally been perceived by the respondents. In fact, as Ogunbode et al. (2019) show, the attribution of the EWE to climate change is a necessary condition to transform such experience in climate behavioral responses. *Individual-level economic vulnerability* (2) is measured through household income quintiles, calculated from the income distribution in each country. The variable, therefore, is a measure of respondent’s household income relative to other households in her/his society.

Moving to the country level variables, to measure the *country-level economic vulnerability* (3) we use the GDP per capita as Purchasing Power Parity (PPP) calculated by the World Bank

in 2022³. The *country-level climate vulnerability* (4) is assessed through an index measuring the climate risk level of every country, the World Risk Index. The World Risk Index enables us to pursue a comprehensive analysis of environmental degradation, considering the multiple factors that make a country environmentally vulnerable, rather than concentrating on a single indicator. The 2023 World Risk Index has been edited by the Institute for International Law of Peace and Armed Conflict (IFHV) of Ruhr-University Bochum that revises the index methodology since 2018. The index assesses the level of environmental risk of a country interacting two dimensions that compose it: the exposure to natural hazards and the societal capacities to respond to these events. The exposure dimension consists in the frequency and intensity of extreme weather events to which the population is exposed. The second dimension consists in the range of capacities necessary to cope with such environmental risks. It is composed by three subdimension: (i) susceptibility, indicating the structural characteristics and the general condition of the population that influence the reaction to climate risk; (ii) the coping capacities to mitigate the effect of climate disasters as well as the capacities to recover after it; and (iii), the adaptive capacities that consist in the long-term strategies to mitigate and prevent negative impacts of climate hazards. The index varies from 0 to 100, where 0 corresponds to no climate risk and 100 maximum climate risk. Among the countries considered in the present analysis, the World Risk Index varies from 0.9 in Denmark, Hungary and Slovakia, to 40 in Philippines and India. On average it scores 12, but with high variability across countries (standard deviation of 12).

The analyses also control for three individual-level variables: gender of the respondent (men as reference vs women), age (15-29 as reference, 30-59, 60-85) and level of education (up to lower secondary education as reference, upper secondary education to short-cycle tertiary education, tertiary and post tertiary education).

2.3.4 Modelling strategy

To test our hypotheses, we rely on multilevel random intercept and random slopes linear regression models⁴. Multilevel analysis enables the researcher to account for both the hierarchical structural of data (in this case individuals clustered in countries) as well as to include macro-level variables measuring contextual characteristics. In Model 1 we look at the

³ Data download in September 2023. World bank statistics provided online at <https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

⁴ Before performing the multilevel models, we proceeded with a country-by-country analysis to test the direct relationship between environmental concern and WTP looking at differences across countries. Results are reported in Figure 1 in the Appendix.

effect of environmental concern by itself. Then, in Models 2 and 3, we include the direct effects of PEWE and household income on WTP, as well as the control variables (Model 3). Successively, we add the interaction between environmental concern and household income (Model 4) and PEWE (Model 5). We then move to the country-level factors. In Models 6 and 7 we, respectively, include GDP and World Risk. Lastly, we include the two contextual variables in two cross-level interaction effects between environmental concern and, respectively, GDP (Model 8) and World Risk Index (Model 9). To facilitate the interpretation of the cross-level interaction effects, we graphically report their predicted values with 95% confidence intervals derived from Models 8 and 9.

2.4 Results

2.4.1 Environmental Concern on Willingness to pay to protect the environment

Figure 2.2 shows the mean level of willingness to pay to protect the environment by the mean level of environmental concern in the 27 countries. The countries range from 3.2 to 4.3 in the average level of environmental concern, confirming the presence of high levels of concern for environmental issues in several western and non-western countries. The coefficient of variation across the countries means is 0.06, indicating little variation in the environmental concern across different contexts. On the other hand, the willingness to pay to protect the environment is generally lower, as it varies from 1.8 (in Slovakia) to 3.7 (in India) with most countries scoring between 2.5 and 3.2. Thus, on average, individuals have high levels of environmental concern but low willingness to pay to protect the environment. The country-level coefficient of variation is 0.14, indicating that there is high variability in the extent to which individuals are willing to pay to protect the environment in different countries. Moreover, the figure shows that willingness to pay is not strongly related to environmental concern at the country level. Indeed, the correlation between the country mean level of environmental concern and willingness to pay is 0.2. Thus, environmental concern does not appear to be a convincing explanation of why willingness to pay for the environment is much higher in some countries than in others. In the following section, we empirically assess the direct relationship between environmental concern and WTP at the individual level using multilevel models.

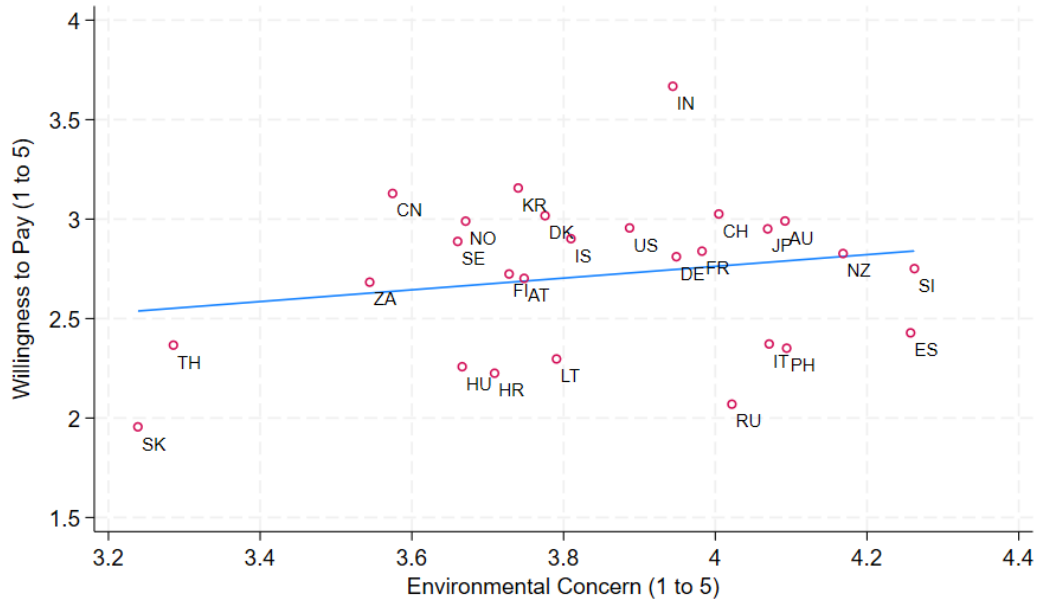


Figure 2.2. 1 Mean national willingness to pay to protect the environment by mean national concern for the environment.

2.4.2 Multilevel Analysis

Table 2.1 shows the results of the multilevel models. Model 0 is a null model with no covariates, used to compare the following models with. The Intra-class correlation, calculated from the country and individual variance is equal to 0.11, indicating that 11% of the variance of willingness to pay to protect the environment is explained by country differences and the rest by differences within countries.

As expected, environmental concern is positively associated with willingness to pay to protect the environment (beta coefficient equal to 0.31, Model 1). Model 2 adds household income and PEWE. The results show that both the variables have a positive and significant effect on the willingness to pay to protect the environment. The effects remain equal even under the control of sociodemographic variables (Model 3). As regards economic vulnerabilities, the results suggest that individuals in higher quintiles of household income are more willing to pay for the environment in comparison to individuals in lower quintiles. Looking at the coefficients of model 3, the difference in the willingness to pay between individuals in the highest and in the lowest quintile is 0.25 on average. As regards climate vulnerabilities, the more individuals perceive having experienced extreme weather events in the last 12 months, the higher is their willingness to pay for the environment in comparison to those who have not experienced such poor environmental conditions. However, the effect of PEWE is particularly small and does not enable us to find support for our hypothesis 2a.

The results for the sociodemographic variables (Model 3) confirm the findings of previous research suggesting that education and being young have positive effects on the support of climate policies, even when personal costs are included (Jacques, 2023; Parth & Vlandas, 2022). In contrast, gender does not have any significant effect on willingness to pay to protect the environment. See the appendix for the complete table showing the effects of control variables.

Models 4 and 5 add the interaction effect between concern and household income, and concern and PEWE, respectively. Model 4 shows a significant interaction effect only between the most vulnerable individuals (1st quintile) and the least vulnerable ones (5th quintile), i.e., the association between environmental concern and willingness to pay for the environment is stronger among individuals in highest household-income quintiles in comparison to those in the lowest one. Therefore, among citizens with the greatest economic vulnerabilities we observe a weaker association between environmental concern and willingness to pay (supporting H1b). In contrast, we find no statistically significant interaction between PEWE and environmental concern on willingness to pay (Model 5). Although having experienced poor environmental conditions moderately affects the willingness to pay, the effect is not multiplicative and such experience does not moderate the effect of environmental concern. Therefore, we did not find support for our hypothesis 2b.

Table 2.1. Multilevel Linear Regression Models of Willingness to pay to protect the environment

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5
Environmental Concern		0.307*** (0.00)	0.299*** (0.01)	0.292*** (0.01)	0.302*** (0.01)	0.278*** (0.01)
Income (rf: 1^ quintile)						
Quintile 2^			0.047** (0.02)	0.037* (0.02)	0.230*** (0.07)	0.037* (0.02)
Quintile 3^			0.092*** (0.02)	0.063*** (0.02)	0.093 (0.06)	0.062*** (0.02)
Quintile 4^			0.192*** (0.02)	0.143*** (0.02)	0.066 (0.07)	0.143*** (0.02)
Quintile 5^			0.337*** (0.02)	0.250*** (0.02)	-0.060 (0.07)	0.250*** (0.02)
PEWE (rf: not at all)						
small extent			0.041** (0.01)	0.036* (0.01)	0.037** (0.01)	-0.039 (0.05)
some extent			0.103*** (0.01)	0.095*** (0.01)	0.094*** (0.01)	-0.049 (0.05)
large extent			0.047** (0.02)	0.042* (0.02)	0.042* (0.02)	0.091 (0.06)
Income*Environmental concern						
Quintile 2^					-0.050** (0.02)	
Quintile 3^					-0.008 (0.02)	
Quintile 4^					0.020 (0.02)	
Quintile 5^					(0.02)	
PEWE*Environmental concern						
small extent						0.021 (0.01)
some extent						0.038** (0.01)
large extent						-0.010 (0.02)
Constant	2.716*** (0.07)	1.537*** (0.07)	1.427*** (0.08)	1.472*** (0.08)	1.436*** (0.09)	1.523*** (0.08)
Random Effects						
Country intercepts	0.143*** (0.04)	0.138*** (0.04)	0.139*** (0.04)	0.138*** (0.04)	0.139*** (0.04)	0.137*** (0.04)
Individual variance	1.110*** (0.01)	1.008 (0.01)	0.993 (0.01)	0.980** (0.01)	0.978** (0.01)	0.980** (0.01)
Log Likelihood (-2LL)	108896.44	105309.29	104758.37	104298.55	104223.71	104285.84
N	36962	36962	36962	36962	36962	36962

Models control for: gender, age, and level of education.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Moving to the effects of country level vulnerabilities, Table 2.2 shows the randoms slope models in which GDP and the World Risk index have been included. Model 6 and 7 shows that national wealth is negatively associated with willingness to pay ($\beta=-0.454$, $p=0.000$), while the level of climate risk is positively associated ($\beta=0.349$, $p=0.000$). With regard to the effect of GDP, these results confirm what previous studies have found (Dunlap & York, 2008; Fairbrother, 2013) and are counter to the affluent and post-materialist hypothesis: in more affluent countries individuals have lower levels of willingness to pay to protect the environment. As regards climate risk, instead, the results suggest a positive direct relationship: living in countries at higher climate risk leads individuals to be more willing to accept costs to protect the environment.

Beyond the direct effect of national wealth or country climate risk on willingness to pay, what can be said about their moderating role in affecting the extent to which environmental concern is translated in willingness to pay? The significant interaction effects – 0.14 for GDP and -0.08 for World Risk in Models 8 and 9 respectively – indicate that both variables play a cross-level moderating role. To provide a clearer representation of the magnitude of the interactions effects we plot predicted mean values with 95% confidence intervals of willingness to pay to protect the environment by environmental concern and the two macro-level variables in Figure 2.3, panels (a) and (b) respectively.

Table 2.2 Multilevel Linear Regression Models of Willingness to pay to protect the environment.

	Model 6	Model 7	Model 8	Model 9
Environmental Concern	0.316*** (0.03)	0.316*** (0.03)	0.310*** (0.02)	0.313*** (0.03)
Income (rf: 1 [^] quintile)				
Quintile 2 [^]	0.037* (0.02)	0.037* (0.02)	0.038* (0.02)	0.037* (0.02)
Quintile 3 [^]	0.068*** (0.02)	0.067*** (0.02)	0.068*** (0.02)	0.067*** (0.02)
Quintile 4 [^]	0.149*** (0.02)	0.149*** (0.02)	0.149*** (0.02)	0.149*** (0.02)
Quintile 5 [^]	0.257*** (0.02)	0.257*** (0.02)	0.257*** (0.02)	0.257*** (0.02)
GDP	-0.454*** (0.09)		-0.470*** (0.08)	
World Risk		0.349*** (0.10)		0.356*** (0.10)
GDP*EnvConcern			0.138*** (0.02)	
World Risk*EnvConcern				-0.075** (0.03)
Constant	1.434*** (0.09)	1.427*** (0.10)	1.432*** (0.08)	1.426*** (0.10)
Random Effects				
Environmental Concern (slope)	0.026*** (0.01)	0.026*** (0.01)	0.009*** (0.00)	0.020*** (0.01)
Country intercepts	0.182*** (0.05)	0.255*** (0.07)	0.167*** (0.05)	0.251*** (0.07)
Individual variance	0.949*** (0.01)	0.949*** (0.01)	0.949*** (0.01)	0.949*** (0.01)
Log Likelihood (-2LL)	103215.34	103223.78	103187.13	103217.45
N	36962	36962	36962	36962

Models control for: gender, age, and level of education

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure 2.3, panel a, provides some support for H3 regarding the role of GDP: as national wealth increases, so does the willingness to pay but only among respondents who are very concerned for the environment. In contrast, the predicted values of WTP among non-concerned individuals decrease substantially from lower to higher GDP countries: the predicted values of WTP are equal to 2.4 for non-concerned individuals in the lowest GDP country and equal to 0.9 among those in the highest GDP country. In other words, non-concerned individuals are much more willing to pay to protect the environment in poorer countries than in wealthier ones and, as a result, the gap between concerned and non-concerned respondents in the degree to which

they are willing to pay to protect the environment is much larger in wealthier countries than in less affluent ones.

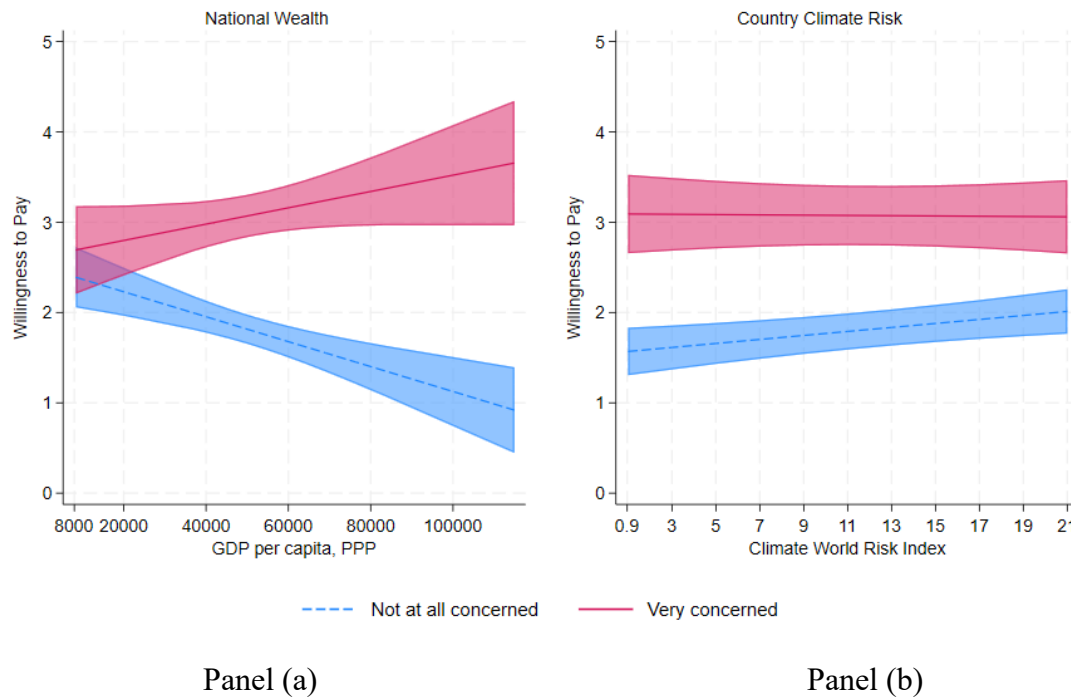


Figure 2.3. Predicted values with 95% confidence intervals of willingness to pay to protect the environment by environmental concern and countries' GDP per capita (panel a) and by environmental concern and levels of Climate World Risk (panel b). The predicted values are derived from Models 8 and 9 in Table 2.2.

Panel b in Figure 2.3, instead, shows the predicted values of willingness to pay by levels of country climate risk for individuals that are very concerned vs not at all concerned for the environment. In contrast with H4, the results suggest that individuals who are concerned for the environment have the same willingness to pay for its protection independently of the level of climate risk of their country. To the contrary, for those who are not environmental concerned, living in high climate risk countries increases the willingness to pay for environmental protection. The predicted values of WTP for non-concerned respondents living in high climate risk countries are equal to 2.02, while for those living in low climate risk countries the predicted WTP is equal to 1.57. Therefore, living in countries with a high climate risk appears to prompt non-concerned individuals to increase their willingness to pay, whereas it does not affect those who already perceive concerns for the issue.

2.5 Discussion and conclusion

The limited commitment to pro-environmental behaviors and climate policy support is a relevant obstacle to the success of climate action on a larger scale. Therefore, understanding the mechanisms by which citizens engage in pro-environmental behaviors is essential to climate change mitigation. Empirical evidence on the topic is mixed: on the one hand, some previous studies have shown that environmental concern acts as a key determinant for pro-environmental behaviors (Dietz et al., 2007; Drews & van den Bergh, 2016); on the other hand, others have emphasized that the relationship is weaker than expected (Hornsey et al., 2016; Mayerl & Best, 2019). Therefore, it is plausible that other mechanisms, beyond environmental concern, influence the extent to which citizens are committed to environmental action. Moreover, in addition to individual differences, comparative studies have found that the strength of the relationship between concern and behaviors varies across countries (Hadler & Haller, 2011; Mayerl & Best, 2019), indicating that contextual characteristics might influence the extent to which individuals succeed or fail in translating their concern in behaviors.

This study contributes to the literature by distinguishing two different factors - both at the individual and at the contextual level – that may interfere in the relationship between individuals' concern for climate change and willingness to pay to mitigate it: economic and climate-related vulnerabilities.

At the individual level, we theoretically rely on the affluent/post-materialist hypothesis and on the idea of perceived distance of environmental problems to argue that economic constraints and climate vulnerabilities influence individuals' willingness to pay to protect the environment in opposing ways. The results support our hypotheses (1a and 1b), showing that a) the more individuals have economic constraints, the less they are willing to pay for the environment (H1a), and b) that economic constraints negatively modify the effect of environmental concern on willingness to pay (H2b). Therefore, in contrast to previous research that mainly analyzed how individual wealth directly affects pro-environmental behaviors, our research adds to previous knowledge by showing that economic vulnerabilities also affect the extent to which individuals translate their environmental concern in willingness to pay to protect the environment.

As regards climate vulnerabilities, at the individual level our results do not support our hypotheses (2a nor 2b). We found a very small effect of the perception of the experience of an extreme weather event on willingness to pay, and we did not find a multiplicative effect of such perceived experience on willingness to pay (no support for hypothesis 2b). Therefore,

environmental concern does not seem to trigger different mental processes in individuals that perceived to have experienced extreme weather events in comparison to those who did not. In contrast to previous studies showing a positive effect of experiencing an extreme weather event on environmental attitudes and behaviors, our research shows that the perception of EWE does not modify pro-environmental behaviors if environmental concern is included in the analysis.

At the contextual level, we hypothesized that economic and climate-related vulnerabilities would have affected the individual-level relationship between environmental concern and willingness to pay (H3 and H4). As regards economic factors, our results show that non-concerned individuals are less willing to pay for the environment in wealthier countries, where there is a gap between concerned and non-concerned in the willingness to pay, than in poorer countries, where instead there is no difference in the willingness to pay according to the level of environmental concern. These results seem to align with the post-materialist thesis, since they suggest that in poorer countries, where the willingness to pay to protect the environment is less dependent on concern, environmental action may be more related to material needs and capacities. Conversely, in wealthier countries, characterized by a greater divide between those concerned and those non-concerned, environmental problems may be more polarized along different values and worldviews rather than material concerns.

As regards environmental conditions, we rely on the environmental degradation thesis, arguing that the climate vulnerability of the country strengthens the extent to which individuals translate their environmental concern in willingness to pay. In contrast to previous studies showing that contextual measures of environmental degradation, such as water and air pollution levels, do not affect pro-environmental behaviors (Franzen & Meyer, 2010; Gelissen, 2007), our study empirically shows that a country's climate vulnerability, assessed through a comprehensive measure of climate risk, impacts the citizens' willingness to protect the environment. Despite this positive direct effect, we do not find support for our last hypothesis according to which the effect of environmental concern would be stronger in more climate vulnerable countries. However, the analysis of the interaction effect indicates that non-concerned individuals are more willing to pay to protect the environment in countries facing greater climate vulnerabilities, in comparison to those living in contexts with lower climate risk.

Therefore, the results suggest that, similar to economically vulnerable countries, in countries facing high climate risk, the willingness to pay for environmental protection may be driven more by immediate, concrete needs than by a general concern for the environment. This may also be influenced by the greater visibility of environmental issues in public discourse and media coverage, which tend to be more prominent in regions frequently affected by climate

risks and extreme weather. As a result, environmental protection may be perceived less as a matter of abstract concern and more as an urgent problem requiring tangible solutions.

A potential limitation of this study regards the bidirectional relationship of environmental concern and perceived experience of an extreme weather event. Environmental concern affects the extent to which individuals perceive to have experienced an extreme weather event, and, vice versa, having experience such an event affects the concern for the environment. This reciprocal relationship may have weakened our results about the effect of individual-level climate vulnerabilities. Further research should disentangle these relationships investigating the impact of experiencing extreme weather events on the translation of environmental concern into willingness to pay.

Another potential limitation relates to the operationalization of pro-environmental behaviors. As previous research highlighted (Mayerl & Best, 2019), although willingness to pay to protect the environment is an intentional behavior to act for the environment, we cannot be sure that it necessarily indicates a behavior in practice.

In conclusion, this study shows that pro-environmental behaviors can be promoted through increasing environmental concern, but the effectiveness of this intervention may be limited, especially for economically vulnerable individuals and in economic and climate vulnerable countries where environmental concern does not seem to be the strongest predictor of willingness to pay for the environment. Hence, further research should explore other factors that might affect pro-environmental behaviors in climate and economically vulnerable countries as well as among economically vulnerable individuals. More specifically, future studies may focus on more concrete factors that lead individuals to be more willing to pay for environmental protection regardless of their general environmental concern. Moreover, future studies may focus on different measures of pro-environmental behaviors in order to analyze whether climate and economic vulnerabilities affect them in a similar way as to the willingness to pay.

Chapter 3

Weathering the storm: Does recalling a natural disaster drive support for climate mitigation?⁵

3.1 Introduction

Climate change is one of the most urgent problems our societies are facing: global temperature is rising, natural disasters are becoming more frequent, while the reduction of green gas emissions is not sufficiently decreasing. Scholars have identified the lack of public support toward climate policies as one of the main obstacles to the reduction of emissions and the development of the green transition (Fairbrother 2022). Yet, while most citizens in most countries are aware of climate change and express concern for it, the levels of pro-environmental behaviors as well as the support for climate policy are particularly low, especially when individual costs are required. Therefore, understanding how to increase public support for such policies and reduce the gap between the perception of the phenomenon and the intentions to act for it is a key issue for social scientists (Fairbrother 2022; Goldberg et al. 2020).

Researchers have proposed several interventions to increase individuals' support for climate policy, including specific framing of policy messages and altering the perception of the phenomenon (Rode et al. 2021). In particular, the interventions aimed at reducing perceived distance from climate change and those focused on stimulating emotional responses resulted to be particularly effective. The mechanisms explaining the increasing support for climate action lie in three different streams of the literature: the reduction of the perceived distance of climate change, the experience of natural disasters and climate change communication. Experiencing extreme weather events and reducing the psychological distance of climate change can contribute to increase the risk perception as well as the willingness to act for climate change mitigation (Demska et al. 2017; Singh et al. 2017). Similarly, different types of messages on climate change can have differentiated influence on climate attitudes and behaviors (Rode et al. 2021). However, most studies focus on the American context, and little is known about which interventions are effective to increase climate policy support in the European context.

⁵ This chapter derives from the following article currently under review at the *Acta Sociologica* journal: Ladini, R. and Moroni, M. (2024). Weathering the storm. Does recalling a natural disaster drive support for climate mitigation?

In this article, we aim to make a novel contribution to the literature by combining the three streams of literature for testing strategies aimed at increasing individual support for the mitigation of climate change. In particular, we test the effect of recalling a natural disaster on respondents' willingness to limit the standard of living to mitigate climate change, by using two survey experiments conducted in the Italian context in 2022 and 2023 within the ResPOnSE COVID-19 project. We analyze two experiments recalling different types of natural disasters happened recently in Italy: a collapse of a glacier and a flooding event. In the first study we test the impact of recalling the collapse of Marmolada glacier in Italy and the collapse of Grand Combin glacier in Switzerland. In the second study we analyze whether recalling the floods in the Emilia Romagna region impacts the willingness to accept costs to mitigate climate change.

Moreover, we test whether such effects are moderated by pre-existing attitudes and orientations, namely, beliefs toward the anthropogenic causes of climate change and political orientation, that have been shown to moderate the effect of experiencing natural disasters on climate attitudes (Rüttenauer 2023).

Findings suggest that recalling a natural disaster can influence the willingness to limit the standard of living to mitigate climate change. However, the effect varies according to the type of disaster considered: recalling the glaciers collapse – whether it is the Marmolada or the Grand Combin - affects the willingness to accept costs for climate mitigation, while recalling the floods in Emilia Romagna does not have any effect. The moderating effects of climate beliefs and political orientation suggest that recalling a natural disaster is more effective among people not believing in the anthropogenic causes of climate change and right-wing individuals. These results point to the relevance of using effective climate communication strategies to encourage support for climate action both among the general population and in particular among specific categories of individuals.

3.2 Background

3.2.1 Climate change as psychologically distant

Climate change is a difficult concept to comprehend and interiorize, as it is a long and slow process. Its consequences are generally slow, latent, and indirect; they consist in weather fluctuations, temperature changes and, occasionally, in natural disasters. In other words, climate change is a statistical phenomenon, defined by the average change of weather conditions over

a long period (IPCC 2018). As a result, it is difficult to quantify and detect for non-expert people, especially on the basis of personal experience (Weber 2010). Since it is practically not possible to experience the changes in weather's temperatures, one of the most direct experiences of climate change regards extreme weather events. However, natural disasters are rare phenomena with low probabilities of occurrence and only a small proportion of the population experience them. As Milfont (2010), Pawlik (1991) and Weber (2010) indicate, when an event has a small probability of occurrence its effects tend to be minimized and to have smaller impact on people's attitudes and behaviors than their objective likelihood of occurrence would require.

As a result of such complexity, climate change is usually psychologically perceived as a remote phenomenon. The tendency to see climate change as a psychological distant phenomenon has been called 'spatial optimism' (Gifford et al. 2009) or 'environmental hyperopia' (Uzzell 2000), referring to the individual's optimistic inclination to perceive climate change effects less threatening to themselves than for distant individuals. In particular, people often believe that its repercussions affect geographically distant regions and populations, with the negative consequences manifesting far in the future by coming generations. (Leiserowitz 2006; Schultz et al. 2014; Tvinnereim et al. 2020). Moreover, individuals across the world tend to perceive climate change as a higher threat for society as a whole than as a personal risk (Biancalana and Ladini 2024; Milfont 2010; Spence and Pidgeon 2010).

As Milfont (2010) and Spence and colleagues (2012) emphasize, climate change is perceived as distant along the four dimensions of psychological distance delineated by Liberman and Trope (2008) in Construal Level Theory: temporal, spatial, hypothetical and social. The first two dimensions assess psychological distance based on how far away the event is in terms of geography and time. The hypothetical dimension measures the likelihood of the event occurring, while the social dimension reflects the degree to which climate change affects people who are different from oneself. Construal Level Theory explains the psychological mechanisms through which we mentally represent distant objects and how these representations (i.e. mental construals) guide individuals' previsions, evaluations and decisions. The central point of Construal Level Theory consists in distinguishing the higher-levels and lower-levels mental construals through which individuals represent distant or closer events. The further away an object is, the more it is represented in abstract and generalized terms – e.g. high-level construals. Conversely, close events are represented by several details and contextualized information – the lower-level ones. These representations guide the evaluations and the decisions on which behaviors and intentions are based on. Hence, Construal Level Theory consists in an effective theoretical background to look at the relationship between the perception of climate change as

a remote event and people's attitudes, intentions and behaviors with respect to it.⁶ In this regard, the Goal Setting Theory (Locke and Latham 1990) provides a mechanism explaining the relationship between distance and intentions to act: psychological closeness and detailed goals increase the likelihood to translate intentions in actions. According to this psychological theory people tend to perform better when specific goals and contextual features are outlined, while general goals are more ambiguous and difficult to achieve.

Nonetheless, the empirical evidence on such relationship is mixed. On the one hand, some empirical studies fail to demonstrate that reducing perceived distance of climate change impacts people's motivation to act (Brügger et al. 2016; Shwom et al. 2008; Spence and Pidgeon 2010). Similarly, Spence and colleagues (2012) found that framing climate change as a threat for distant populations positively impacts intentions to reduce energy use. On the other hand, other studies, exploring the impacts of the dimensions of psychological distance on people's attitudes and intentions, tend to confirm the negative implications of perceiving climate change as a remote event. The more people perceive climate change as geographically, temporally, and socially distant, and the more uncertain they believe it to be, the lower their concern and support for climate policies (Singh et al. 2017). Similarly, Spence and colleagues (2012) found that people's concern about climate change and their readiness to reduce energy uses increases when they believe that climate will impact local areas, it will occur in the near future, and it is surely caused by human activities.

3.2.2 Experiencing natural disasters and attitudes toward climate change

Natural disasters – often referred to as extreme weather events - are environmental shocks, derived from rare and severe weather conditions at a particular time and place, which can cause damages to the environment, human life and human activities (Seneviratne et al. 2021). These events encompass various types, such as floods, hurricanes, drought, glaciers' collapses. Compared to the gradual rise in temperatures and other less noticeable effects of climate change, natural disasters are among the most impactful personal experiences that people can make about the phenomenon.

The relevance of considering the experience of extreme weather events derives from the notion that personal experience is a key driver of risk perception. This hypothesis is rooted in the literature about learning from experience and learning from statistics, according to which

⁶ In this regard, there is debate about the way in which the Construal Level Theory is employed to analyze the relationship between distance perception and action (Brügger et al., 2016),

people make use of both personal experience (learning from experience) and secondary sources (learning from statistics) to understand the abstract risk of climate change (Weber, 2010). Statistical learning requires cognitive efforts and analytical processing of scientific information. Additionally, it depends on trust in the sources of information, and it is likely influenced by people's values and worldviews, which affect how they select and interpret information. Conversely, learning from experience involves fast, automatic and affective responses and can have strong impacts on people's risk perception and actions (Demska et al. 2017; Myers et al. 2013; Weber 2010).

The literature identifies different mechanisms explaining such impact of personal experience. First, two heuristics - availability and affect - can explain the process by which personal experience can affect people's perception (Demska et al. 2017; Van Der Linden 2014). On the one hand, personal experience can make climate change more cognitively available and salient, easing the mental accessibility of the event, that in turn is more likely to influence people's perceptions and judgment (Weber 2010). On the other hand, experiencing a natural disaster can result in strong emotional responses that increase the importance of the experience and in turn influence the risk perceptions (Demska et al. 2017; Van Der Linden 2014; Weber 2010). Second, the experience of disasters can reduce the perceived distance of climate change, revealing the tangible and local impacts of climate change. In line with Goals Setting Theory, such experiences might induce people to perceive the concrete aspects of climate change and in turn to recognize the final goals of environmentally friendly attitudes, actions and policies.

Hence, natural disasters have the potential to increase not only risk perception but also beliefs, intentions and behaviors related to climate change. Many studies found that exposure to extreme weather events increases perceived personal vulnerability, climate concern (Demska et al. 2017; Ogunbode et al. 2017; Spence et al. 2011), the likelihood of believing in anthropogenic global warming (Lyons et al. 2018; Myers et al. 2013; Spence et al. 2011) and the perceived salience of the issue (Demska et al. 2017). Additionally, also the frequency of extreme weather events can influence individuals opinions about climate change (Sloggy et al. 2021; Soni and Mistur 2022). Moreover, the impacts of personal experience have been found also on people's intentions and behaviors. Experiencing natural disasters can change people's support for environmental spending (Soni and Mistur 2022), as well as it is found to indirectly affect preparedness to reduce energy consumption (Spence et al. 2011), behavioral intentions and climate mitigation policies (Demska et al. 2017). As regards the impacts on actual behaviors, the evidence varies according to the extent to which private or public behaviors are considered (see Stern 2000 for the distinction between private and public-sphere behaviors).

When looking at public- behaviors, some authors look at the impact of voting behavior: for example, Kronberg and colleagues found that Swedish municipalities that experienced wildfires had a higher share of green voting than municipalities unaffected by the fires (Kronborg et al. 2024). Conversely, studies focusing on private behaviors - buying sustainable products, saving energy or switching to more sustainable modes of transportation (Stern 2000) - do not find a significant differences between those experiencing extreme weather events and those who did not (Chen 2020; Rüttenauer 2023).

However, not all climate disasters are alike. They can have different impacts, different levels of damage and can be framed in different ways by the public discourse and at the individual level. For instance, people are familiar with certain events that frequently occur in their local areas, making them more hesitant to associate these events with climate change (e.g. floods). Conversely, novel phenomena may prompt both the public and the media to seek new explanations, thereby facilitating the link between these events and global warming (for example, the melting of polar ice or the collapse of glaciers) (Lyons et al. 2018). In this regard, attributing to climate change a natural disaster - that an individual experienced - has been shown to be a necessary condition to impact climate attitudes. For instance, Ogunbode and colleagues (2019) found that experience of the flooding events in 2013/2014 in the UK had an effect on people's perceived vulnerability to climate change and, indirectly, on their mitigation responses, but only among those who considered the floods as an effect of climate change.

The literature on this topic explored different types of events, offering mixed results according to the type of extreme events analyzed. Soni and Mistur (2022) found that extreme winter events and wildfires increased support for environmental spending, whereas floods and droughts did not have any significant impact. Similarly, Lyons and colleagues (2018) revealed climate change beliefs to be linked with polar vortex and drought events, but they did not find any association between climate beliefs and the experience of tornado, hurricane or floods. As regards flooding events, the results are particularly mixed. Some studies do not find any difference between beliefs in climate change of those who experienced and those who do not experience them (Whitmarsh 2008) or any effect on environmental spending (Soni and Mistur 2022). Conversely, floods' experience has also been shown to be associated with higher personal vulnerability, salience and behavioral intentions (Demskei et al. 2017; Spence et al. 2011).

3.2.3 *The moderation of climate change beliefs and political orientation*

Furthermore, it becomes relevant to understand whether the impact of the exposure to a natural disaster on attitudes toward climate change varies by subgroup. In this article, we will focus on the willingness to accept costs for the mitigation of climate change, more precisely, the willingness to modify the standard of living. Previous research identifies two main moderators in the relationship between exposure to extreme weather events and attitudes toward climate change, namely, climate change beliefs and political orientations (Rüttenauer 2023). There are two contrasting expectations derived by different mechanisms, which are proposed and thoroughly explained by Rüttenauer (2023).

On the one side, according to the ‘motivated reasoning’ mechanism, the experience of an extreme weather event mostly reinforces attitudes among those people who are already aware of the climate risks and willing to support the ecological transition. People believing in the anthropogenic origin of climate change are more likely to perceive an extreme weather event as a consequence of human activity on the global climate, and thus further increase their awareness and support for climate actions after having been hit by such events. Indeed, among those people the experience of an extreme event is supposed to be a driver that further reinforces their beliefs, and accordingly their willingness to accept costs for the mitigation of climate change. Instead, people holding uncertain and denial positions toward the anthropogenic causes of climate change are less likely to be influenced by extreme weather events, since they tend to perceive them as natural phenomena independent of climate change. Moreover, as several contributions in political psychology point out (Jost 2009; Jost et al. 2008), left-wing people hold stronger preference toward change in general, besides showing higher levels of climate change beliefs (Hornsey et al. 2016). Therefore, among left-wing people, the exposure to an extreme weather event is supposed to increase their support for the ecological transition. On the contrary, right-wing people are more concerned about defending the *status quo*, thus they are less likely to change their support toward the ecological transition even after the experience of a natural disaster. Furthermore, as argued by Ogunbode et al. (2017), in line with the social identity theory we should expect that individuals process climate change information depending on the positions that are prevalent in their political area. Thus, people are more likely to change their attitudes toward climate change after an extreme weather event when there is higher consensus toward the attribution of extreme weather events to climate change within the political stances they support. Accordingly, leftist people are supposed to be more willing to change their standard of living toward climate change, even because among right-wing political groups there is lower consensus in considering extreme weather events as a consequence of

climate change (Ogunbode et al. 2017; Biancalana and Ladini 2024). All in all, according to these explanations, people tend to reinforce their previous attitudes and beliefs after the experience of an extreme weather event.

On the other side, according to the mechanism of ‘attitudinal updating’ through experiential learning, the experience of an extreme weather event could represent the occasion for a shift in attitudes especially among those people perceiving higher spatial and temporal distance toward climate change, such as climate uncertain and denial and right-wing people. Indeed, by experiencing an extreme weather event they learn some of the consequences of climate change and, accordingly, become more aware of the climate change issue and its proximity. On the contrary, those people who perceive climate change as spatially and temporally proximate tend to be less affected by the proximity of a climate disaster, as they are already aware of the consequences of climate change. In this direction, Rüttenauer (2023) underlines that ceiling effects can explain the lower attitudinal change after the exposure to a natural disaster among those people who already believe in the anthropogenic cause of climate change. Nonetheless, while this argument is very appropriate when the outcome of interest is climate change belief, as well as climate worry, the same is supposed to be less appropriate when dealing with support for climate policies and willingness to accept costs for the mitigation of climate change, as they are substantially lower (Fairbrother 2022).

Previous empirical research has rarely tested whether the exposure to natural disasters has a differentiated impact on public opinion by individual characteristics. By analyzing UK panel data covering the period 1991-2020, Rüttenauer (2023) provides support toward the mechanism of attitudinal updating through experiential learning among right-wing people and climate sceptics, who overall reinforce their beliefs in climate change after being exposed to floods and heatwaves. Indeed, he shows that the individual exposure to floods and heatwaves impacts on climate change beliefs among such categories of individuals, nonetheless it does not have any significant effect on pro-environmental behavior (e.g. saving electricity, turning down the heating, etc.). Other works, instead, provides evidence on the mechanism of motivated reasoning. Hazlett and Mildemberger (2020) find that in California the exposure to wildfires is associated with higher number of votes in four pro-environment ballot initiatives in areas with a majority of Democratic votes, while the association was negligible in areas with a majority of Republican votes. In the UK contest, Ogunbode and colleagues (2017) show that the experience of local flooding indirectly increases the willingness to reduce energy use only among left-wing voters, not among right-wing ones.

3.2.4 Interventions on climate change and their impact on climate change attitudes

A large amount of research has tested the role of climate change communication on attitudes toward climate change, especially in the US context. For this purpose, extant research analyzed the impact of several interventions - messages aimed at influencing climate attitudes - by employing experiments in which different treatments are assigned to randomized groups of individuals. A metanalysis analyzing the impact of interventions coming from 76 experiments carried out in the US on climate change attitudes (Rode et al. 2021), revealed that interventions are more effective when they include ambiguous viewpoints, counterarguments and information to decrease belief in climate change. In those cases, the effectiveness of messages consists in increasing uncertainty and denialism toward the existence of climate change and its anthropogenic causes. Types of messages aimed at increasing belief in climate change messages were also found to be effective when they invoked emotion, involved religion and decreased psychological distance.

Our contribution goes into this latter direction, by analyzing how interventions aimed at recalling a recent and proximate extreme weather event, thus reducing the psychological distance, impacted on the willingness to accept limitations in people's standard of living. In the next paragraphs we will present in detail the context of the study and our research design.

3.3 Context of the study

In this article we focus on the Italian context by analyzing the effect of recalling two types of natural disasters that differ in the extent to which individuals attribute them to climate change: the collapse of a glacier and a flooding event. Firstly, glacier collapses are easily attributed to rising temperature while the direct causal link between a singular flooding event and climate change is more difficult to establish. Climate change increases the frequency and intensity of floods, but a unique flood is caused by multiple factors, including local management and prior adaptation interventions. These differences are reflected also in the extent to which people attribute the event to climate change, as suggested by previous studies reporting that the experience of flooding is not necessary associated with climate change (see Biancalana and Ladini 2024; Ogunbode et al. 2019; Whitmarsh 2008). Secondly, glacier collapses are associated with the imagery of melting ice, a central theme in the climate change narrative, and

they have been rarely experienced before the onset of global warming; on the contrary, flooding events are familiar for several people, besides climate change.

Therefore, although our study focuses on the Italian context and on two specific events that occurred in Italy in recent years, the types of disasters we examine are not uniquely tied to the Italian setting. One event is widely familiar to people across Europe and other Western countries, while the other, being related to ice melting, is a common element of the global climate change narrative. This broader relevance of the events should help in enhancing the generalizability of our findings to other national contexts.

As regards glacier collapses, we analyze the recalling of two events that differ for their territorial affiliation and their symbolic importance for the Italian population: the collapse of Italy's Marmolada glacier, labelled as ‘the queen of the Dolomites’⁷, in July 2022, and the collapse of Switzerland's Grand Combin glacier in May 2022.⁸ These events also differ in the salience in the public discourse; while the Marmolada collapse dominated the news (Azzalini and Marchese 2022), the Grand Combin collapse did not receive a comparable coverage in Italy.

As regards the flooding event we consider the floods happened in May 2023 in Emilia Romagna causing several deaths and tens of thousands of displaced people. Although the event has been at the center of the Italian news for days (Imperatore and Frazzetta 2023), the causes of the floods have been largely debated in the media, and the prevalence of attribution to climate change or to the local management substantially varies by political preferences (Biancalana and Ladini 2024).⁹

⁷ <https://www.visittrentino.info/en/articles/unesco-dolomiti/dolomiti/marmolada>

⁸ The collapse of the Marmolada glacier caused 11 deaths and 8 injuries, the collapse of Grand Combin glacier caused 2 deaths and 9 injuries. The two glaciers are located in the Alps, and the Grand Combin glacier, although located in Switzerland, borders the Italian region Valle d'Aosta.

⁹ As pointed out by Imperatore and Frazzetta (2023, 320), a study published on May 31, 2023, - a couple of weeks after the flood - by the World Weather Attribution (WWA) ‘acknowledges the potential link between climate change and extreme weather events but contends that it did not detect a statistically significant connection in the Emilia-Romagna flood. Nonetheless, other scholars, including climatologists, meteorologists, physicists, and environmental engineers, have identified several structural limitations in the study’. In this regard, see also <https://www.nature.com/articles/d43978-023-00082-z>.

3.4 Hypotheses

First, we argue that the recalling of a natural disaster, by reducing the perceived distance of climate change, impacts the willingness to limit the standard of living to mitigate climate change. Thus, our first hypothesis stands as follows:

H1: Recalling a natural disaster increases the willingness to accept limitations in the standard of living for the mitigation of climate change.

Second, we assume that the messages recalling the collapses of glaciers Marmolada and Grand Combin glaciers are more likely to affect mitigation responses than Emilia Romagna floods for several reasons discussed above. Hence, we hypothesize:

H2: Recalling the glacier collapses is more effective in increasing the willingness to accept limitations in the standard of living for the mitigation of climate change in comparison than recalling the floods.

Moreover, we expect that because of the different symbolic relevance and the different mediatic attention, recalling Marmolada glacier collapse is more effective than recalling Grand Combin collapse among the Italian population. Thence:

H3: When recalling the same type of natural disaster, recalling a symbolically closer and more mediatized event is more effective in increasing the willingness to accept limitations in the standard of living for the mitigation of climate change in comparison than recalling a more symbolically distant and less mediatized event.

Finally, we argue that the effect of recalling a natural disaster might change according to pre-existing attitudes and orientations. To test the motivated reasoning and the attitudinal updating mechanisms we formulate two sets of competing hypotheses.

On the one hand, as regards climate change beliefs, we hypothesize that:

H4a: Recalling the glacier collapses is more effective in increasing the willingness to accept limitations in the standard of living among individuals believing in the anthropogenic causes of climate change (motivated reasoning mechanism).

H5a: Recalling the glacier collapses is more effective in increasing the willingness to accept limitations in the standard of living among individuals not believing in the anthropogenic causes of climate change (attitudinal updating mechanism).

On the other hand, concerning political orientation we hypothesize that:

H4b: Recalling the glacier collapses is more effective in increasing the willingness to accept limitations in the standard of living among left-wing individuals (motivated reasoning mechanism).

H5b: Recalling the glacier collapses is more effective in increasing the willingness to accept limitations in the standard of living among right-wing individuals (attitudinal updating mechanism).

3.5 Methodology

3.5.1 Data

Data come from the fifth and sixth waves of the ResPOnSE COVID-19 survey (Response of Italian Public Opinion to the COVID-19 Emergency), a research project started in 2020 with the aim of monitoring Italian public opinion during the COVID-19 pandemic (Biolcati et al. 2021; Vezzoni et al. 2020, 2024). The survey includes questions on several social and political attitudes, together with socio-demographic characteristics, and the fifth and sixth waves contain questions on attitudes toward climate change. The sample was drawn from the opt-in online community of a commercial research institute (SWG S.p.A), stratifying by macro-area of residence and, subsequently, quoting by gender and age class. In the fifth wave, carried out between November 7 and December 22, 2022, 2,347 respondents answered the module on attitudes toward climate change. In the sixth wave, carried out between June 6 and July 6, 2023, all the 3,087 respondents answered the module on attitudes toward climate change. Although the non-probabilistic nature of the sample is a potential threat to the external validity of the findings, the use of a randomized experimental design has the potential to test specific interventions on climate attitudes.

3.5.2 *Experimental design*

To answer our research questions, we included two survey experiments respectively in the fifth and sixth wave of the ResPOnSE COVID-19 survey. Our dependent variable is the willingness to cut the standard of living for the mitigation of climate change, intended as a measure of public support to address the climate change issue. Although the item does not directly measure specific climate policies, it is considered as a good proxy for climate policy support, extensively used in previous research (Andrew et al. 2024).

The measure is inspired from an item included in all the editions of the International Social Survey Programme (ISSP) on the environment (1993, 2000, 2010, 2020). Nonetheless, the wording of the original item is slightly different, as the ISSP measures the willingness to cut the standard of living for the protection of the environment, while here we specifically focused on the mitigation of climate change because our conceptual framework refers to attitudes toward climate change, and not to more general attitudes toward the environment. Previous research has highlighted the peculiar feature of the climate change issue, which has been considered as positional since it implies the combination of the imperative altruistic and the restructuring of the economy (Farstad 2018; Schworer 2024). Moreover, since it has been argued that individuals are more supportive of accepting costs for the ecological transition when they are not directly asked to pay more taxes (Baranzini and Carattini 2017), we decide to focus on a measure that does not explicitly evoke the payment of new taxes.

The dependent variable is measured on a five-point Likert scale and ranges from 1 (not at all willing) to 5 (totally willing), after having inverted the semantic polarity of the original variable (1: totally willing; 5: not at all willing).

In the experimental designs, we aim at testing whether recalling a recent natural disaster (a collapse of a glacier in the first study, a flood in the second study) affects people's willingness to accept limitations in their standard of living for the mitigation of climate change.

In the first study, we randomly assigned respondents to three different conditions. About half of the respondents answer the question on the limitations of the standard of living with no priming (control group). The remaining half of respondents was randomly split in two groups (treatment groups), in which a priming message recalling the collapse a glacier (Marmolada for one group, Grand Combin for the other group) preceded the text of the item. The wording of the three experimental conditions stood as follows:

- Control group (50% of the sample): How willing would you be to accept cuts in your standard of living to help mitigate climate change?

- Treatment group (Marmolada glacier – 25%): Last summer, part of the Marmolada glacier collapsed unexpectedly, causing deaths and injuries. How willing would you be to accept cuts in your standard of living to help mitigate climate change?
- Treatment group (Grand Combin glacier – 25%): Last summer, part of a glacier on the Grand Combin in Switzerland collapsed unexpectedly, causing deaths and injuries. How willing would you be to accept cuts in your standard of living to help mitigate climate change?

With a similar experimental design, in the second study half of the respondents were assigned to the question on willingness to accept limitations in the standard of living with no priming (control group), while the remaining half of the respondents received a priming message recalling the flood which took place in Emilia-Romagna (treatment group). Thus, the wording of the two experimental conditions stood as follows:

- Control group (50% of the sample): How willing would you be to accept cuts in your standard of living to help mitigate climate change?
- Treatment group (50% of the sample): In mid-May, a number of rivers in Emilia-Romagna overflowed, and many people were evacuated or died because of the resulting floods. How willing would you be to accept cuts in your standard of living to help mitigate climate change?

3.5.3 Measures

As we aim to analyze whether the effect of recalling a natural disaster on the willingness to limit the standard of living varies by certain individual characteristics, we consider as moderating variables climate change beliefs and political orientation. The variables refer to questions preceding the experimental design in the questionnaire.

For what concerns climate change beliefs, we focus on belief in the causes of climate change. We recoded the five possible answers to the question ‘Do you think that climate change is caused by natural causes, human activity, or both?’ in the following three categories: entirely/mainly by natural processes; equally by natural processes and human activity; entirely/mainly by human activity.¹⁰

¹⁰ In the recoded variable, for the sake of simplicity of data analysis we joined into a single category the original answer categories ‘entirely by natural processes’ and ‘mainly by natural processes’, as well as the answer categories ‘entirely by human activity’ and ‘mainly by human activity’.

Political orientation is measured by using the self-reported position on the left-right scale (from 0 to 10) and distinguishing between the following categories: left (0-3), centre (4-6), right (7-10), don't know/don't answer.

3.5.4 Empirical analysis

We answer our research questions by employing linear regression models, in which the dependent variable is the willingness to accept limitations in the standard of living for the mitigation of climate change and the experimental condition is the main independent variable. We run separate regression analysis for each of the two experimental studies to test H1-3, by including controls for sex, age class and education. To analyze whether the effect of recalling a natural disaster on the willingness to accept limitations in the standard of living varies by climate change beliefs and political orientation, we employ linear regression models which include an interaction term between the experimental condition and those two variables, testing respectively H4a-H5a and H4b-H5b.

3.6 Results

First, we aim at testing whether the interventions have been successful in increasing the willingness to accept limitations in the standard of living. In this regard, the data analysis reported in Table 3.1 provides mixed evidence. For what concerns the first study, recalling the collapse of a glacier substantially increases the willingness to accept sacrifices for the mitigation of climate change. Empirical analysis shows that when recalling the collapse of the Marmolada glacier, the predicted mean of willingness to accept limitations is 0.30 higher (on a 0-10 scale) than in the control group, which did not receive any recall (difference statistically significant, p -value < 0.01). Even when recalling the collapse of the Grand Combin glacier, the willingness to accept sacrifices is on average 0.21 higher than among those not receiving the recall. Although there is a slight mean difference (0.08) in the willingness to accept limitations in the standard of living between people exposed, respectively, to the recall of the Marmolada and the Grand Combin glacier, it is not statistically significant (p -value = 0.143). Instead, the analysis of the experimental design included in the second study shows the ineffectiveness of recalling the flood in Emilia-Romagna in increasing the willingness to accept cuts in the standard of living: difference with control group is 0.06, not significant at $\alpha = 0.05$).

In light of the results shown in Table 3.1, we provide mixed evidence toward H1 (recalling glacier collapses proves to be effective, while recalling floods not) and support for H2. Instead, there is not sufficient evidence for supporting H3.

Table 3.1: Linear regression models with the willingness to accept limitations in the standard of living as dependent variable and the experimental condition as independent variable.

Independent variables	Categories	Study 1 Glacier	Study 2 Flood
Experimental condition (No priming)	Priming: Marmolada Glacier	0.30*** (0.05)	
	Priming: Grand Combin glacier	0.21*** (0.05)	
	Priming: Emilia- Romagna flood		-0.06 (0.04)
Sex (Male)	Female	-0.01 (0.04)	0.13*** (0.04)
Age (18-34)	35-54	-0.16** (0.07)	-0.28*** (0.06)
	55 and more	-0.04 (0.07)	-0.03 (0.06)
Education (Low)	Medium	0.28*** (0.08)	0.25*** (0.07)
	High	0.42*** (0.08)	0.43*** (0.07)
Constant		3.17*** (0.10)	3.39*** (0.09)
Observations		2,18	2,888
R-squared		0.03	0.03

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For what concerns the moderating role of climate change beliefs and political orientation, we focus on the results of the first study, namely, the experimental design recalling glacier collapse. Moreover, as we do not have specific hypotheses regarding the differentiated effects of recalling the collapse of the two different glaciers (Marmolada and Grand Combin), for the sake of simplicity in the interpretation of the results and statistical power, in the following analysis the independent variable measuring the experimental condition is dichotomized (no recalling/recalling).

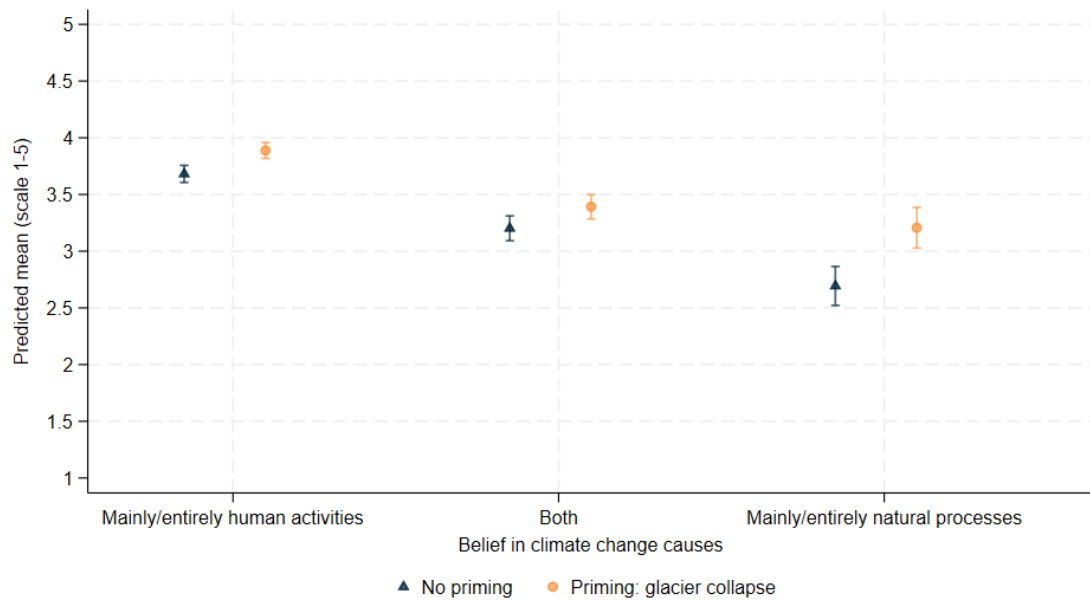


Figure 3.1. Predicted means of willingness to accept limitations in the standard of living for the mitigation of climate change by experimental condition (priming: glacier collapse vs no priming) and belief in belief in climate change causes. Results estimated by Model 1 in Table 3.1 in the Appendix (study 1, $n = 2,092$).

Figure 3.1 shows the predicted means of the willingness to accept limitations in the standard of living for the mitigation of climate change by experimental condition and belief in the anthropogenic causes of climate change. All in all, as expected, the willingness to accept limitations in the standard of living is the highest among individuals believing that human activity is the main/entire cause of climate change (predicted mean equal to 3.68 for the group not receiving the priming), and the lowest among those believing that climate change is mainly/entirely caused by natural processes (predicted mean equal to 2.69 for the group not receiving the priming). When analyzing the experimental results, we show that recalling the collapse of a glacier raises the willingness to accept limitations in the standard of living for every category of individuals (mean differences between the treatment and the control groups always larger than 0). Nonetheless, the effect of recalling the glacier is substantially and significantly higher (at $\alpha = 0.05$) among those individuals not believing in the anthropogenic causes of climate change than among other categories. For those people the effect is positive and equal to 0.51, while it is respectively equal to 0.19 and 0.21 for those people believing that both natural processes and human activity cause climate change and those believing that human activity is the main/entire cause. Accordingly, empirical evidence supports H5a and rejects H4a. In other words, the mechanism of attitudinal updating prevails, in line

with recent evidence by Rüttenauer (2023) on the effect of the exposure to extreme weather events on climate change beliefs.

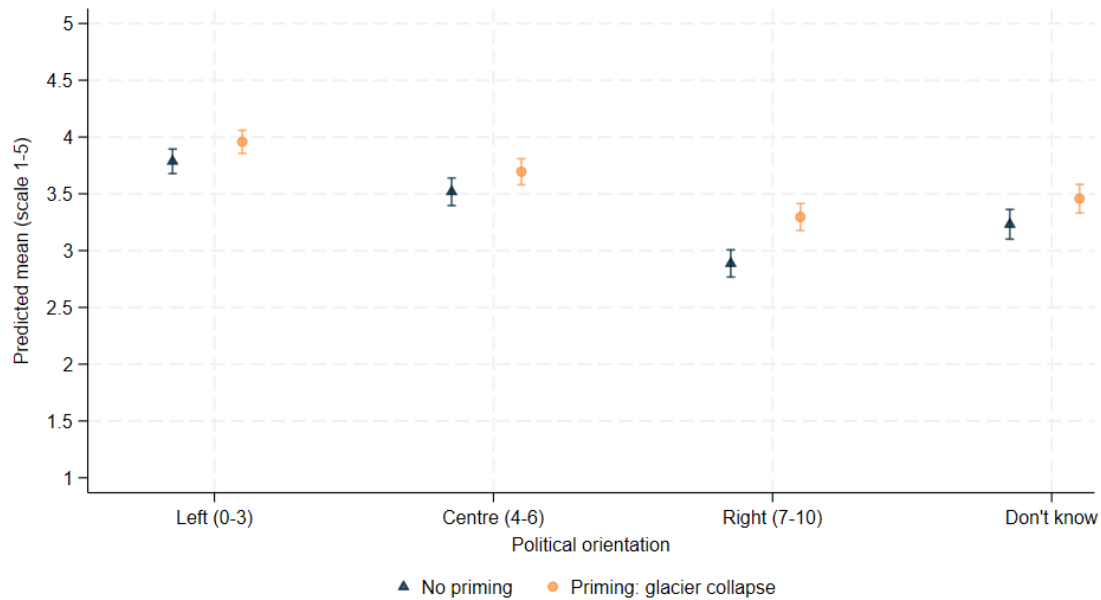


Figure 3.2. Predicted means of willingness to accept limitations in the standard of living for the mitigation of climate change by experimental condition (priming: glacier collapse vs no priming) and political orientation. Results estimated by Model 2 in Table 3.1 in the Appendix (study 1, $n = 2,180$).

As Figure 3.2 suggests, an analogous mechanism explains the moderating role of political orientation in the effect of recalling the glacier collapse on the willingness to accept limitations in the standard of living for the mitigation of climate change. Leftist people show the highest willingness to accept limitations, while rightist people show the lowest willingness. Also in this case, the effect of recalling the glacier collapse is positive and statistically significant for each subgroup characterized by the same political orientation, but the largest effect is detected among people self-locating on the right of the political spectrum (0.41, while respectively equal to 0.17 and 0.18 for leftist and centrist people). Such effect proves to be statistically larger (at $\alpha = 0.05$) when compared the effects for leftist and centrist people. Therefore, results still support the mechanism of attitudinal updating (Rüttenauer 2023) and, accordingly, H5b. Thence, empirical evidence does not support H4b.¹¹

Instead, there is no evidence of heterogeneity of the effect of recalling the flood in Emilia-Romagna on the willingness to accept limitations in the standard of living by climate attitudes

¹¹ Findings shown in Figures 1 and 2 are largely consistent when controlling respectively for political orientation and climate change beliefs (see Figures S1 and S2 in the Online Supplementary Materials).

and political orientation (interaction terms always not significant, see Table 3.3 in the Appendix).¹² In other words, there is no effect of recalling the flood for any subcategory of individuals.

Analogously, the analysis shows that the effect of recalling a natural disaster on the willingness to accept limitations in the standard of living to mitigate climate change does not substantially vary by area of residence, thus it is not stronger in the region affected by the natural disaster itself.¹³

3.7 Discussion and conclusions

By employing two experimental designs, our study has aimed to understand whether recalling a natural disaster impacts people's support for the mitigation of climate change. Results show that interventions aimed at reducing the psychological distance from climate change can be able to increase the willingness to sacrifice for the mitigation of climate change. Nonetheless, messages recalling a natural disaster are not always effective. Their effectiveness depends on the nature of the natural disaster itself. Interventions lead to an increase in the willingness to accept limitations in the standard of living when the object of recall is the collapse of a glacier, while they are not effective when the object of the recall is a flood. Results are consistent with previous research analyzing the impact of experiencing floods on climate attitudes. As argued in the background section, there is some evidence showing that the personal exposure to a flood is associated with lower changes in climate attitudes when compared with the exposure to other extreme weather events such as droughts, wildfires and extreme winter events (Lyons et al. 2018; Soni and Mistur 2022).

Although we do not have direct evidence on the mechanisms explaining those results, we suggest some interpretations in light of the theoretical framework and previous empirical evidence. Historically, floods are more regularly reported than glaciers collapse – for what concerns the context of the study, the Italian history was characterized by several floods - thus individuals may find more difficult to associate floods with climate change. This is confirmed

¹² In the sixth wave of the ResPOnSE COVID-19 survey, the variable measuring climate change belief was missing. Hence, we tested whether the effect of recalling the floods varies according to other two variables: climate change concern and the attribution of the floods (to climate change or to water and land management). However, no moderating effect was found.

¹³ This applies both for study 1 and study 2 (see Figures S3 and S4 in the Online Supplementary Materials).

by public opinion data on the attribution of natural disasters. While there is high consensus among the public regarding climate change as the cause of the glacier collapse, the same does not apply for the flood. According to the ResPOnSE COVID-19 survey data, the large majority of respondents indeed think that the collapse of the glacier is an effect of climate change (84% of participants in the fifth wave of survey, carried out in 2022, agree or totally agree with the statement ‘Glacier collapses are an effect of ongoing climate change’, $n = 2,349$). Instead, only a minority of the respondents declares that the flood, which provoked several victims in the Emilia Romagna region in 2023, was mainly or entirely caused by climate change (18% of the sample, $n = 3,087$).¹⁴ In addition, we should point out that while we did not register a public and media debate around the causes of the glaciers collapse (Marmolada and Grand Combin in 2022), the attribution of the causes of the flood in Emilia-Romagna has been politicized, with different positions depending on the political orientation of the media and the public (Imperatore and Frazzetta 2023; Biancalana and Ladini 2024). Accordingly, this could have impacted on the public perception of the causes of the flood itself.

Moreover, results of our study go beyond assessing whether the effect of certain interventions is successful, since we examine the moderating role of climate change beliefs and political orientation. Although recalling the collapse of a glacier proves to be effective in raising support for climate change mitigation across different groups of individuals, consistently with recent literature (Rüttenauer 2023), our results provide evidence toward the prevailing mechanism of attitudinal updating through experiential learning. Such a mechanism is far more effective than motivated reasoning, since it implies that especially people not believing in the anthropogenic causes of climate change update their support for mitigating climate change when exposed to certain natural disasters. This has relevant implications on climate change communication and the role of social sciences to promote solutions to change public attitudes toward the urgent issue of climate change (Goldberg et al. 2020).

In interpreting the results of his study, Rüttenauer (2023) suggests the possible presence of ceiling effects that limit the increase of climate change attitudes among those who already believe in climate change and its anthropogenic causes and self-locate on the left of the left-right spectrum. Since the dependent variable of our study is the willingness to accept limitations in the standard of living for the mitigation of climate change – which receives substantially less

¹⁴ The survey question asked whether the flood in Emilia-Romagna is attributable to climate change, bad management of the territory and the waters, or both to a similar extent. 45% of the sample answered both to a similar extent, 30% mainly or only the bad management of the territory and the waters, and the remaining 6% did not know.

consensus than climate change beliefs – we tend to rule out the presence of ceiling effects in our results. Indeed, even for climate change believers and leftist people there was room to increase their willingness to sacrifice. Therefore, we maintain that our results have substantial implications. Nonetheless, we acknowledge some limitations of our research design.

First, when comparing the two studies we have to highlight an asymmetry in the temporal distance from the natural disaster and its recalling. While in the first study the glaciers collapse recalled in the priming message took place about five to seven months before the fieldwork, in the second study the flood recalled in the priming message took place about one month before the fieldwork. Therefore, we cannot rule out that the absence of the effect of recalling the flood is even attributable to the very short temporal distance between the event and the fieldwork that might have reduced the differences between the control and the treatment group.

Second, the survey did not include any manipulation check aimed at directly assessing individual-level attentiveness in answering the questionnaire (Kane and Barabas 2019). Therefore, we cannot detect whether respondents have paid sufficient attention to the intervention as well to the specific object of recall (especially for what concerns glacier collapse, Marmolada vs Grand Combin). Accordingly, we can interpret the experimental effects only in terms of intent-to-treat effects. Thus, the reported estimates of the regression models should be intended as conservative.

Third, as highlighted by Rode and colleagues (2021), experimental settings usually expose individuals to a one-time message, while previous research has shown that repeated messages tend to have a more meaningful effect on individual attitudes.

Finally, our research design cannot assess whether the effect of recalling natural disasters on the willingness to accept limitations in the standard of living to mitigate change persists in the long run. In this regard, recent research has pointed out that climate change communication should go beyond strategic messages aimed at influencing individual attitudes – namely, what we did in our experimental setting – by employing an approach based on engagement (Badullovich 2023). Such an approach is needed for building the social conditions for supporting climate policies, for instance, by leveraging people's social identity. All things considered, our research has provided a novel contribution on the efficacy of communication strategies that recall natural disasters with the aim of increasing support for climate action, but only under specific conditions and especially for certain groups of people.

The results of our research cannot be assumed to generalize universally across different contexts or types of natural disasters, as the experiments were conducted in the Italian context and focused on two specific events. However, the consistency of our findings with those of

previous studies suggests that the impact of recalling natural disasters may be extended to other contexts and events. In particular, our results align with previous studies suggesting that only certain types of natural disasters influence climate change attitudes and behavioral intentions (Soni and Mistur 2022) – and, especially, those that are clearly attributed to climate change (Ogunbode et al. 2019). Therefore, in a potential replication of our experiments to different contexts and different events, we would expect to see an effect of recalling a natural disaster if the event recalled is mostly attributed to climate change. Conversely, we would expect that the impact of the recall may be attenuated or absent when the event is commonly experienced (such as floods), not perceived as climate-related, or when its causes have become highly politicized and polarized. Innovative research designs are encouraged for enlarging the scope and further reinforcing the conclusion of our experimental studies to other contexts and different types of natural disasters.

Chapter 4

Socioeconomic and ideological roots of private-sphere environmental behaviors

4.1 Introduction

Addressing the climate crisis requires a range of actions and diverse solutions. While systemic regulations and international efforts to reduce carbon emissions play a major role in climate mitigation, individual behaviors and everyday choices (what I refer to as private-sphere pro-environmental behaviors) also contribute significantly and should not be overlooked.

First, individual actions significantly impact the total greenhouse gas emissions and carbon footprint that is driving global warming and the actual climate crisis (IPCC, 2023). Personal choices, such as those related to household energy use, transportation modes, and the consumption of disposable or high-emission products, directly impact individuals' carbon footprint and collectively contribute to global warming.

Second, the extent to which people adopt these behaviors influences the demand for eco-friendly products and drives the request for incentives to green choices - such as infrastructure development and economic incentives. Moreover, many private-sphere behaviors require smaller changes and sacrifices in comparison to the significant shifts needed at the structural and collective levels, making them easier to adopt and incentivize. For instance, local and national governments can promote these behaviors at lower political costs – consider the implementation of cycling routes or the promotion of certain sustainable consumption practices, compared to the introduction of a carbon tax.

Therefore, studying people's propensity to engage in pro-environmental behaviors and adopt green actions in their daily lives is crucial for social scientists aimed at understanding their key drivers and identifying the most effective interventions and strategies in promoting them (Steg, 2018; Whitmarsh et al., 2013). The existing literature largely concentrates on the impact of environmental attitudes and values on individual pro-environmental behaviors. However, empirical studies indicate that, while these factors are important, having such attitudes alone is insufficient to promote pro-environmental behavior.

This article explores the role of two factors that have been proved crucial in explaining both climate attitudes and public-sphere environmental behaviors (such as willingness to pay to

mitigate climate change or climate policy support), but that have been largely overlooked in studies focusing on private-sphere behaviors: economic factors and political orientation. In line with the post-materialist theory and the affluent thesis, affluent individuals and individuals living in affluent countries tend to show more positive environmental attitudes and engage in public-sphere environmental behaviors (Franzen & Meyer, 2010; Inglehart, 1998, 1995). Similarly, left-wing individuals show less skepticism about climate change and higher willingness to accept limitations and policies to handle the climate crisis (Fisher et al., 202; Hornsey et al., 2016). Economic conditions and political orientations, in fact, influence individuals' priorities, values, and worldviews, all of which shape decision-making, including sustainable choices. Thus, alongside well-studied environmental attitudes, these factors help explain the people propensity to engage in or refrain from pro-environmental behaviors.

By focusing on these two characteristics, this study aims at contributing to explain the socioeconomic and political roots of engagement in private-sphere environmental behaviors. This is crucial for understanding the opportunities and challenges to incentive such behaviors, as well as for understanding motivations, designing targeted policies, and tailoring effective communication strategies.

Furthermore, the existing research focusing on private-sphere behaviors tends to either study a specific type of environmental behavior or, conversely, to group together various types of actions. However, the set of private-sphere behaviors considered as pro-environmental (Stern, 2000) includes a wide range of actions that vary significantly in terms of the effort required, the resources they depend on, and the motivations that drive their adoption. For example, avoiding the use of disposable items or the consumption of meat require ongoing daily effort but little to no financial investment and they are likely to be driven by environmental attitudes, whereas installing solar panels or purchasing an electric car are one-time actions that demand significant economic resources and might be primarily driven by their long-term economic benefits through improved energy efficiency. Thus, understanding whether various types of private-sphere behaviors are differently influenced by different individual characteristics is crucial, as it may indicate the need for differentiated strategies to promote and sustain their adoption. Previous studies, in fact, highlight that different types of private environmental behaviors are influenced by different predictors (Poortinga et al., 2004; Lavelle et al., 2015). Therefore, this research differentiates between two groups of private-sphere behaviors based on their frequency of occurrence, the resources needed and the intentions presumed to motivate them: habitual behaviors and occasional behaviors.

Using the Eurobarometer data collected in 2020 in 27 countries, I first look at the economic explanations and analyze the relationship between habitual and occasional environmental behaviors with perceived economic status and country economic wellbeing. Second, I analyze the effect of political orientation on the two types of behaviors. Finally, I test whether perceived economic status differently affects the engagement in environmental behaviors of right-wing and left-wing respondents.

4.2 Theoretical background

4.2.1 Definitions of private-sphere pro-environmental behaviors

The literature on environmental behaviors traditionally refers to Stern's Theory of Significant Environmental Behaviors (2000) that distinguishes between public-sphere and private-sphere behaviors. Public-sphere behaviors refer to those actions intended to indirectly influence environmental conditions by shaping the public and the political context. Such behaviors entail both non-activist behaviors - such as support for climate policies, willingness to accept costs to protect the environment - and activist-behaviors - protesting, taking part in environmental organizations, signing petitions. Private environmental behaviors, instead, entail personal actions that should directly impact the environment, such as recycling, public transport use, sustainable energy consumption or purchase of sustainable products.

Next to the distinction between private and public behaviors, Stern (2000) differentiates between intent-oriented and impact-oriented perspectives. The intent-oriented perspective classifies behaviors based on individuals' intentions to benefit the environment. For example, choosing to reduce air travel to minimize one's carbon footprint reflects this intent. In contrast, the impact-oriented perspective focuses on the actual environmental impact of a choice or behavior. For instance, reducing car use can be evaluated either from its environmental impact or from the actor's intent to lower their carbon footprint. Stern (2000) highlights that environmental intentions and impacts can sometimes diverge. People may adopt behaviors intending to protect the environment, but these actions might not achieve their intended effect. For example, as Stern points out, some individuals might avoid using spray cans to protect the ozone layer, even though ozone-destroying substances are no longer used in spray cans. Conversely, individuals may adopt behaviors that benefit the environment without any explicit

climate-related intention—for instance, insulating their homes to reduce energy bills, rather than to mitigate climate change.

This distinction is relevant because impact- and intent-oriented actions can be associated to different factors: whereas intent-oriented behaviors are especially influenced by attitudinal factors, impact-oriented tend to be more determined by sociodemographic and economic conditions (Poortinga et al., 2004; Stern, 2000). Moreover, whereas public-sphere behaviors are most likely performed according to an intent-oriented perspective (e.g., support climate policies, participating to a protest), among private-sphere actions one can detect both impact-oriented actions – such as installing solar panel, buying an energy-efficient household item – and intent-oriented actions – such as limiting air travel for vacations, avoid consuming products and food with high carbon footprint. In other words, although private-sphere behaviors have by definition a direct impact on the environment, there are some private actions that are necessarily intended-oriented, while others are not necessarily driven by environmental intentions, they may be influenced by other factors, as saving money (e.g. purchasing energy-efficient appliances) or complying with regulations (e.g. recycling waste).

Furthermore, a more recent disaggregation of private pro-environmental behaviors distinguishes between habitual and occasional behaviors (Lavelle et al., 2015). The former refers to everyday activities that require adjustments in daily routines and lifestyle but do not necessarily require major structural change or economic effort. The second represents one-time and non-routine actions that involve conscious decision-making and a relevant economic effort. They often include “purchase-related” or “efficiency behaviors”, such as buying energy-efficient technologies, insulating roofs or replacing old windows frames. Lavelle et al. (2015) shows that clear differences exist in the socioeconomic characteristics of the two behavioral groups: while high-educated and wealthier individuals are more likely to have engaged in some occasional behaviors, the everyday green activities are more likely reported by lower educated and less well-off citizens.

While there are several studies investigating different categories of public-sphere environmental behaviors (Drews & van den Bergh, 2016; Taniguchi & Marshall, 2018; Whitmarsh & O’Neill, 2010), fewer contributions differentiate among private-sphere behaviors. Most empirical studies analyzing self-reported pro-environmental behaviors consider either single-item or multi-items scales including very diverse behaviors. Generally, the multi-item scales include various types of environmentally friendly behaviors without classifying types of private environmental actions (for a review of measurements of private-sphere behaviors see Lange and Dewitte 2019; Markle 2013). In this study, I focus on private-

sphere behaviors and follow the two criteria that have been used in the literature to distinguish among environmental behaviors: impact-based versus oriented-based and habitual versus occasional behaviors. On the one hand I group together occasional behaviors, like energy-efficiency decisions or one-time purchases (e.g., installing solar panels), that generally consist in one-time expensive action (occasional) and that are not necessarily driven by environmental attitudes, but are likely to be affected by their economic and energy efficiency impact (impact-based). Thus, behaviors that may be primarily driven by a rational assessment of costs and benefits—as suggested by rational choice theory—where convenience and economic advantage play a key role in the decision to adopt them. On the other hand, I group together those behaviors that are typically engaged on a recurring basis (habitual) rather than being one-off decisions, and whose engagement is reasonably driven by specific motivations linked with green attitudes (oriented-based). For example, avoiding the use of disposable items, using ecofriendly transport means or considering the carbon foot print of food and transport choices. Therefore, I end up with two groups of private-sphere pro-environmental behaviors: *habitual and occasional behaviors* (see table 4.1).

4.2.2 Determinants of pro-environmental behaviors

Most of the existing research on private-sphere environmental actions is rooted in models of environmental behaviors emphasizing the role of internal and psychological factors, such as beliefs, attitudes, norms and intentions (Li et al., 2019; Van Valkengoed et al., 2022). Several empirical studies rely on the Theory of Planned Behaviors - TPB - (Ajzen, 1991) and on the Values Norms Theory – VBN - (Stern, 1999) to explain the causal chain that links environmental attitudes and beliefs to environmental behaviors, considering especially the role of intentions and social norms (Morren & Grinstein, 2016). Overall environmental concern and environmental attitudes appear to be crucial conditions to engage in such behaviors, both in the private and in the public sphere (Johansson Sevä & Kulin, 2018; Pisano & Lubell, 2017). However, empirical evidence also suggests that environmental concern is not a sufficient and neither a necessary condition to determine changes in individual actions: it is not sufficient since several external and internal barrier make difficult to translate concern into actions (Hoffmann et al., 2024; Kollmuss & Agyeman, 2002; Morren & Grinstein, 2016), and it is not a necessary condition because people can behave in sustainable ways without having green attitudes (Martinsson & Lundqvist, 2010).

This research investigates two barriers that have been highly considered in the literature on public-sphere behaviors, but they have been overlooked in studies on private sphere behaviors: economic and ideological factors. In the following sections I discuss these two explanations, and I argue that investigating their effect on private pro-environmental behaviors is fundamental to promoting such actions.

4.2.2.1 Socio-economic explanations

In addition to environmental concern and other attitudinal factors, the resistance to engage in pro-environmental behaviors might be linked to economic capacities and material resources.

Environmental problems are often understood as secondary concerns, primarily of interest to people who have already met their immediate and material needs. This conclusion results from both the two main theoretical explanations about the socioeconomic differences in environmental concern and behaviors: the prosperity thesis and the post-materialist thesis (Franzen & Meyer, 2010). According to the first one, rooted in environmental economics, environmental quality is a good whose demand rises together with income. Therefore, well-off individuals show a greater demand for environmental protection than individuals in economic difficulties (Diekmann & Franzen, 1999).

The post-materialist thesis, instead, argues that environmental attitudes are part of a broader shift in values that has been observed in affluent societies because of their economic and social development (Inglehart, 1995; Inglehart 1997). Therefore, according to Inglehart, environmental concern and demand for environmental protection are indirect consequences of prosperity, mediated by a change towards post-materialist values.

Empirical studies relying on these theoretical backgrounds consistently find a positive association between individual economic resources and environmental concern (Franzen & Vogl, 2013), willingness to pay for the environment (Fairbrother, 2013; Franzen & Meyer, 2010; Meyer & Liebe, 2010) as well as support for climate policies (Dietz et al., 2007). By contrast, studies exploring the relationship between individuals' economic condition and private sphere-behaviors are relatively limited and vary in their measurement approach (specific behaviors vs scales combining different types of behaviors) and in the level of analysis (national vs multinational level).

At the national level, Sánchez et al., (2016) analyze a survey in Spain and differentiate between purchase behaviors – such as buying green products - and consumption behaviors related for example to energy and water saving. They find that personal economic condition – measured as having a good employment situation – is positively associated with certain pro-

environmental purchase behaviors but not with other consumption behaviors. Poortinga et al. (2004), instead, look at the transport and household energy use in The Netherlands and finds that consumption increases with household income, revealing a negative association between income and sustainable practices. Moreover, Bertolotti and colleagues (2023) have shown that although economic conditions did not directly impact the intention to engagement in private-sphere environmental behaviors, it moderated the impact of psychological factors such as collective and individual perceive efficacy.

Cross-countries studies suggest that sociodemographic and socioeconomic characteristics tend to be stronger predictors of private-sphere behaviors than public-sphere ones. However, income and economic security do not consistently emerge as significant predictors. For instance, Parth and Vlandas (2022) as well as Parth (2024), analyzing respectively 2019 Eurobarometer and 2010 ISSP data, show that specific economic vulnerable groups are less likely to support climate policies and to adopt private environmental behaviors. Conversely, Hadler and Haller (2011), using the 2010 module of the International Social Survey data (ISSP), find that sociodemographic factors are more strongly associated with recycling and reducing car use than with public-sphere behaviors, but they do not find a positive association with household income. Similarly, Pisano and Lubell (2017) analyze 2010 ISSP data and do not show a positive relation between income and a larger group of private sphere behaviors.

However, none of these studies properly distinguish between different types of private environmental behaviors. Lavelle et al. (2015) have shown that there are significant socioeconomic differences between groups engaging in occasional behaviors and those engaging in habitual behaviors. Similarly, Gatersleben et al. (2002) have emphasized the need to distinguish between impact- and intent-oriented environmental behaviors, as each one is influenced by distinct explanatory variables.

In this research I analyze how the two different sets of private-sphere pro-environmental behaviors –habitual and occasional behaviors - are associated with perceived economic security, arguing that they are positively associated. Moreover, I argue that occasional behaviors are more strongly affected by economic security than habitual behaviors, because they require more economic resources than habitual behaviors and because they are less influenced by other factors such as climate attitudes. In contrast, habitual behaviors require a level of commitment driven by positive environmental attitudes. As a result, they are less likely to be adopted by individuals who lack such attitudes, even if they have sufficient financial resources, and more likely to be embraced by those with strong environmental concerns, even when their economic means are limited.

Therefore, I formulate the following hypotheses:

H1a: Individuals who perceive more economic security tend to engage more in private pro-environmental behaviors than individuals with less economic resources.

H1b: The association between perceived economic security and engagement in pro-environmental behaviors is stronger when occasional behaviors are considered in comparison to the habitual ones.

Previous studies identify cross-national differences in the engagement in pro-environmental behaviors as well as in the extent to which environmental concern and attitudes are translated in actions (Johansson Sevä & Kulin, 2018; Morren & Grinstein, 2016). Moreover, as Hadler & Haller (2011) emphasize, private-sphere behaviors show greater differences across countries than public-sphere behaviors, which are more consistent across national contexts. This suggests that certain contextual characteristics impact the extent to which citizens engage in ecofriendly actions. The post-materialist and the affluent theses offer a compelling societal explanation for such differences, arguing that citizens living in affluent and more developed countries are more likely to support environmental protection due to a stronger endorsement of post-materialist values and greater economic resources. Empirical studies showed mixed results concerning the effect of national affluence on climate concern and people's willingness to pay to mitigate climate change. Certain studies show a positive effect of national affluence on environmental concern (Franzen & Meyer, 2010; Moroni & Dotti Sani, 2024), while others indicate that concern and willingness to pay to mitigate climate change are actually higher in less affluent countries (Dunlap & York, 2008; Fairbrother, 2013). As regards private sphere behaviors, the empirical evidence is scarcer but more consistent: generally it is shown that individuals in more developed and affluent countries tend to report higher adoption of private environmental actions (Knussen et al., 2004; Parth & Vlandas, 2022; Pisano & Lubell, 2017).

In this research I aim to contribute to such debate, analyzing the role of national affluence on different types of private environmental behaviors in Europe. I assume that individuals living in more affluent countries are more likely to engage in private-sphere behaviors due to greater opportunities, such as the presence of a reward system for pro-environmental behaviors (Seyfang & Longhurst, 2013), as well as the broader diffusion of postmaterialist values, which include environmental attitudes and concerns.

I hypothesize as follow:

H2: *Individuals living in more affluent countries tend to engage more in private pro-environmental behaviors.*

4.2.2.2 Ideological explanations

There is a wide literature emphasizing the political divide in climate attitudes and behaviors, arguing that environmentalism is more aligned with the left-liberal ideology than with the conservative one (Hornsey et al., 2016). The political divide is generally rooted partly in certain values and worldviews and partly in differing positions on the economic and social implications of climate mitigation.

On the one hand, left-liberal ideology is typically characterized by values and orientations that are positively associated to climate attitudes and behaviors – such as egalitarianism, collectivism, open-to-change values. Individuals entailing self-enhancement and individualistic values as well as conservative worldviews tend to be more sceptics about the anthropogenic climate change and less concerned about its consequences in comparison to individuals with collectivist values and egalitarian worldviews (Poortinga 2011, Withmarsh 2011, Poortinga 2019; Hornsey et al., 2016). Similarly, climate policy support and willingness to act for the environment are positively associated with altruistic values and egalitarian worldviews (Dietz et al., 2007; Drews & van den Bergh, 2016; Rhodes et al., 2017).

On the other hand, tackling climate change requires substantial changes in the system of production and in the economic system in general. For instance, the measures required for a green transition – such as investing in renewable energy and restructuring industries – often demand government intervention, such as subsidies for green technologies and regulations of green gas emission. In fact, as Cabeza et al. (2024) found relatively to the Italian context, attitudes towards state interventions are clearly related to support for climate policies. These interventions are typically more supported by left-wing individuals, who tend to favor government interference in the economy and are more willing to accept regulations and market restrictions. In contrast, conservative voters generally align with laissez-faire principles and are less willing to accept economic limitations (McCright & Dunlap, 2011).

Along with individual values and orientations, political research on environmentalism has emphasized the central role of elites in affecting public opinion on a controversial topic such as climate change (McCright & Dunlap, 2011). According to the elite cues' hypothesis, in situations of conflicting information and polarization, people tend to rely on the information provided by the political elites they support. This hypothesis has been extensively confirmed by studies analyzing the U.S. context, where there is strong elites' polarization about

environmental problems and especially about climate change (Birch, 2020; Brulle et al., 2012). The anti-reflexivity thesis helps to explain such dynamic, emphasizing the role of the climate denial movement developed in certain U.S. industrial and conservative sectors (McCright, 2016). This movement sought to defend the existing economic system and reject any critiques or risks associated with the current process of modernization. Although this interpretation has been applied in the literature across various countries, other studies highlight that the anti-reflexivity thesis cannot be generalized to other contexts where there is not a comparable climate denial movement and where political ideology plays a weaker role in shaping environmental attitudes (Fairbrother, 2016; Lewis et al., 2019).

Nevertheless, despite the different levels of climate change politicization across Western countries, empirical evidence identifies some political divide in Western European countries both at the elites and at the individual level (Birch, 2020; Fisher et al., 2022; McCright et al., 2016). Most of such work has been confined to single country studies. For instance, Poortinga and colleagues (2011) analyzing the British national context, find that respondents who express an intention to vote for the Conservative Party have higher level of climate skepticism in comparison to those who have different party preferences. Biancalana and Ladini (2024) explore the Italian political divide at both the parties' and individual level and reveal that a Southern European country like Italy – characterized by relatively low salience and low polarization of environmental issues - is experiencing a partial politicization of the climate crisis. Although climate denial is absent in the Italian political space, the authors' longitudinal analysis of parties' manifestos reveals varying levels of salience and differing positions on climate issues among the different parties. Similarly, they observe that public opinion shows clear differences between left- and right-wing individuals across various aspects of climate attitudes, particularly in their willingness to make sacrifices to mitigate climate change.

As regards studies at the cross-national level, Tjernström and Tietenberg (2008) analyze the ISSP (2020) environmental module and show that leftist individuals have higher perceived risk of climate change in comparison to right-wing ones. Similarly, McCright and colleagues (2016) find an association between political ideology and beliefs about anthropogenic climate change, the perceived seriousness of the problem, and personal willingness to pay to fight global warming across countries. However, they find this relationship only among Western European countries, while they do not find any effect of political ideology in the Eastern European ones. Likewise, Fisher and colleagues (2022), focusing on partisanship, reveal a clear political divide on climate beliefs between right-wing and left-wing voters in Western Europe, but not in East Europe.

Overall, the literature finds a political divide on climate attitudes as well as on public-sphere behaviors, in particular on climate policy support and on the willingness to sacrifice for climate mitigation (Drews & van den Bergh, 2016). However, studies looking at the role of political orientation on the engagement in private pro-environmental behaviors are significantly fewer. Taniguchi and Marshall (2018) analyze the association between political party affiliation, measured on a left-right scale, and they find that leftism is positively associated with some ecofriendly consumer behaviors (namely, private-sphere behaviors). Focusing on parties' manifestos, (Neumayer, 2004), finds mixed evidence, with a clear climate divide on certain private behaviors, such as reducing water usage, but no significant effect on others, like recycling or reusing products.

Therefore, as far as I know, the studies examining the association between political orientation and private-sphere behaviors are limited, typically focusing on a narrow range of actions, such as energy and water consumption. In this research, I aim to further contribute to this topic investigating what role is played by political ideology in explaining the engagement in different types of pro-environmental behaviors in the European context.

Based on the above, I argue that left-wing individuals are more likely to engage in such behavior in comparison to right-wing ones because of their personal values and orientations, their positive attitudes towards climate change as well as their positions on state intervention in the economy. However, I assume that this association is stronger for habitual behaviors, as these are more intent-driven and tend to be more influenced by attitudinal factors than the other private behaviors, making them potentially more shaped by political orientation.

Therefore, I hypothesize that:

H3a: Left-wing individuals engage more in pro-environmental behaviors in comparison to right-wing individuals.

H3b: The association between political orientation and engagement in pro-environmental behaviors is stronger when habitual behaviors are considered in comparison to occasional behaviors.

This research analyzes the role of two factors that have been overlooked in the literature on private pro-environmental behaviors: a structural one - economic security - and an ideological one – political orientation. Beyond having independent effects on the engagement in private-environmental behaviors, they are likely to interact with each other and the impact of economic

security might differ according to the political position of individuals. There are two alternative assumptions depending on the type of behavior considered.

On the one hand, one can assume that, since occasional behaviors are more influenced by economic factors than environmental attitudes, economic security may have a stronger effect on right-wing individuals, who typically hold lower climate-related concerns. For left-wing individuals, whose engagement in pro-environmental behaviors is more often driven by environmental values, the impact of economic prosperity may be smaller.

On the other hand, since habitual behaviors tend to align more closely with climate attitudes and are less driven by convenience-based motivations, economic security may reinforce the likelihood of engaging in these behaviors more among left-wing individuals than among right-wing individuals. More secure economic conditions may enable left-wing individuals, who are typically more environmentally conscious, to more easily engage in these behaviors. In contrast, the effect may be weaker for right-wing individuals, whose lower environmental concern drives them to a lesser extent in adopting such behaviors. For example, adjusting the shopping according to the footprint of the products or opting for eco-friendly means of transport, can require higher economic resources. However, without environmental motivations, higher economic security alone does not incentivize the engagement in these behaviors. Previous studies on climate attitudes in the U.S. indicate that economic security can strengthen dismissive climate attitudes, particularly among conservative right-wing individuals. Their higher economic status often leads them to further justify and defend the existing system, reinforcing resistance to climate change mitigation policies (Ballew et al., 2020).

Hence the following two competing hypotheses are formulated:

H4: The positive association between perceived economic security and engagement in occasional pro-environmental behaviors is stronger among right-wing individuals in comparison to the left-wing ones.

H4b: The positive association between perceived economic security and engagement in habitual pro-environmental behaviors is stronger among left-wing individuals in comparison to the right-wing ones.

4.3 Data, Variables and Methods

4.3.1 Data

The analyses are based on the special Eurobarometer data collected in 2021 in 27 European countries. The Eurobarometer survey collect information on several private-sphere individual behaviors since 2008. I select respondents between 15 and 85 years old and I proceed with list-wise deletion of missing values, resulting in an overall sample of 23368 individuals. The countries included in this special Eurobarometer are the following ones: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

4.3.2 Variables

To measure the dependent variable about private pro-environmental behaviors, a battery of 12 private-sphere pro-environmental behaviors has been considered. Each item indicates whether the respondents engage in the behavior (1) or whether they do not (0) during the last 6 months. Following the theoretical criteria explained in paragraph 4.2.1, I combine the behaviors in two different categories. The first category includes occasional behaviors that are often influenced by convenience factors related to energy consumption and not necessary as environmental choice: installing devices to reduce energy use, installing solar panels at home, insulating home better, buying an energy-efficient home, buying energy efficient appliances, buying a low fuel consumption car and buying an electric car. The second group, instead, represents behaviors that are habitual and are reasonably a green choice¹⁵: consumption of organic food, less consumption of meat, less use of the car, reduction and recycling of waste, less consumption of disposable items, consideration of carbon footprint in travel and consideration of carbon footprint for food choices. One behavior—switching to an energy supplier with a high share of renewable energy—was excluded from the analysis, as it is the only occasional behavior clearly driven by pro-environmental attitudes and therefore does not align with the behavioral categorization used here. Since these two groups of behaviors are not

15 The correlations of the two indexes with a measure of climate change attitudes provides further support to the categorization in occasional and habitual behaviors also in terms of their connection with climate attitudes. The correlation between occasional behaviors and perceived seriousness of climate change (1 – not at all serious to 10 – extremely serious) is equal to 0.08, while the correlation with habitual behaviors is equal to 0.3.

assumed to reflect an underlining latent construct, the behaviors composing them are not expected to be highly correlated¹⁶.

Therefore, two composite indexes have been constructed by averaging the variables that compose them, respectively: habitual environmental behaviors and occasional environmental behaviors. Each index ranges from 0, which indicates that no action has been taken, to 1, where every behavior has been adopted. Table 4.1 reports the items composing the two indexes.

Table 4.1. Survey items composing the two pro-environmental indexes.

Occasional Behaviors	Installed devices to control and reduce energy use (e.g., smart meter).
	Installed solar panels at home.
	Improved home insulation to reduce energy consumption.
	Purchased a low-energy home.
	Prioritize low energy consumption when buying new household appliances (e.g. washing machine, fridge
	Purchased a new car with low fuel consumption as a key factor.
	Bought an electric car.
Habitual Behaviors	Buy and eat more organic food.
	Buy and eat less meat.
	Use eco-friendly transport alternatives (walking, cycling, public transit, car-sharing
	Reduce waste and regularly separate it for recycling.
	Minimize consumption of disposable items (e.g., plastic bags, excess packaging).
	Consider carbon footprint in food purchases and adjust shopping accordingly.
	Consider carbon footprint of transport for holidays and long trips, adjusting plans as needed.
<i>Excluded from the analysis</i>	<i>Switched to an energy supplier with a higher share of renewable energy.</i>

Moving to the independent variables, economic wellbeing at the individual level is captured by perceived economic hardship, a three-response options variable distinguishing between individuals who “most of the time” find difficult to pay the bills (1), those who “time to time” find it difficult (2) and lastly individuals who “never or almost never” have difficulties at paying the bills (3).

¹⁶ Tables 4.3 to 4.6 in the Appendix, which present the analyses conducted for each behavior separately, provide further support for the validity of the two indices, as the individual behaviors are associated with the predictors in the same direction as the index in which they were grouped.

Political ideology is measured through self-placement on the left-right scale. The original scale ranging from 1 (left) to 10 (right) was recoded in three categories: left (values from 1 to 4), center (values from 5 to 6) and right (values from 7 to 10).

At the country level, the economic condition of the country is measured through the GDP per capita as Purchasing Power Parity (PPP), at the current international \$, calculated in 2021 by the World Bank¹⁷.

Moreover, the analyses also control for three individual level variables: *gender* of the respondent (women as reference vs men), *age cohort* based on year of birth (1936-1950 as reference, 1951-1965, 1966-1985, 1986-1995 and 1996-2006) and *level of education* determined by the age when full-time studies were completed (16 years old or younger – low educated - as reference, between 16 and 20 years old – medium educated – above 21 years – high - and still studying). Table 4.1 in the Appendix presents the summary statistics for the dependent and independent variables.

4.3.3 Empirical strategy

Firstly, a descriptive analysis of the two types of pro-environmental behaviors is illustrated through two scatterplots of their means across countries. Subsequently, to test my hypotheses, multilevel linear regression models are performed for each index of private environmental behaviors. Every model has been applied equally to the indexes, models “a” refers to occasional behaviors and models “b” to habitual behaviors. Models 1 test the effect of perceived economic security, political ideology, and national GDP, while in Models 2 the control variables gender, age and education are added. Models 3 add the individual-level interaction effect between political ideology and perceived economic hardship. Finally, to facilitate the interpretation of the interaction effects, two graphs of the predicted values with 95% confidence intervals are presented. The first one derives from model 3a and the second from model 3b.

4.4 Results

Figure 4.1 presents the mean levels of the two types of environmental behaviors by country: occasional behaviors in Panel A and habitual behaviors in Panel B. Overall, the two panels show

¹⁷ Data downloaded in October 2024. World bank statistics provided online at <https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

clear differences in Europe in the average adoption of the two types of behaviors: occasional behaviors are adopted only by a minority of the population in most countries, while a larger part of the Europeans engage in habitual behaviors. On a scale from 0 to 1, the adoption of occasional behaviors ranges from 0.09 in Spain, Finland, Polonia to 0.22 In Belgium and Ireland and 0.32 in the Netherlands, while the engagement in habitual scores on average from 0.18 and 0.19 respectively in Bulgaria and Romania to 0.52 in Sweden and 0.56 in the Netherlands.

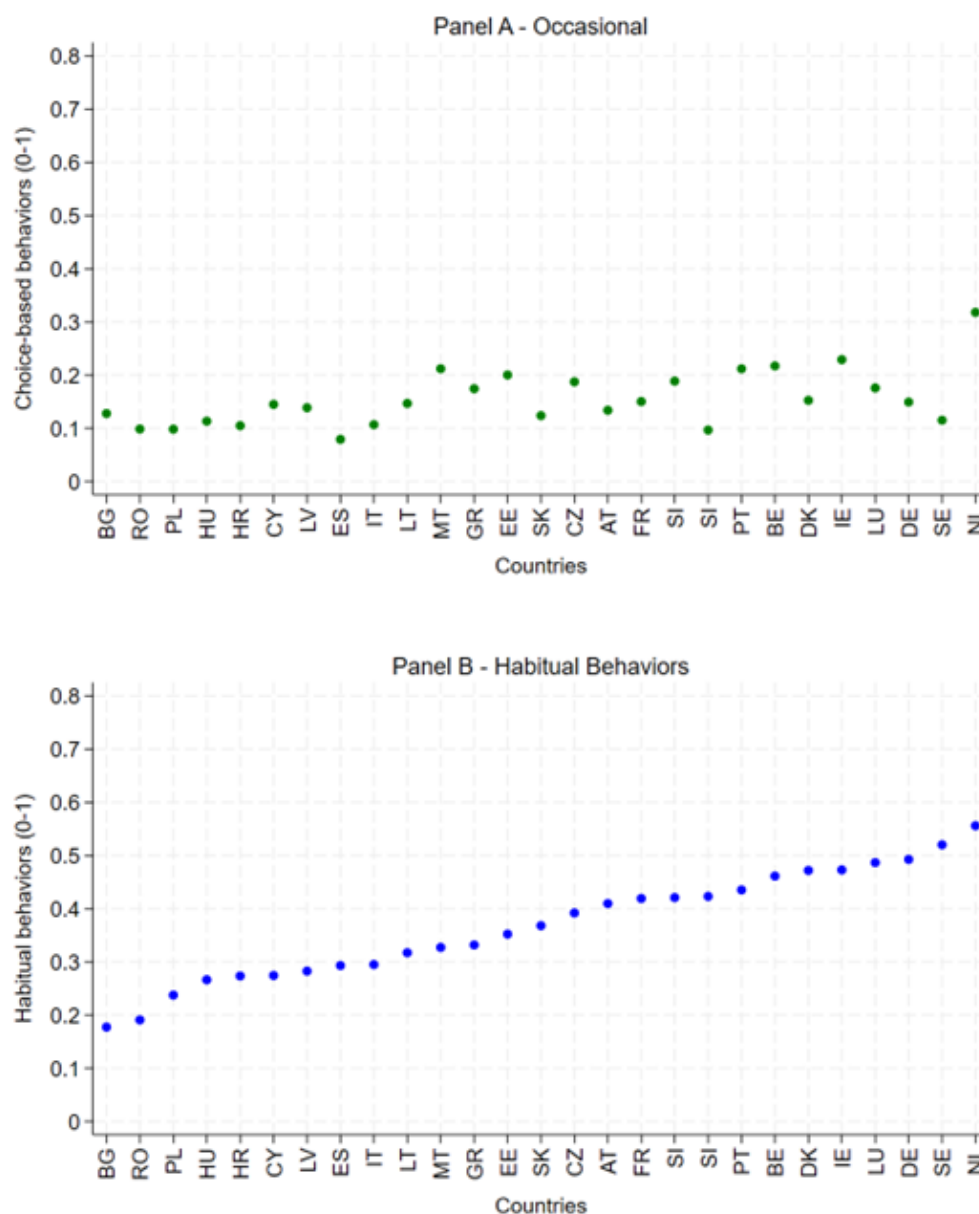


Figure 4.1. Average levels of occasional (panel A) and habitual behaviors (panel B) by country.

In accordance with previous studies (Hadler & Haller, 2011) the present analysis confirms that the adoption of the two behavioral groups differs across countries. The Intra-class

coefficient calculated on the null models per each behavioral group scores 0.11 for occasional behaviors and 0.17 for habitual behaviors. Therefore, between the 17% and 11% of the variance of such behaviors is located at the country level.

Table 4.2 shows the results of the multilevel models calculated for each behavioral group¹⁸. As expected, economic security positively influences the engagement in private-sphere behavior. Individuals who never or almost never experience economic difficulty are more likely to adopt pro-environmental behaviors in comparison to those who do experience economic hardship most of the time. Models 2 show that even controlling for sociodemographic variables the association remains the same. However, the beta coefficients of models 'a' show that the magnitude of such association is not stronger for occasional behaviors than for habitual behaviors as predicted by hypothesis 1b. Therefore, while hypothesis 1a is supported by these results, hypothesis 1b is not.

Moreover, the table shows the effect of national economic conditions calculated as GDP of the country. As regards occasional behaviors Models 'a' do not show any significant effect of GDP, while Models 'b' does indicate a positive association between national GDP and the engagement in habitual behaviors ($\beta=0.05$ in Model 1b). Moreover, model 2b confirms that the association remains significant also controlling for gender, education and age cohort. Thus, the expectations of hypothesis 2 are confirmed only for habitual behaviors. This suggests that national contextual factors can affect different environmental behaviors in distinct ways. Considering national economic wellbeing as a reflection of the national cultural and value orientation, its stronger association with habitual behaviors may indicate that these behaviors align more closely with societal norms and attitudes. In contrast, occasional behaviors, which are less strongly tied to environmental attitudes, seem to be more independent from these overarching cultural patterns.

Models 1 and 2 include also political ideology. As regards occasional behaviors, Models 1a and 2a show the opposite association than the one assumed. The difference between right-wing and left-wing individuals in the engagement in occasional behaviors is slightly positive, indicating that right-wing individuals tend to engage more in such behaviors than left-wing respondents. Conversely, the results of Models 1b and 2b on habitual behaviors confirm the expectations: left-wing individuals report higher levels of engagement in habitual pro-

¹⁸ To examine how the effects of these predictors differ across the different behaviors, Models 2 and 3 were run separately for each behavior (see tables 4.3 to 4.6 in the Appendix). The results show that, although the strength of the associations with economic security and political ideology varies across behaviors, the direction of these associations remains consistent with that observed for the composite index where they were grouped.

environmental behaviors in comparison to right-wing individuals ($\beta=-0.09$ in Model 1b and -0.08 in Model 2b) and centrist individuals ($\beta=-0.06$ in Model 1b and in Model 2b). Hence the hypothesized H3a and H3b are supported as regards habitual behaviors but they are not supported for the occasional ones.

The results of the sociodemographic variables added in Models 2a and 2b confirm the findings of previous studies indicating that women and high-educated individuals tend to engage more in pro-environmental behaviors than men and low-educated individuals (Meyer, 2015). However as regards gender the association is positive and significant only for habitual behaviors. Suggesting that the effect of being a woman varies on whether the behaviors regard the individual and domestic sphere - such as reducing the consumption of meat or recycling waste – since it does not persist when behaviors related to economic investments and one-time purchase choices are considered (occasional behaviors).

Finally, in Models 3, I include the interactions between political ideology and economic security, arguing that the effect of perceived economic wellbeing may differ for left-wing and right-wing respondents. The results show very small negative interactions, suggesting that left-wing individuals are more affected by their economic condition in comparison to right-wing individuals. However, the interactions are not significant, indicating that any significant moderations between economic condition and political ideology can be claimed from these results. Therefore, the last hypotheses 4a and 4b cannot be supported.

To better elucidate the two interaction effects, Figure 4.2 illustrates the predicted probabilities of engaging in occasional and habitual behaviors by economic security and political orientation. Panel A shows that as regards occasional behaviors, there is no difference at all in the effect of economic security between right-wing and left-wing individuals. As regards habitual behaviors, Panel B shows that the largest difference between right- and left-wing respondents in their engagement in habitual behaviors occurs among those who never or almost never experience economic hardship. This result goes in the direction of what has been assumed regarding the higher impact of economic wellbeing for the engagement in habitual behaviors of left-wing individuals, who are generally more environmentally concerned.

Table 4.2. Multilevel linear regression models of private-sphere pro-environmental behaviors

	Occasional Behaviors			Habitual Behaviors		
Economic difficulty (rf: most of the time)	Model 1a	Model 2a	Model 3a	Model 1b	Model 2b	Model 3b
From time to time	0.01** (0.00)	0.01 (0.00)	0.01 (0.01)	0.02*** (0.01)	0.02** (0.01)	0.01 (0.01)
Almost never/Never	0.04*** (0.00)	0.03*** (0.00)	0.04*** (0.01)	0.06*** (0.01)	0.05*** (0.01)	0.06*** (0.01)
Political orientation (rf: Left)						
Centre	0.00 (0.00)	0.01* (0.00)	0.01 (0.01)	-0.06*** (0.00)	-0.06*** (0.00)	-0.05*** (0.01)
Right	0.01*** (0.00)	0.01*** (0.00)	0.01 (0.01)	-0.09*** (0.00)	-0.08*** (0.00)	-0.08*** (0.01)
GDP	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.05*** (0.01)	0.05*** (0.01)	0.05*** (0.01)
Gender						
Female		-0.00 (0.00)	-0.00 (0.00)		0.07*** (0.00)	0.07*** (0.00)
Age cohort (rf: till 1950)						
1951-1965		0.02*** (0.00)	0.02*** (0.00)		0.01** (0.00)	0.01** (0.00)
1966-1985		0.02*** (0.00)	0.02*** (0.00)		0.01 (0.00)	0.01 (0.00)
1986-1995		-0.00 (0.00)	-0.00 (0.00)		0.01* (0.01)	0.01* (0.01)
>1996		-0.04*** (0.01)	-0.04*** (0.01)		-0.00 (0.01)	-0.00 (0.01)
Education (rf: low)						
Middle		0.03*** (0.00)	0.03*** (0.00)		0.03*** (0.00)	0.03*** (0.00)
High		0.05*** (0.00)	0.05*** (0.00)		0.09*** (0.00)	0.09*** (0.00)
Still studying		0.02*** (0.01)	0.02*** (0.01)		0.10*** (0.01)	0.10*** (0.01)
Economic difficulty#Political orientation						
From time to time#centre			-0.00 (0.01)			0.00 (0.01)
From time to time#right			-0.01 (0.01)			0.02 (0.02)
Almost Never/Never#centre			-0.00 (0.01)			-0.01 (0.01)
Almost Never/Never#Right			-0.01 (0.01)			-0.00 (0.02)
Constant	0.12*** (0.01)	0.08*** (0.01)	0.08*** (0.01)	0.36*** (0.02)	0.27*** (0.02)	0.26*** (0.02)
Random Effects						
Country Intercept	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.01*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
Individual Variance	0.02*** (0.00)	0.02*** (0.00)	0.02*** (0.00)	0.05*** (0.00)	0.04*** (0.00)	0.04*** (0.00)
Log Likelihood -2L	-24421.34	-25225.92	-25227.20	-5202.57	-6346.13	-63454.62
N	23668	23668	23668	23668	23668	23668

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

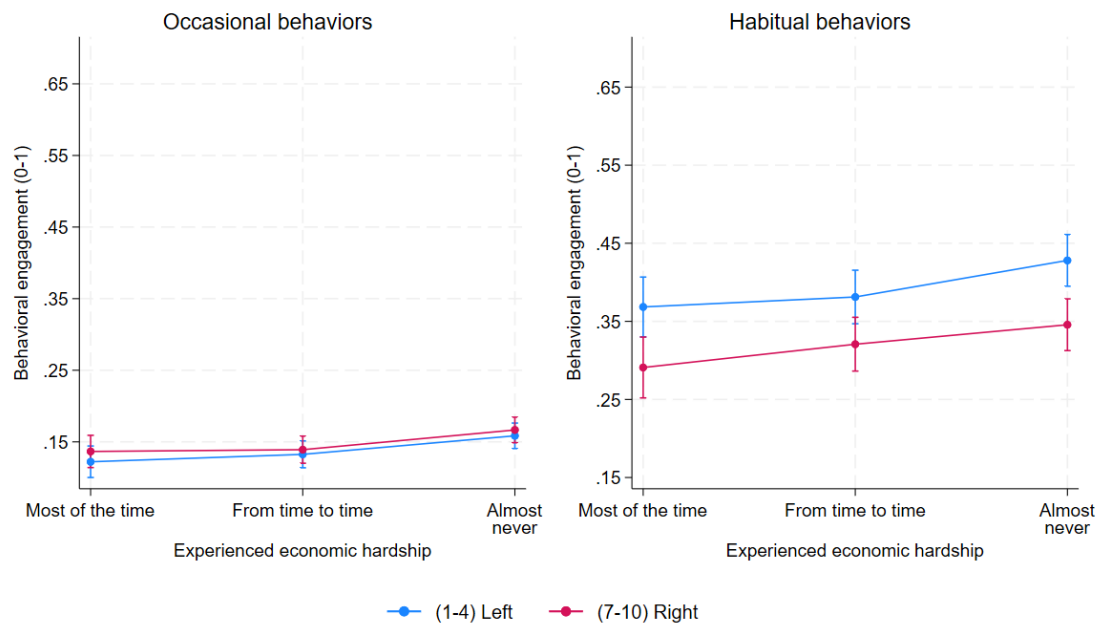


Figure 4.2. Predicted values with 95% confidence intervals of occasional (panel a) and habitual behaviors (panel b) by perceived economic hardship and political orientation (left- and right-wing). The predicted values are derived from Models 3b and 3a in table 2.

4.5 Discussion and conclusions

Among the various actions required to address climate change, individuals' choices and behaviors contribute not only to environmental outcomes, but also in influencing societal and political decisions concerning the environment and climate mitigation. While previous studies have focused on the role of personal values and environmental attitudes in shaping the adoption of eco-friendly choices, others have shown that individuals who are concerned for the environment often fail in translating their concerns into actual environmental actions (Kollmuss & Agyeman, 2002; Morren & Grinstein, 2016). This suggests that non-attitudinal factors may play a significant role in explaining why certain behaviors are not adopted, even when the awareness of environmental issues is present.

By distinguishing between two different types of private-sphere pro-environmental behaviors, this study has aimed to understand whether two factors different from climate attitudes, – individual economic condition and political orientation - affect the engagement in these behaviors. Results show, first, that distinguishing according to different characteristics of private-environmental behaviors can be useful to explore the several ways in which various

individual and contextual factors influence their engagement. Second, the findings indicate that economic conditions and political orientation matter in the adoption of these behaviors, but their influence is not uniform across different categories of behaviors.

As regards the categorization of environmental behaviors, this study followed two main criteria used in the literature to define pro-environmental behavior - the motivation behind the action and its frequency (Stern, 2000; Lavelle et al., 2015) – and distinguishes between occasional and habitual behaviors. The first category encompasses one-time, often costly, behaviors that are mostly driven by economic considerations rather than environmental concerns. In contrast, the second group refers to actions performed regularly or habitually, typically guided by eco-friendly intentions - such as considering the carbon footprint in consumption choices, reducing car usage, or limiting meat intake.

As regards the impact of economic conditions, the results do find that financially secure people are more likely to engage in these green actions. Interestingly, the effect of individual income appears to be similar for both habitual and occasional pro-environmental behaviors. This finding suggests that individual economic resources play a uniform enabling role across different types of environmental actions. While the postmaterialist thesis would lead to expecting a stronger association between higher economic security and value-driven habitual behaviors, the observed similarity across behavior types may indicate that financial capacity facilitates environmental engagement more broadly. This aligns more to the affluent hypothesis according to which, as any good, the demand for environmental quality rises together with income. However, we can also assume that the mechanisms through which personal economic condition affects the engagement in behaviors are different for occasional and habitual behaviors, while for the first one, economic resources may be a material necessary condition to engage in these behaviors, for habitual behaviors economic security may reflect an entailment of post-materialist values, that results in higher green concerns and higher demand for environmental protection. The analysis of this study does not provide direct evidence to test these mechanisms, but future studies may further analyze whether there are different mechanisms through which different types of pro-environmental behaviors are influenced by economic conditions.

When considering country-level economic conditions, the impact on occasional and habitual behaviors differs: national affluence plays a role in shaping habitual behaviors, but such association is not found for occasional behaviors. Therefore, national economic wellbeing results being effective only when the behaviors that are more closely aligned with environmental attitudes are considered. This seems to provide some support for post-materialist

thesis which argues that the economic development of societies leads to a reduction in materialist needs and a shift toward post-materialist values and orientations, which include greater environmental concerns and eco-friendly actions. Occasional behaviors, on the other hand, being less directly tied to environmental attitudes, may be more influenced by the availability of specific and individual resources or local characteristics, rather than by broader attitudinal and value-based patterns. To further investigate this, future studies could on the one hand directly test the role of the cultural context and the diffusion of postmaterialist values in affecting habitual environmental behaviors, on the other hand further research may contribute in better understanding the extent to which local contextual factors, such as regional policy interventions or infrastructures, affect the adoption of occasional environmental behaviors.

As regards political orientation, this study contributes to the literature adding further findings to the few research focusing on the relationship between political orientation and private environmental behaviors. The expectations regarding the higher adoption of green actions among left-wing individuals compared to right-wing ones were confirmed only for habitual behaviors, while for occasional behaviors the results show the opposite association. Therefore, a clear political divide is observed in the adoption of behaviors based on green attitudes (habitual behaviors), while this divide diminishes and reverses when examining occasional behaviors. These results suggest that when environmental behaviors are not directly tied to environmental attitudes and their adoption is driven also by rational choice and convenience, the political divide diminishes, since different factors may contribute to explaining their engagement. This can have relevant implications in terms of strategies to incentive the engagement in pro-environmental behaviors. Policies targeting certain pro-environmental behaviors may be more effective if framed in terms of cost-saving and energy efficiency, rather than environmental benefits, as this is more likely to engage individuals across the political spectrum.

Moreover, I argued that, beyond the separate roles of economic and political conditions, understanding how these factors interact is crucial to gain insights into the drivers of environmental decision-making. Unlike studies that focus on how education and political orientation jointly influence climate attitudes and behaviors (Ballew et al., 2020), my analysis of private environmental behaviors does not reveal opposing effects of economic security between right- and left-wing individuals. In fact, I do not find any significant interactions between political ideology nor economic security. Right-wing and left-wing individuals seem to be similarly influenced by their economic conditions in the engagement in private-sphere pro-environmental behaviors.

Two main limitations of this study may relate to the measure of pro-environmental behaviors. First, a potential limitation concerns the categorization adopted to distinguish different types of private-sphere behaviors. One could argue that the two criteria used—frequency and environmental motivation—are not necessarily mutually exclusive. Some behaviors may be both occasional and climate-motivated, while others may be habitual but not primarily driven by environmental concerns. Indeed, for this reason, the behavior related to switching to a sustainable energy provider was excluded from the analysis, as it did not clearly fit into either category. Nonetheless, robust checks controlling for the association with perceived seriousness of climate change confirmed that the two indexes differ meaningfully in their relationship with an environmental attitude variable. This increases confidence that the behavioral categories do, to some extent, reflect differences in their connection to environmental concerns. That said, future studies drawing on a wider range of pro-environmental behaviors could further explore the engagement patterns across other behavioral types. Second, another limitation concerns the composition of the 'occasional behaviors' category, which includes actions that are not equally accessible to all individuals due to the substantial economic resources or specific structural conditions they require (e.g., installing solar panels). This may affect the generalizability of the results, given that the analysis does not account for additional external constraints that could restrict individuals' ability to adopt occasional behaviors.

In conclusion, examining drivers of different types of pro-environmental behaviors beyond environmental attitudes - such as economic security and political orientation - provides valuable insights for understanding and incentivizing eco-friendly actions. By recognizing the complexities of how these factors influence different types of behaviors, we can develop more targeted strategies to increase the engagement in sustainable practices. For instance, strategies that could effectively incentivize environmental behaviors while overcoming the polarization on climate change, which is expected to intensify as the issue's salience increases (Biancalana, Ladini and Visconti, 2023). Hence, this study underscores the need for multifaceted approaches to environmental behavior change, suggesting that interventions aimed at increasing support for environmental sustainability can be more effective if they are tailored to specific groups based on the type of behavior. For instance, efforts to promote green behaviors might be more effective among right-wing individuals if they address behaviors that are less directly associated with climate attitudes.

Chapter 5

Conclusions

The climate crisis represents one of the most significant and urgent global challenges of our time, with negative impacts on ecosystems, human societies, and economies worldwide. Addressing climate change requires not only structural changes but also support for climate policies and widespread engagement in pro-environmental behaviors. Public support for climate actions and engagement in environmental behaviors are at the core of this study.

This research dealt with the topic in different perspectives, including a comparative perspective and an experimental approach. In particular, the aim was to address the various research questions presented in the introduction and developed throughout the chapters, focusing primarily on exploring the role of four key factors – climate attitudes, economic conditions, environmental vulnerability, and political orientation – in explaining the low willingness to bear personal costs for climate mitigation and the limited engagement in private-sphere environmental behaviors. Therefore, the overall objective of this thesis consisted in understanding some mechanisms explaining support for environmental protection as well as to explore possible strategies to increase such support. Especially, I aimed at (i) further exploring the weak relationship between environmental concern and environmental intentions (the climate attitudes-behavior gap), (ii) investigating economic and climate-related factors influencing individuals' willingness to pay for environmental protection, (iii) testing the effect of recalling an extreme weather event in rising support for climate actions, and (iv) identifying different types of private-sphere environmental behaviors and their economic and political determinants.

The first study in chapter 2 confirmed the key role of environmental concern in affecting the willingness to accept cost to protect the environment. However, it also highlighted that environmental attitudes alone are insufficient to fully explain support for environmental protection, emphasizing the presence of the climate attitudes-behaviors gap across countries. To explore the mechanisms underlying this gap, the study examined the role of economic factors and found that both the economic status of individuals and the economic conditions of the country significantly influence people's willingness to protect the environment. The more individuals have economic capacities and the more they live in affluent countries, the more they are willing to accept costs to protect the environment. These results align with the *post-*

materialist theory and the *affluent hypothesis* (Inglehart, 1995; Diekmann & Franzen, 1999), indicating that material insecurities hinder pro-environmental engagement, as individuals prioritize immediate needs over broader environmental goals. Moreover, the study found that economic conditions moderate the relationship between environmental attitudes and intentions, both at the individual and contextual level. At the individual level, higher-income individuals are more likely to translate their environmental concern into willingness to accept costs for environmental protection. At the contextual level, the findings indicated that in less affluent countries, support for environmental protection is less tied to environmental attitudes and less polarized along levels of environmental concern. Thus, in poorer countries environmental concern seems to be less influenced by worldviews or values—key drivers of environmental attitudes—and, instead, more connected to material needs and economic capacities. These insights are consistent with Inglehart's *objective conditions and subjective predispositions* thesis (Inglehart, 1995), according to which in less-developed countries, environmental attitudes and concerns are shaped by the immediate and poor environmental conditions people face, making environmental issues a material need rather than a post-materialist value. Further supporting this idea, the study found that country-level climate vulnerability plays a moderating role, influencing how environmental concern translates into willingness to accept costs for environmental protection. In particular, in countries with higher climate vulnerability, individuals who are concerned about the environment show similar intentions to protect it as those who are not concerned. In contrast, in countries with lower climate vulnerability, individuals who are not concerned about the environment are less likely to engage in environmental protection compared to their counterparts living in high-risk countries.

A key implication of these findings is that while raising environmental concern can be somewhat effective in increasing support for environmental protection, such interventions are likely to be effective primarily among affluent groups and in wealthier countries. Conversely, in more vulnerable contexts and among more vulnerable individuals, support for environmental protection might be easier incentivized stressing material and practical aspects rather than general attitudes and concerns toward the environment.

However, although the first study contributes to highlight some mechanisms explaining the low support for environmental protection, it leaves unresolved questions regarding the strategies for increasing environmental intentions. Therefore, in an attempt to address this, the second study in chapter 3 focused on the effect of an intervention aimed at reducing the psychological distance of climate change to increase the willingness to sacrifice for the mitigation of climate change. The results indicated that recalling natural disasters is effective

in increasing support for climate change mitigation. This suggests that using natural disasters as a communication strategy can help reduce the psychological distance people perceive between themselves and climate change—a factor that often negatively affects their intentions and behaviors, as highlighted by the *goal setting theory* (Locke and Latham 1990). However, the effectiveness of this approach depends on the type of disaster. For example, while recalling floods did not significantly influence support for climate mitigation, recalling a glacier collapse did. These findings imply that the impact of such interventions is contingent on the nature of the event recalled. Disasters that are more familiar to the population or whose causes are harder to link to climate change may be less effective in rising support for mitigation efforts. Additionally, the lack of effect from recalling floods could be attributed to the strong politicization and media coverage surrounding the specific flood event considered.

Moreover, in line with Rüttenauer (2023), the study found support for the *attitudinal updating mechanisms* according to which people are likely to update their attitudes and intentions thanks to the mechanisms of experiential learning in act with the exposure to natural disasters. In fact, the study found that recalling a glacier collapse was particularly effective among individuals who do not believe in the human causes of climate change, as well as among right-wing individuals.

Although the results refer to a unique context and solely on two types of natural disasters, the consistency with the results of previous studies and the types of disaster analyzed, allow for some suggestions on key approaches for increasing support for climate mitigation. First, they suggest that communication strategies involving natural disasters can be effective, helping especially the most skeptical individuals shift their views by learning about climate change in a more concrete, less abstract manner. Second, as natural disasters and extreme weather events are expected to become more frequent and impactful in the present and future, these findings imply that the rise in such events could generally boost support for climate mitigation, particularly among certain groups. However, the difference in the effects of the two events recalled highlights the influence of media representation and public discourse on how such disasters may raise awareness about the consequences of climate change and, in turn, strengthen support for mitigation efforts. When an event is not attributed to climate change—either due to its familiarity or the way it is framed in the media and public debate—it fails to impact climate attitudes and intentions (Ogunbode et al., 2019). Therefore, interventions and policies aimed at increasing support for climate mitigation should consider strategies that bring climate change closer to people's experiences but must be cautious about how this proximity is framed and communicated.

Lastly in the third study in chapter 4, I shifted the focus from intentions and public-sphere behaviors to private pro-environmental behaviors. First, the study emphasized the relevance of distinguishing different types of environmental behaviors in order to better address incentives to promote such sustainable lifestyles. In particular, two groups of behaviors are distinguished: occasional and habitual behaviors. The first type includes daily or frequent actions that typically require deliberate eco-conscious intentions, such as considering the environmental impact of daily decisions, reducing car usage, or cutting down on meat consumption. The second category involves one-time, and often costly, behaviors mostly driven by economic or convenience factors than by environmental concerns, such as switching energy providers or installing solar panels.

Analyzing the two types of behaviors separately, the results of this study align with those of the first study relatively to the impact of individual and contextual economic conditions. Individuals with greater financial security and those living in more affluent countries are generally more likely to adopt environmentally friendly actions than those with less financial security. However, the results also showed that while individual economic conditions impact similarly habitual and occasional behaviors, the national GDP impacts only those behaviors that are more tied to environmental attitudes - habitual behaviors. This suggests that personal economic security is a necessary condition to be more likely to engage in eco-friendly behaviors in general, but also that the national economic context, as reflection of the broader national value orientation seems to impact especially those behaviors more tied to environmental attitudes.

Moreover, the third study also showed that political ideology emerges as a critical factor in shaping pro-environmental behaviors, with left-leaning individuals more likely to adopt environmentally friendly actions, but only those requiring environmental conscious effort (habitual behaviors). However, the divide diminishes and even reverses for occasional behaviors, where right-leaning individuals demonstrate higher engagement. This indicates, in accordance with the results of the second study, that although ideological differences persist also for private-sphere behaviors, the nature and framing of environmental actions can help bridging political divides. On the one hand, the second study testing the recall of natural disasters, showed that certain interventions can be effective in increasing support for climate mitigation especially among right-wing individuals, who are typically more skeptical and less willing to make sacrifices for the environment. On the other hand, the third study suggests that if interventions aimed at rising support for environmental sustainability, focus on behaviors less directly linked with climate attitudes- they can be effective in encouraging environmental

behaviors among right-wing and more skeptical individuals. Overall, these results suggest that ideological positions toward climate change are not firmly established, implying that there is potential for changing attitudes and behaviors, even among those with opposing views.

In conclusion, first this thesis confirmed the role of economic conditions, climate vulnerability and political ideology in explaining the engagement in pro-environmental behaviors. Second, it also confirmed the existence of a gap between what people perceive about climate change and their willingness to act for environmental protection. This poses challenges for the future implementation of policies aimed at mitigating climate change, as low public support may hinder their feasibility and success. However, although the climate attitudes-behaviors gap has been confirmed, it's important to highlight that the results showing significant differences across rich and poorer countries in the effect of environmental concern on support for environmental protection, underscore the importance of tailoring climate strategies to specific socio-economic and environmental contexts of different regions. In affluent and non-climate vulnerable countries where there is high polarization in support for environmental protection between concerned and non-concerned individuals, working on increasing environmental concern might be more efficient than in less affluent countries and more climatic vulnerable countries where support for environmental protection does not seem particularly influenced by levels of environmental concern. Therefore, this varying polarization can suggest that in more affluent and less climatic vulnerable countries, environmental issues are less related to practical needs of environmental protection and more a matter of ideological and values positions, while the opposite happens in poorer and more climatic vulnerable countries.

Nevertheless, the results of this thesis also suggest that there is some room to increase green intentions and behaviors. First, through communication strategies underlining the concrete and imminent impacts of climate change, thus reducing the perceived distance of climate change. Second, through interventions aimed at incentivizing those environmental behaviors that are less associated to climate attitudes, less ideologically driven and more economically convenient. Moreover, the positive effect of recalling extreme weather events suggests that in a future characterized by an increase in natural disasters and extreme weather conditions, these immediate and tangible impacts of climate change could help enhance support for climate mitigation efforts and narrow the gap between climate perceptions and actions.

Ultimately, returning to the initial point about the importance of studying public opinion on climate change: is raising awareness about climate change crucial for increasing support for climate mitigation and engagement in environmental behaviors? Is it sufficient?

This research suggests that highlighting the urgency of climate change can still be effective in increasing support for climate actions. First, when it focuses on reducing the perceived distance, by emphasizing its concrete and imminent effects. Second, it is effective in contexts with good economic conditions and low climate vulnerabilities, where environmental concern plays a significant role in shaping support for environmental protection. Moreover, fostering awareness is relevant, but its effectiveness depends on how it is approached. As the second chapter shows, reducing the perceived distance of climate change is impactful only when specific types of natural disasters are considered—particularly those whose causes are clearly attributable to climate change and have not been highly politicized or contested in public debate. However, this research also suggests that raising awareness alone may not be a sufficient strategy to increase support for climate mitigation. In fact, the findings confirm the existence of a climate attitude-behavior gap across different countries and they highlight that economic capacities significantly influence the willingness to bear costs for mitigating climate change, even independently of climate awareness. Moreover, the results reveal that in contexts of high climate risk and poor economic conditions, factors other than environmental attitudes and concern may play a more significant role in fostering support for environmental actions.

In addition to the insights this research has brought to light, further investigation is still needed to approach these issues from different perspectives. Firstly, moving beyond general measures of environmental concern is essential to better understand how people perceive the phenomenon and why there is a gap between attitudes and behaviors. For instance, this thesis has highlighted that perceiving climate change as proximate can positively influence climate orientations, while perceiving it as a distant phenomenon can hinder climate actions. Therefore, deeper insights about how people perceive climate change can help in understanding the discrepancy between climate perception and behaviors. In turn, this understanding can help identifying which factors should be prioritized to enhance awareness and foster greater support for climate action. Moreover, this research did not focus on specific climate policies, as such measures are not included in international probabilistic surveys. However, given that addressing climate change requires implementing specific policies and interventions, understanding public opinion on different measures is crucial and future research should explore how support for various climate policies varies by economic conditions, ideological orientations, or other contextual factors. This could offer valuable insights into designing and promoting effective mitigation strategies. Similarly, with regard to private-sphere environmental behaviors, further studies on different types of sustainable actions are needed to identify opportunities for encouraging sustainable actions among more skeptical and less advantaged groups in society.

Moreover, it would be beneficial to conduct more context-related studies to understand how regional characteristics, such as geography and infrastructure, influence individuals' ability and willingness to adopt these behaviors. These insights could be crucial to design more effective strategies that encourage sustainable actions at the local level. Lastly, greater attention should be given to the role of climate vulnerabilities and the direct experience of climate change impacts, such as extreme weather events and natural disasters. As we move into a future characterized by increasing climate vulnerabilities, investigating how these factors influence people's attitudes toward environmental protection will become even more crucial. This thesis has laid the groundwork for this area of research, specifically by exploring the role of recalling extreme weather events and how the perceived experience of these events can moderate people's attitudes toward climate action. However, further research is needed to explore whether actual experiences of climate impacts narrow the gap between climate change perceptions and behaviors. Investigating the role of climate vulnerability and experiences of extreme weather events is crucial to understand their potential influence on climate action, particularly in a future of rising climate risks.

In conclusion, fostering widespread engagement in climate action requires a nuanced understanding of the diverse factors influencing behaviors and attitudes. By addressing economic insecurities, climate vulnerabilities, and political divides, it is possible to design interventions that resonate across different groups and contexts, paving the way for more inclusive and effective climate solutions.

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Appendix

Table 2.1. Summary of Statistics: Means and proportions of variables.

WTP	2.75 (SD=1.12)
Environmental Concern	3.84 (SD=1.07)
PEWE	
Not at all	0.25
To a small extent	0.31
To some extent	0.29
To a great extent	0.15
Income	
Quintile 1^	0,1876
Quintile 2^	0,1522
Quintile 3^	0,1719
Quintile 4^	0,1543
Quintile 5^	0,1325
Missing values	0,2016
Gender	
Female	0.47
Male	0.53
Age	
18-29	0.15
30-59	0.53
60-85	0.32
Education	
Low	0.24
Medium	0.47
High	0.29
GDP	49369.3 (SD=24096.94)
WorldRisk	123236 (SD=12.70)

Figure 2.1. Predicted values of willingness to pay to protect the environment by levels of environmental concern. Results are based on linear regression Models controlling for age, sex, education and income.

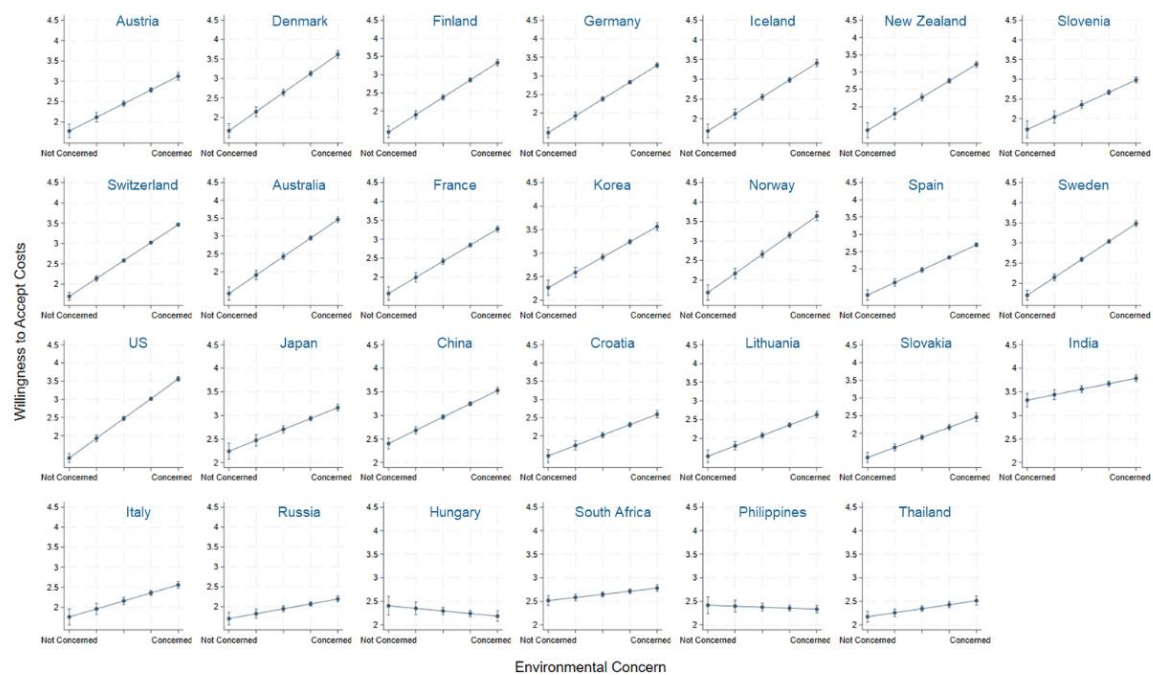


Table 2.2. Multilevel Linear Regression Models of Willingness to pay to protect the environment.

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5
Environmental Concern		0.307*** (0.00)	0.299*** (0.01)	0.292*** (0.01)	0.302*** (0.01)	0.278*** (0.01)
Income (rf: 1 [^] quintile)						
Quintile 2 [^]			0.047** (0.02)	0.037* (0.02)	0.230*** (0.07)	0.037* (0.02)
Quintile 3 [^]			0.092*** (0.02)	0.063*** (0.02)	0.093 (0.06)	0.062*** (0.02)
Quintile 4 [^]			0.192*** (0.02)	0.143*** (0.02)	0.066 (0.07)	0.143*** (0.02)
Quintile 5 [^]			0.337*** (0.02)	0.250*** (0.02)	-0.060 (0.07)	0.250*** (0.02)
PEWE (rf: not at all)						
small extent			0.041** (0.01)	0.036* (0.01)	0.037** (0.01)	-0.039 (0.05)
some extent			0.103*** (0.01)	0.095*** (0.01)	0.094*** (0.01)	-0.049 (0.05)
large extent			0.047** (0.02)	0.042* (0.02)	0.042* (0.02)	0.091 (0.06)
Female (rf: male)				-0.008 (0.01)	-0.008 (0.01)	-0.008 (0.01)
Age (rf: 18-29)						
30-59				-0.123*** (0.02)	-0.123*** (0.02)	-0.123*** (0.02)
60-85				-0.075*** (0.02)	-0.077*** (0.02)	-0.076*** (0.02)
Education (rf: low)						
Medium				0.056*** (0.01)	0.056*** (0.01)	0.056*** (0.01)
High				0.280*** (0.02)	0.279*** (0.02)	0.280*** (0.02)
Income*Environmental concern						
Quintile 2 [^]					-0.050** (0.02)	
Quintile 3 [^]					-0.008 (0.02)	
Quintile 4 [^]					0.020 (0.02)	
Quintile 5 [^]					0.079*** (0.02)	
PEWE*Environmental concern						
small extent						0.021 (0.01)
some extent						0.038** (0.01)
large extent						-0.010 (0.02)
Constant	2.716*** (0.07)	1.537*** (0.07)	1.427*** (0.08)	1.472*** (0.08)	1.436*** (0.09)	1.523*** (0.08)
Random Effects						
Country intercepts	0.143*** (0.04)	0.138*** (0.04)	0.139*** (0.04)	0.138*** (0.04)	0.139*** (0.04)	0.137*** (0.04)
Individual variance	1.110***	1.008	0.993	0.980**	0.978**	0.980**

	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log Likelihood (-2LL)	108896.44	105309.29	104758.37	104298.55	104223.71	104285.84
N	36962	36962	36962	36962	36962	36962

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.3. Multilevel Linear Regression Models of Willingness to pay to protect the environment.

	Model 6	Model 7	Model 8	Model 9
Environmental Concern	0.316*** (0.03)	0.316*** (0.03)	0.310*** (0.02)	0.313*** (0.03)
Female (rf: male)	-0.021* (0.01)	-0.021* (0.01)	-0.021* (0.01)	-0.021* (0.01)
Age (rf: 18-29)				
30-59	-0.114*** (0.01)	-0.114*** (0.01)	-0.113*** (0.01)	-0.114*** (0.01)
60-85	-0.071*** (0.02)	-0.072*** (0.02)	-0.071*** (0.02)	-0.072*** (0.02)
Education (rf: low)				
Medium	0.070*** (0.01)	0.070*** (0.01)	0.070*** (0.01)	0.070*** (0.01)
High	0.275*** (0.02)	0.275*** (0.02)	0.275*** (0.02)	0.275*** (0.02)
Income (rf: 1 st quintile)				
Quintile 2 nd	0.037* (0.02)	0.037* (0.02)	0.038* (0.02)	0.037* (0.02)
Quintile 3 rd	0.068*** (0.02)	0.067*** (0.02)	0.068*** (0.02)	0.067*** (0.02)
Quintile 4 th	0.149*** (0.02)	0.149*** (0.02)	0.149*** (0.02)	0.149*** (0.02)
Quintile 5 th	0.257*** (0.02)	0.257*** (0.02)	0.257*** (0.02)	0.257*** (0.02)
GDP	-0.454*** (0.09)		-0.470*** (0.08)	
WorldRisk		0.349*** (0.10)		0.356*** (0.10)
GDP*EnvConcern			0.138*** (0.02)	
WorldRisk*EnvConcern				-0.075** (0.03)
Constant	1.434*** (0.09)	1.427*** (0.10)	1.432*** (0.08)	1.426*** (0.10)
Random Effects				
Environmental Concern (slope)	0.026*** (0.01)	0.026*** (0.01)	0.009*** (0.00)	0.020*** (0.01)
Country intercepts	0.182*** (0.05)	0.255*** (0.07)	0.167*** (0.05)	0.251*** (0.07)
Individual variance	0.949*** (0.01)	0.949*** (0.01)	0.949*** (0.01)	0.949*** (0.01)
Log Likelihood (-2LL)	103215.34	103223.78	103187.13	103217.45

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.1. Linear regression models with the willingness to accept limitations in the standard of living as dependent variable and the interaction between experimental condition and belief in climate change causes (Model 1) and political orientation (Model 2) as main independent variable (study 1).

Independent variables	Categories	Model 1	Model 2
Experimental condition (No priming)	Priming	0.51*** (0.13)	0.17** (0.08)
Belief in climate change causes (Mainly/only human activity)	Both natural processes and human activity	-0.48*** (0.07)	
	Mainly/only natural processes	-0.99*** (0.10)	
Experimental condition# Belief in climate change causes	Priming#Both natural processes and human activity	-0.02 (0.09)	
	Priming#Mainly/only natural processes	0.31** (0.14)	
Political orientation (Left: 0-3)	Centre (4-6)		-0.27*** (0.08)
	Right (7-10)		-0.90*** (0.08)
	Dk/Da		-0.55*** (0.09)
Experimental condition # Political orientation	Priming#Centre		0.00 (0.11)
	Priming#Right		0.24** (0.11)
	Priming # Dk/Da		0.05 (0.12)
Sex (Male)	Female	-0.01 (0.04)	-0.03 (0.04)
Age (18-34)	35-54	-0.03 (0.06)	-0.09 (0.07)
	55 and more	0.11* (0.06)	-0.05 (0.06)
Education (Low)	Medium	0.23*** (0.07)	0.21*** (0.08)
	High	0.36*** (0.08)	0.29*** (0.08)
Constant		3.39*** (0.09)	3.64*** (0.11)
Observations		2,092	2,180
R-squared		0.12	0.11

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure 3.1. Predicted values with 95% confidence intervals of willingness to accept limitation to the standard of living to mitigate climate change by beliefs in climate change causes and experimental condition (study 1). The predicted values are derived from model 1 in Table 2.2 of the Appendix which controls for political orientation and sociodemographic variables.

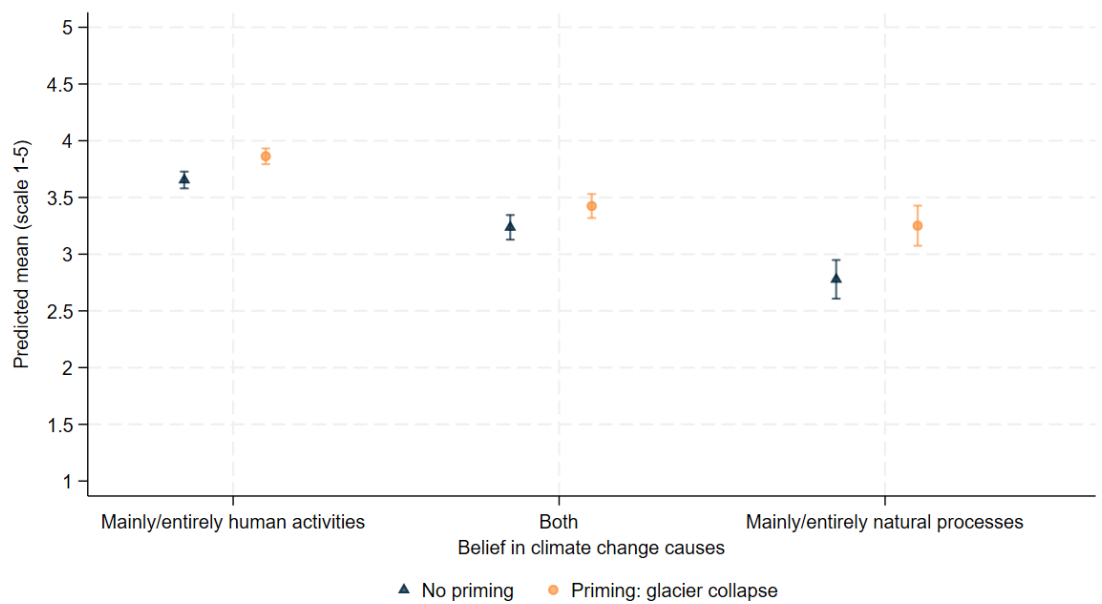


Figure 3.2. Predicted values with 95% confidence intervals of willingness to accept limitation to the standard of living to mitigate climate change by political orientation and experimental condition (study 1). The predicted values are derived from model 2 in Table 2.2 of the Appendix which controls for belief in climate change causes and sociodemographic variables.

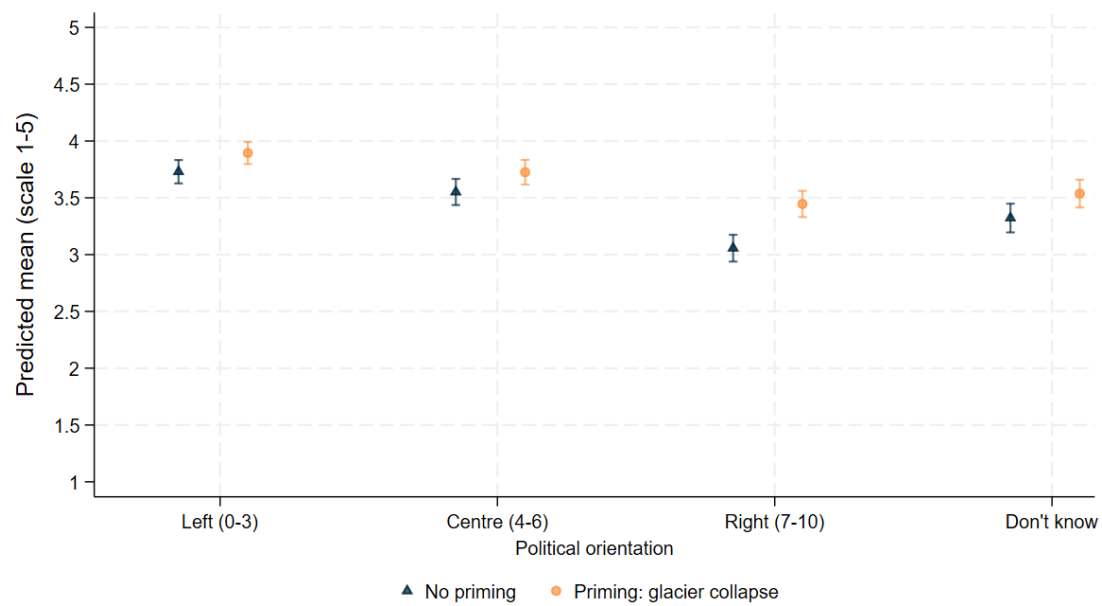


Figure 3.3. Predicted values with 95% confidence intervals of willingness to accept limitation to the standard of living to mitigate climate change by geographical area and experimental condition (study 1).

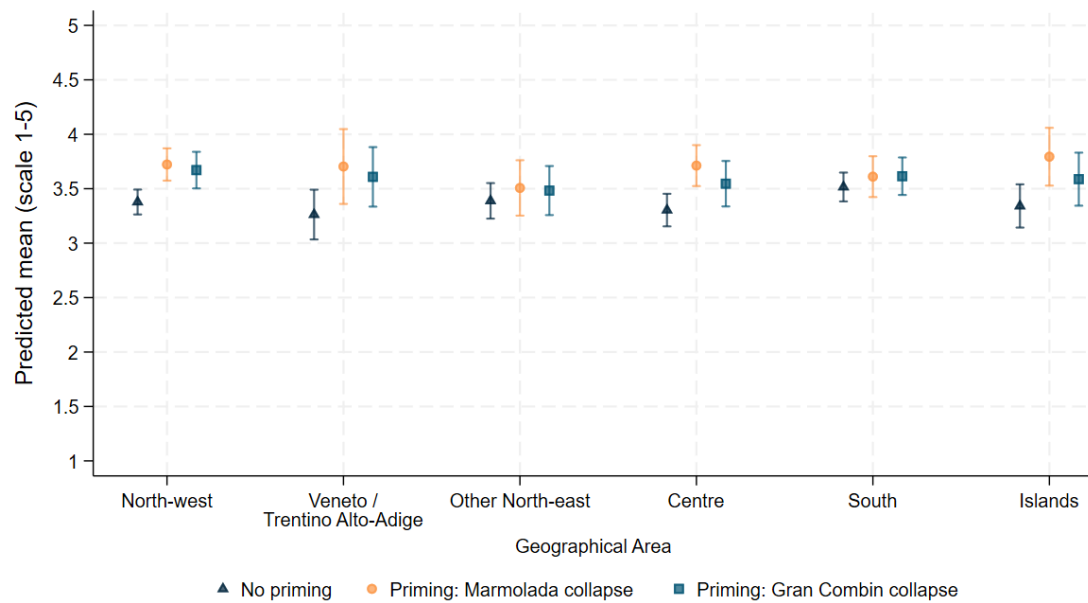


Figure 3.4. Predicted values with 95% confidence intervals of willingness to accept limitation to the standard of living to mitigate climate change by geographical area and experimental condition (study 2).

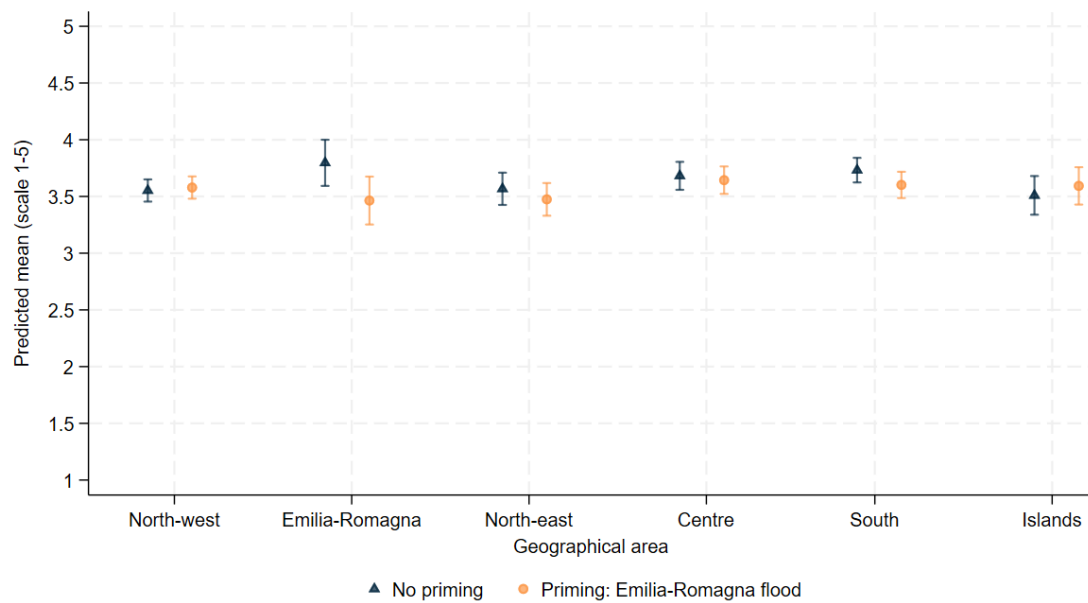


Table 3.2: Linear regression models with the willingness to accept limitations in the standard of living as dependent variable and the interaction between experimental condition and belief in climate change causes (Model 1) and political orientation (Model 2) as main independent variable, respectively controlling for political orientation and belief in climate change causes (study 1).

Independent variables	Categories	Model 1	Model 2
Experimental condition (No priming)	Priming	0.47*** (0.12)	0.16** (0.07)
Belief in climate change causes (Mainly/only human activity)	Both natural processes and human activity	0.41*** (0.10)	-0.40*** (0.05)
	Mainly/only natural processes	0.80*** (0.10)	-0.67*** (0.07)
Experimental condition# Belief in climate change causes	Priming#Both natural processes and human activity	-0.02 (0.09)	
	Priming#Mainly/only natural processes	0.27** (0.13)	
Political orientation (Left: 0-3)	Centre (4-6)	-0.17*** (0.05)	-0.18** (0.08)
	Right (7-10)	-0.55*** (0.06)	-0.67*** (0.08)
	Dk/Da	-0.38*** (0.06)	-0.41*** (0.08)
Experimental condition # Political orientation	Priming#Centre		0.01 (0.11)
	Priming#Right		0.22** (0.11)
	Priming # Dk/Da		0.05 (0.11)
Sex (Male)	Female	-0.02 (0.04)	-0.02 (0.04)
Age (18-34)	35-54	-0.00 (0.06)	-0.01 (0.06)
	55 and more	0.08 (0.06)	0.07 (0.06)
Education (Low)	Medium	0.17** (0.07)	0.18** (0.07)
	High	0.26*** (0.08)	0.26*** (0.08)
Constant		2.87*** (0.13)	3.70*** (0.10)
Observations		2,092	2,092
R-squared		0.16	0.16

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.3: Linear regression models with the willingness to accept limitations in the standard of living as dependent variable and the interaction between experimental condition and concern for climate changeⁱ (Model 1) and political orientation (Model 2) as independent variable. Study 2.

Independent variables	Categories	Model 2b	Model 3b
Experimental condition (No priming)	Priming: Emilia-Romagna floods	0.00 (0.08)	-0.01 (0.06)
Climate change concern (Not concerned)	Quite concerned	1.19*** (0.07)	
	Very concerned	1.68*** (0.07)	
Experimental condition # Climate change concern	Priming # Quite concerned	-0.01 (0.10)	
	Priming # Very concerned	-0.05 (0.09)	
Political orientation (Left: 0-3)	Centre (4-6)		-0.37*** (0.07)
	Right (7-10)		-0.75*** (0.07)
	Dk/Da		-0.55*** (0.08)
Experimental condition# Political orientation	Priming # Centre		0.02 (0.10)
	Priming # Right		-0.01 (0.10)
	Priming # Dk/Da		-0.14 (0.11)
Sex (Male)	Female	0.04 (0.03)	0.14*** (0.04)
Age (18-34)	35-54	-0.17*** (0.05)	-0.20*** (0.06)
	55 and more	0.05 (0.05)	-0.04 (0.06)
Education (Low)	Medium	0.20*** (0.06)	0.17*** (0.07)
	High	0.30*** (0.06)	0.27*** (0.07)
Constant		2.17*** (0.09)	3.82*** (0.09)
Observations		2,848	2,888
R-squared		0.33	0.12

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

ⁱ The original variable measuring climate change concern (five categories) has been recoded into three categories: very concerned (extremely/very concerned), quite concerned (quite), not concerned (little/not concerned)

Table 4.1. Summary of Statistics: Means and proportions of variables.

Habitual behaviors	0.14 (SD=0.15)
Occasional behaviors	0.37 (SD=0.24)
Economic difficulty	
Most of the time	6.16
From time to time	22.07
Almost never/never	71.77
Political orientation	
Left (1-4)	31.30
Centre (5-6)	39.99
Right (7-10)	28.70
Gender	
Women	51.94
Men	48.06
Age cohort	
1936-1950	11.0
1951-1965	29.34
1966-1985	36.34
1986-1995	13.49
1996-2006	9.81
Education	
Low	12.02
Medium	38.24
High	41.30
Still studying	8.43
GDP	53224.52 (SD=20997.98)

Table 4.2 Multilevel linear regression models of occasional and habitual pro-environmental behaviors, controlling for perceived seriousness of climate change

Economic difficulty (rf: most of the time)	Occasional Behaviors	Habitual Behaviors
From time to time	0.01 (0.00)	0.02** (0.01)
Almost never/Never	0.03*** (0.00)	0.04*** (0.01)
Political orientation (rf: Left)		
Centre	0.01*** (0.00)	-0.04*** (0.00)
Right	0.01*** (0.00)	-0.05*** (0.00)
GDP	0.01 (0.01)	0.05*** (0.01)
Gender		
Female	-0.01** (0.00)	0.06*** (0.00)
Age cohort (rf: till 1950)		
1951-1965	0.02*** (0.00)	0.01** (0.00)
1966-1985	0.02*** (0.00)	0.01 (0.00)
1986-1995	-0.00 (0.00)	0.01 (0.01)
>1996	-0.04*** (0.01)	-0.01 (0.01)
Education (rf: low)		
Middle	0.03*** (0.00)	0.03*** (0.00)
High	0.05*** (0.00)	0.08*** (0.00)
Still studying	0.02** (0.01)	0.09*** (0.01)
Climate Change Seriousness	0.01*** (0.00)	0.03*** (0.00)
Constant	0.04*** (0.01)	0.04* (0.02)
Random Effects		
Country intercepts	0.00*** (0.00)	0.00*** (0.00)
Individual Variance	0.02*** (0.00)	0.04*** (0.00)
N	23632	23632

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.3 Multilevel logistic regression models of occasional pro-environmental behaviors (Models 2a in table 4.1, Chapter 4)

Economic difficulty (rf: most of the time)	Installed devices to reduce energy use	Installed solar panels	Improved home insulation	Purchased a low- energy home	Prioritize low energy consumption appliances	Purchased a new car with low fuel consumption	Bought an electric car
From time to time	-0.16 (0.11)	0.24 (0.13)	0.25** (0.08)	0.19 (0.19)	0.07 (0.06)	-0.01 (0.12)	-0.19 (0.24)
Almost never/Never	-0.16 (0.10)	0.52*** (0.12)	0.61*** (0.08)	0.43* (0.18)	0.34*** (0.06)	0.35** (0.11)	0.20 (0.22)
Political orientation (rf: Left)							
Centre	0.07 (0.05)	0.10 (0.06)	0.04 (0.04)	0.16 (0.08)	-0.02 (0.03)	0.12* (0.05)	0.22 (0.11)
Right	0.11* (0.06)	0.15* (0.06)	0.12** (0.04)	0.19* (0.09)	-0.07* (0.04)	0.18** (0.06)	0.44*** (0.11)
GDP	0.26* (0.12)	0.27 (0.16)	-0.03 (0.10)	0.18 (0.11)	0.06 (0.09)	0.14* (0.07)	0.43*** (0.11)
Gender							
Female	-0.15*** (0.04)	-0.16** (0.05)	-0.05 (0.03)	-0.11 (0.07)	0.22*** (0.03)	-0.32*** (0.04)	-0.20* (0.09)
Age cohort (rf: till 1950)							
1951-1965	0.02 (0.07)	0.34*** (0.09)	0.09 (0.06)	0.06 (0.14)	0.32*** (0.05)	0.30*** (0.08)	0.41* (0.18)
1966-1985	0.01 (0.07)	0.31*** (0.09)	-0.06 (0.06)	0.48*** (0.13)	0.34*** (0.05)	0.41*** (0.08)	0.66*** (0.18)
1986-1995	-0.24** (0.09)	-0.19 (0.12)	-0.38*** (0.07)	0.61*** (0.15)	0.08 (0.06)	0.30** (0.10)	0.33 (0.21)
>1996	-0.64*** (0.13)	0.14 (0.15)	-0.97*** (0.10)	-0.21 (0.22)	-0.59*** (0.08)	0.19 (0.13)	0.53* (0.27)
Education (rf: low)							
Middle	0.14 (0.08)	0.23* (0.09)	0.46*** (0.06)	0.47** (0.15)	0.33*** (0.05)	0.25** (0.09)	0.37* (0.19)
High	0.41*** (0.08)	0.55*** (0.09)	0.60*** (0.06)	0.88*** (0.15)	0.49*** (0.05)	0.42*** (0.09)	0.66*** (0.19)
Still studying	0.25 (0.13)	0.29 (0.15)	0.39*** (0.11)	0.57* (0.23)	0.11 (0.08)	-0.14 (0.14)	0.24 (0.28)

Constant	-2.23*** (0.18)	-3.67*** (0.24)	-2.24*** (0.16)	-4.67*** (0.27)	-0.89*** (0.12)	-3.06*** (0.16)	-5.20*** (0.33)
Random Effects							
Country intercepts	0.44*** (0.13)	0.80*** (0.23)	0.35*** (0.10)	0.34** (0.11)	0.24*** (0.07)	0.13** (0.04)	0.31** (0.12)
N	23668	23668	23668	23668	23668	23668	23668

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.4 Multilevel logistic regression models of habitual pro-environmental behaviors (Model 2b in table 4.1, Chapter 4)

Economic difficulty (rf: most of the time)	Eat more organic food	Eat less meat.	Eco-friendly transport alternatives	Recycling	Reduce use of disposable items	Consider food carbon footprint	Consider transport carbon footprint
From time to time	-0.16* (0.07)	0.27*** (0.07)	0.05 (0.07)	0.30*** (0.07)	0.15* (0.06)	-0.14 (0.12)	0.13 (0.10)
Almost never/Never	-0.07 (0.07)	0.38*** (0.07)	0.25*** (0.07)	0.67*** (0.06)	0.48*** (0.06)	-0.05 (0.11)	0.28** (0.09)
Political orientation (rf: Left)							
Centre	-0.43*** (0.04)	-0.33*** (0.04)	-0.27*** (0.03)	-0.13** (0.04)	-0.21*** (0.03)	-0.44*** (0.05)	-0.42*** (0.04)
Right	-0.57*** (0.04)	-0.49*** (0.04)	-0.41*** (0.04)	-0.24*** (0.04)	-0.29*** (0.04)	-0.60*** (0.06)	-0.58*** (0.05)
GDP	0.33*** (0.08)	0.24** (0.09)	0.20* (0.08)	0.32** (0.10)	0.19** (0.07)	0.37** (0.13)	0.47*** (0.12)
Gender Female	0.58*** (0.03)	0.46*** (0.03)	0.19*** (0.03)	0.40*** (0.03)	0.53*** (0.03)	0.04 (0.04)	0.48*** (0.04)
Age cohort (rf: till 1950)							
1951-1965	-0.08 (0.05)	0.12* (0.05)	0.22*** (0.05)	0.04 (0.06)	0.05 (0.05)	0.20* (0.08)	0.15* (0.07)
1966-1985	-0.27*** (0.05)	0.09 (0.05)	0.24*** (0.05)	-0.11 (0.06)	0.00 (0.05)	0.29*** (0.08)	0.26*** (0.06)
1986-1995	-0.11 (0.06)	0.15* (0.06)	0.35*** (0.06)	-0.33*** (0.07)	-0.06 (0.06)	0.22* (0.09)	0.38*** (0.07)
>1996	-0.21** (0.08)	0.06 (0.08)	0.33*** (0.08)	-0.42*** (0.08)	-0.16* (0.08)	0.31** (0.12)	0.11 (0.10)
Education (rf: low)							
Middle	0.11* (0.06)	0.31*** (0.06)	0.13* (0.05)	0.27*** (0.05)	0.18*** (0.05)	0.27** (0.09)	0.23** (0.07)
High	0.56*** (0.06)	0.74*** (0.06)	0.39*** (0.05)	0.53*** (0.06)	0.46*** (0.05)	0.69*** (0.09)	0.59*** (0.07)
Still studying	0.62*** (0.09)	0.66*** (0.09)	0.60*** (0.08)	0.49*** (0.09)	0.39*** (0.08)	0.75*** (0.12)	0.81*** (0.10)
Constant	-1.06***	-1.80***	-1.40***	0.28*	-0.17	-2.75***	-2.54***

	(0.13)	(0.14)	(0.13)	(0.14)	(0.11)	(0.20)	(0.18)
Random Effects							
Country intercepts	0.22*** (0.06)	0.25*** (0.07)	0.21*** (0.06)	0.31*** (0.09)	0.17*** (0.05)	0.51*** (0.15)	0.45*** (0.13)
N	23668	23668	23668	23668	23668	23668	23668

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.5 Multilevel logistic regression models of occasional pro-environmental behaviors (Models 3a in table 4.1, Chapter 4)

Economic difficulty (rf: most of the time)	Installed devices to reduce energy use	Installed solar panels	Improved home insulation	Purchased a low-energy home	Prioritize low energy consumption appliances	Purchased a new car with low fuel consumption	Bought an electric car
From time to time	0.12 (0.22)	0.23 (0.24)	0.50** (0.16)	0.05 (0.38)	-0.11 (0.11)	0.14 (0.24)	0.51 (0.76)
Almost never/Never	0.19 (0.20)	0.67** (0.23)	0.83*** (0.15)	0.49 (0.35)	0.15 (0.11)	0.45* (0.22)	1.28 (0.72)
Political orientation (rf: Left)							
Centre	0.52* (0.23)	0.20 (0.27)	0.29 (0.18)	0.23 (0.42)	-0.28* (0.13)	0.27 (0.26)	1.30 (0.77)
Right	0.50 (0.26)	0.41 (0.30)	0.49* (0.20)	0.17 (0.47)	-0.31* (0.15)	0.32 (0.29)	1.74* (0.77)
Economic difficulty##Political orientation							
Fromtimetotime#centre	-0.40 (0.26)	0.08 (0.31)	-0.28 (0.20)	0.22 (0.47)	0.27 (0.15)	-0.18 (0.29)	-0.61 (0.83)
Fromtimetotime#right	-0.35 (0.29)	-0.07 (0.33)	-0.42 (0.22)	0.13 (0.52)	0.23 (0.17)	-0.26 (0.32)	-1.00 (0.84)
AlmostNever/Never#centre	-0.49* (0.24)	-0.14 (0.28)	-0.27 (0.19)	-0.13 (0.43)	0.29* (0.14)	-0.15 (0.27)	-1.20 (0.78)
AlmostNever/Never#Right	-0.42 (0.27)	-0.32 (0.30)	-0.38 (0.20)	-0.00 (0.48)	0.26 (0.16)	-0.12 (0.29)	-1.38 (0.78)
GDP	0.26* (0.12)	0.27 (0.16)	-0.03 (0.10)	0.18 (0.11)	0.06 (0.09)	0.14* (0.07)	0.43*** (0.11)
Gender							
Female	-0.15*** (0.04)	-0.16** (0.05)	-0.05 (0.03)	-0.11 (0.07)	0.22*** (0.03)	-0.32*** (0.04)	-0.19* (0.09)
Age cohort (rf: till 1950)							
1951-1965	0.02 (0.07)	0.34*** (0.09)	0.09 (0.06)	0.06 (0.14)	0.32*** (0.05)	0.30*** (0.08)	0.41* (0.18)
1966-1985	0.01	0.31***	-0.06	0.48***	0.34***	0.41***	0.66***

	(0.07)	(0.09)	(0.06)	(0.13)	(0.05)	(0.08)	(0.18)
1986-1995	-0.24**	-0.20	-0.38***	0.61***	0.08	0.30**	0.33
	(0.09)	(0.12)	(0.07)	(0.15)	(0.06)	(0.10)	(0.21)
>1996	-0.64***	0.14	-0.97***	-0.22	-0.59***	0.19	0.52
	(0.13)	(0.15)	(0.10)	(0.22)	(0.08)	(0.13)	(0.27)
Education (rf: low)							
Middle	0.14	0.23*	0.46***	0.47**	0.33***	0.25**	0.37*
	(0.08)	(0.09)	(0.06)	(0.15)	(0.05)	(0.09)	(0.19)
High	0.41***	0.55***	0.60***	0.88***	0.49***	0.42***	0.65***
	(0.08)	(0.09)	(0.06)	(0.15)	(0.05)	(0.09)	(0.19)
Still studying	0.25	0.29	0.38***	0.57*	0.11	-0.14	0.24
	(0.13)	(0.15)	(0.11)	(0.23)	(0.08)	(0.14)	(0.28)
Constant	-2.55***	-3.78***	-2.46***	-4.70***	-0.72***	-3.17***	-6.21***
	(0.25)	(0.30)	(0.20)	(0.40)	(0.15)	(0.24)	(0.75)
Random Effects							
Country Intercept	0.44***	0.80***	0.35***	0.34**	0.24***	0.13**	0.31**
	(0.13)	(0.23)	(0.10)	(0.11)	(0.07)	(0.04)	(0.11)
N	23668	23668	23668	23668	23668	23668	23668

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4.6 Multilevel logistic regression models of habitual pro-environmental behaviors (Models 3b in table 4.1, Chapter 4)

Economic difficulty (rf: most of the time)	Eat more organic food	Eat less meat.	Eco-friendly transport alternatives	Recycling	Reduce use of disposable items	Consider food carbon footprint	Consider transport carbon footprint
From time to time	-0.26* (0.12)	0.26* (0.13)	0.11 (0.12)	0.23 (0.12)	0.00 (0.12)	0.06 (0.20)	0.20 (0.16)
Almost never/Never	-0.02 (0.11)	0.49*** (0.12)	0.29* (0.11)	0.51*** (0.12)	0.35** (0.11)	0.25 (0.19)	0.32* (0.15)
Political orientation (rf: Left)							
Centre	-0.33* (0.14)	-0.21 (0.15)	-0.24 (0.14)	-0.18 (0.14)	-0.39** (0.13)	-0.09 (0.24)	-0.34 (0.20)
Right	-0.70*** (0.17)	-0.39* (0.18)	-0.30 (0.17)	-0.61*** (0.15)	-0.45** (0.15)	-0.06 (0.27)	-0.56* (0.24)
Economic difficulty##Political orientation							
Fromtimetotime#centre	0.04 (0.16)	0.04 (0.17)	-0.04 (0.16)	-0.05 (0.16)	0.21 (0.15)	-0.27 (0.27)	-0.11 (0.22)
Fromtimetotime#right	0.39* (0.20)	-0.01 (0.20)	-0.17 (0.19)	0.32 (0.18)	0.20 (0.17)	-0.36 (0.30)	-0.06 (0.27)
AlmostNever/Never#centre	-0.15 (0.15)	-0.18 (0.16)	-0.04 (0.15)	0.11 (0.15)	0.18 (0.14)	-0.37 (0.24)	-0.08 (0.20)
AlmostNever/Never#Right	0.07 (0.18)	-0.12 (0.19)	-0.11 (0.17)	0.42** (0.16)	0.16 (0.15)	-0.60* (0.27)	-0.02 (0.24)
GDP	0.33*** (0.08)	0.24** (0.09)	0.20* (0.08)	0.32** (0.10)	0.19** (0.07)	0.36** (0.13)	0.47*** (0.12)
Gender							
Female	0.58*** (0.03)	0.46*** (0.03)	0.19*** (0.03)	0.40*** (0.03)	0.53*** (0.03)	0.05 (0.04)	0.48*** (0.04)
Age cohort (rf: till 1950)							
1951-1965	-0.08 (0.05)	0.12* (0.05)	0.22*** (0.05)	0.04 (0.06)	0.05 (0.05)	0.20* (0.08)	0.15* (0.07)
1966-1985	-0.27*** (0.05)	0.09 (0.05)	0.24*** (0.05)	-0.11 (0.06)	0.00 (0.05)	0.29*** (0.08)	0.26*** (0.06)

1986-1995	-0.11 (0.06)	0.14* (0.06)	0.35*** (0.06)	-0.32*** (0.07)	-0.06 (0.06)	0.22* (0.09)	0.38*** (0.07)
>1996	-0.22** (0.08)	0.06 (0.08)	0.33*** (0.08)	-0.41*** (0.08)	-0.16* (0.08)	0.31** (0.12)	0.11 (0.10)
Education (rf: low)							
Middle	0.11* (0.06)	0.31*** (0.06)	0.13* (0.05)	0.27*** (0.05)	0.18*** (0.05)	0.27** (0.09)	0.23** (0.07)
High	0.56*** (0.06)	0.74*** (0.06)	0.39*** (0.05)	0.53*** (0.06)	0.46*** (0.05)	0.69*** (0.09)	0.59*** (0.07)
Still studying	0.62*** (0.09)	0.66*** (0.09)	0.60*** (0.08)	0.49*** (0.09)	0.39*** (0.08)	0.75*** (0.12)	0.81*** (0.10)
Constant	-1.08*** (0.15)	-1.87*** (0.16)	-1.45*** (0.15)	0.41* (0.16)	-0.05 (0.14)	-3.02*** (0.25)	-2.58*** (0.21)
Random Effects							
Country Intercept	0.22*** (0.06)	0.25*** (0.07)	0.20*** (0.06)	0.31*** (0.09)	0.17*** (0.05)	0.51*** (0.15)	0.45*** (0.13)
N	23668	23668	23668	23668	23668	23668	23668

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

