Universitat Autònoma de Barcelona

Essays on Sustainable Consumption

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DOCTORAL DISSERTATION

Essays on Sustainable Consumption

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Abstract

Climate is changing, and human actions are the main responsible. Hence, understanding the nature of consumers' environmental behaviors will help design better environmental policies for a sustainable future. In our first study, reported in Chapter 2, drawing on the responsible environmental behavior (REB) theoretical framework, we disentangle the effects of sociopsychological environmental factors on Europeans' behaviors, considering that living contexts vary from country to country. The data was provided by the Eurobarometer Special Survey series conducted in the 2017 survey "Attitudes of European citizens toward the environment". As the survey was not developed to collect data based on the attitude-behavior theory, we applied exploratory factor analysis (EFA) uncover the interdependence among indicators to measure the theoretical drivers of pro-environmental behavior. Additionally, we used Harman's single-factor test to check whether common method variance was a threat to our findings' internal validity. Later, a multilevel model applied to measure the effect of individual-level environmental factors and analyze the impact of the country context on Europeans' environmental behaviors. Results show that the three tested environmental behaviors (eco-friendly purchasing, public transport use, and reduced resource consumption) are explained by individual-level environmental factors as well as by country differences. Still, the effects differ depending on the behavior considered. We also find that the effects of knowledge, attitudes, and perceived behavioral control are mediated by a set of social categories and indicators of social position (age, gender, education, and income).

After finding evidence that countries matter regarding pro-environmental behavior, we study the country-level drivers and their effects on Europeans' mean behavior and cross-level interactions using

a multilevel regression model in our second study, reported in Chapter 3. To examine the influence of country-level drivers on behavior and attitude-behavior relationships, we added country-level data to the study, retrieved from several secondary sources. Correlations between individual- and country-level dependent and independent variables had been checked before the analysis. The variance inflation factor for each independent variable was assessed. The direct impact of country-level drivers on pro-environmental behaviors was as expected: country affluence and income inequality had positive and negative impacts, respectively, whereas educational development, environmental issues, and cultural values had no direct impact on country mean environmental behavior. Nonetheless, when looking at the cross-level interactions, educational development increased the effect of perceived behavioral control on behaviors. In more developed countries, the influence of country development on behavior through social-psychological drivers may follow a different social mechanism. A pattern in which income is not enough to change perceptions of reality, but income may be transformed into cultural capital that may change socially ingrained habits, skills, and dispositions.

Contrasting with research published to date, this doctoral dissertation also aims to uncover individual environmental behavior patterns and how they are distributed across countries with its last study, reported in Chapter 4. As far as we are aware, this is the first attempt that examines how European Union (EU) citizens systematically differ in their environmental attitude-behavior relationships according to country-level contextual drivers. Using a multilevel latent class regression model, we identified four attitude-behavior relationships that we labelled, according to mean environmental behavior scores, environmentalist, pre-environmentalist, less-environmentalist and non-environmentalist. We found that environmentalist Europeans were associated with more privileged

social positions, but the impact of sociopsychological drivers was lower in comparison to other patterns. Regarding the distribution of environmental patterns across the EU, we have reduced the countries' heterogeneity to four country clusters reflecting pattern similarities that we labelled green (Belgium, Luxembourg, the Netherlands, Sweden), pre-green (Austria, Denmark, Finland, France, Germany, Malta, Slovenia), brown (Czech Republic, Estonia, Italy, Ireland, Hungary, Latvia, Poland, Spain, Slovakia, United Kingdom) and grey (Bulgaria, Croatia, Cyprus, Greece, Lithuania, Portugal, Romania) countries. As expected, the country clusters reflected socioeconomic development levels (more developed countries were greener). In the interest of reducing inequality in the distribution of environmentally healthy and vital ecosystems, we suggest that EU environmental policies should mainly focus their efforts to address the environmental issues of countries classified as brown and grey. Finally, we provide an explanation for heterogenous attitude-behavior relationships based on the crowding-out effect of external motivators. We hope that the last study will help policymakers design better environmental action plans that consider systematic differences in the individual environmental behaviors of Europeans and their distribution across EU countries.

Contents

List of figures

List of tables

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Hope is the thing with feathers - Emily Dickinson

Preface

This dissertation is a compilation of three articles (Chapter 2, 3 and 4), two of them are already published or accepted to be published. Study one, Chapter 2, has been published at the *Sustainability* journal (DOI: 10.3390/su12104307); study two, Chapter 3, has been published at the *Journal of Environmental Sociology* (DOI: 10.1080/23251042.2021.2018123) while study three, Chapter 4, is under review to be published in the *Environment and Behavior* journal. Furthermore, a study based on the second study, Chapter 3, was presented at 15th European Sociology Association (ESA) conference under a relevant section (RN12- Environmental Attitudes and Behaviors).

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Abbreviations

A-B-C: Attitude-Behavior-Context

AIC: Akaike's Information Criterion

ANOVA: Analysis of Variance

ATEB: Attitudes Toward Environmental Behavior

BIC: Bayesian Information Criterion

EA: Environmental Attitudes

EFA: Exploratory Factor Analysis

EK: Environmental Knowledge

EU: European Union

EU27+UK: 27 EU Member States plus the United Kingdom

EU-28: 28 EU Member States

GDP: Gross Domestic Product

GHGs: Greenhouse Gases

ICC: Intra-Class Correlation

IPCC: Intergovernmental Panel on Climate Change

KMO: Kaiser-Meyer-Olkin

LPI: Living Planet Index

NAM: Norm Activation Model

NEP: New Environmental Paradigm

PBC: Perceived Behavioral Control

PCA: Principal Component Analysis

PEB: Pro-Environmental Behavior

PPP: Purchasing Power Parity

REB: Responsible Environmental Behavior

REML: Restricted Maximum Likelihood

SDG: Sustainable Development Goal

SEM: Structural Equation Model

SEN: Subjective Environmental Norms

TPB: Theory of Planned Behavior

TRA: Theory of Reasoned Action

VBN: Value-Belief-Norm

VIF: Variance Inflation Factor

Chapter 1. Introduction

This introductory chapter provides a brief review of the research background and motivation relating to environmental behavior. Next, the research gaps in the literature are highlighted, and the research objectives and questions of this doctoral dissertation are provided. Finally, the research methods and the thesis structure are presented, respectively.

1.1. Background and Motivation

Human behavior continues to threaten the earth's livelihood. Carbon emissions continue to rise, fossil fuels dominate the energy mix, and the demands of growth exert unsustainable pressure on natural resources (OECD, 2019). As a result, more than 10,000 representative populations of mammals, birds, reptiles, amphibians, and fish, has declined by 52 percent between 1970 and 2010, according to the global Living Planet Index (LPI) (WWF, 2014). Climate change also brings flooding, drought, sea-level rise, coastal erosion, melting of glaciers and ice, loss of summer Arctic sea ice, changes to the ocean, reduced oxygen levels, and more throughout the 21st century (IPCC, 2021). Even the 2021 wildfire season on multiple continents, including the wildfires in Algeria, Italy, Greece, Spain, Turkey, and countless more, lasted longer than in previous years, and the intensity and scale of fires has also increased as a consequence of climate change (The Associated Press, 2021).

Hence, climate change is a global challenge of our time regardless of location. The Intergovernmental Panel on Climate Change (IPCC, 2021)'s Sixth Assessment report recently confirms that emissions of greenhouse gases (GHGs) from human activities are responsible for approximately 1.1°C of warming since 1850-1900 but it is expected to exceed 1.5°C warming over the next 20 years. Besides, what the report states is that every region is facing increasing climate changes in multiple ways (IPCC,

2021) and, according to the United Nations (UN) Secretary-General Antonio Guterres, it is a "red code for humanity" (United Nations, 2021). Accordingly, GHGs are the main drivers of climate change, and human activities are the unequivocal main cause, yet, we all still have the potential to determine the future course of climate (IPCC, 2021).

Many environmental issues have behavioral solutions with changes in energy technologies, personal and collective uses of resources, consumption habits, socio-economic systems, and even political changes. Individual behavior brings change when achieved by billions of people makes a decisive difference to solve environmental problems. Nevertheless, altering individual behavior toward environment is often challenging (Weber, 2015; Williamson et al., 2018).

When environmentally relevant behaviors reduce their negative impact on natural resources, they are defined as environmental behavior (Bonnes & Bonaiuto, 2002). Although environmental behavior is needed here and right now, the benefits of environmental behaviors are uncertain and will be enjoyed in the near future in many different geographical areas. The nature of environmental behavior makes it so complex that it goes far beyond rational processes (Weber, 2015). Accordingly, understanding the nature of environmental behavior has become an important topic of study for researchers and governments interested in building a pathway to a sustainable future and reversing the negative effects of climate change (Kostadinova, 2016).

1.2. Research gap

Although most people in developed nations accept the reality of climate change, developed countries' ecological footprint per capita is five times the one of developing nations (WWF, 2014). Most of the main countries polluting the environment are located in the European Union (SDSN & IEEP, 2020).

The largest contribution to GHGs emissions is mobility, heating, and nutritional habits. In summary, it come from the private-sphere environmental behavior (Carmichael, 2019).

Since the 1960s environmental research has aimed at understanding and identifying the factors underpinning environmental behavior, yet findings are not conclusive (Steg & De Groot, 2012). Despite many consumers being concerned about environmental issues, behavioral inconsistency constraints consumers from taking further action on environmental behaviors (Gupta & Ogden, 2006; Wiederhold & Martinez, 2018). Furthermore, by now, there has been little detailed and comprehensive research on European private-sphere environmental behaviors (Gross & Telesiene, 2017), although they are the main polluters. Consequently, there should be major behavioral research interest in exploring possible drivers and relationships to predict Europeans' environmental behavior in daily life more effectively. The lack of detailed studies on Europeans' environmental behavior refers to the first research gap.

The two sides of environmental behavior come from the abilities and motivations of individuals for behaving pro environmentally as well as cultural and social contexts that encourage or discourage consumers. These factors can be critical when introducing interventions and policies to increase the effectiveness of behavioral change efforts (Swim et al., 2011). However, most research to date has been conducted into individual-level drivers operating in a particular environmental context (Bamberg & Möser, 2007; Hines et al., 1987; Klöckner, 2013; Morren & Grinstein, 2016). Yet, country-level drivers are fundamental when we want to explain how the effect of individual-level drivers varies depending on their situational context (i.e., the country in which they live). Accordingly, the direct and the indirect influence (cross-level interactions) of the individual- and

contextual-level drivers on environmental behavior is also an important point to consider and indicates the second research gap.

Last but not least, "one size fits all" approach in examining environmental behaviors to bring about solutions regarding environmental problems is likely to be both unfair and useless as environmental behaviors are rooted in different cultural and societal contexts (Swim et al., 2011). Unfortunately, research has paid more attention to theoretical drivers of environmental behavior (Klöckner, 2013), but less to how the theoretical relationships varied across individuals and countries (Dolnicar & Grün, 2009; Morren & Grinstein, 2016). The literature review will reveal that no previous study has investigated the systematic differences and similarities across European countries and individuals towards the environment indicating the presence of the third research gap.

1.3. Research aim and research questions

In brief, addressing the research gaps given in Section 1.2., the purpose of this research is to identify the main individual- and country-level drivers that may affect Europeans' environmental behavior and to uncover the systematic heterogeneity among European countries regarding the environmental behavior of their residents. Hence, our main research questions are as follows:

1. To what extent can the socio-psychological drivers of environmental behavior explain the systematic heterogeneity among European behavior and are socially embedded at the personal and country levels?
2. To what extent do country-level drivers explain behavioral differences between Europeans, not only in terms of their mean behavior but also in the impact of country-level drivers on the relationship between attitudinal constructs and behavior?

3. To what extent do Europeans' environmental behavior systematically differ between European countries according to their socio-psychological environmental and country-level drivers?

These research questions are addressed in Chapter 2, 3, and 4.

1.4. Research Framework

All chapters share a common theoretical framework, the pro-environmental behavior theories, but is further developed according to the focus of each piece of research. For instance, Chapter 2 studies the extent to which the socio-psychological drivers of environmental behavior can explain the systematic heterogeneity among European behavior and are socially embedded at the personal and country levels. Consequently, the theoretical framework focused on socio-psychological environmental drivers and sociological environmental theories to explain how behavior depends on the individual agency and social structures. Chapter 3 reviews the extent to which country-level drivers explain behavioral differences between Europeans, so the attitude-behavior framework is further developed to include the context as an influence of behavior. Chapter 4 studies to what extent Europeans' environmental behavior systematically differs within and between European countries accordingly their socio-psychological environmental drivers and country-level drivers, so the theoretical focus changes from individuals to patterns of behaviors and patterns of institutional contexts.

Regarding the study one, Chapter 2, the theoretical framework is built on the theories that study individual-level drivers of environmental behaviors: the theory of planned behavior, TPB (Ajzen, 1985), the norm-activation model, NAM (Schwartz, 1977), and the value-belief-norm, VBN (P. C. Stern et al., 1999) theory. They refer to environmental behavior's rational, pro-social and moral

nature, respectively. TPB offers a rational framework proposing that perceived behavioral control, attitudes, and subjective norms are the factors that will have an influence on environmental behavior via intentions. In contrast, the NAM and VBN include awareness of consequences, the ascription of responsibilities, personal norms, values, beliefs components to draw attention to the pro-social perspective of environmental behavior.

The responsible environmental behavior theory (REB) (Hines et al., 1987) mixes NAM, VBN and TPB and offers researchers a comprehensive and more flexible theoretical framework. The REB model comes from the first meta-analysis of environmental behavior and agrees that socio-psychological factors affect behavior.

The socio-structural view of environmental behavior suggests that even though individual behavior is driven by people's internal psychological states, their agency, what they can do is constrained or facilitated by the social structures they live in. At the most immediate level, the social categories and social position an individual is localized in, are the first structures that influence their environmental behavior (Bourdieu, 1989; Giddens, 1986). Therefore, to examine the influence of individual-level drivers on behavior, we have to consider the psychological environmental drivers and the sociological environmental drivers.

Regarding the study reported in Chapter 3, the theoretical framework extends the socio-structural view one level up compared to the previous article. After uncovering that countries represent a social structure that influences environmental behavior, we extend the theoretical framework and introduce country-level environmental drivers that might explain individual differences in environmental behavior controlling for psychological and social environmental drivers. We extend the theoretical

framework to include the attitude-behavior-context (A-B-C) theory (Guagnano et al., 1995). The A-B-C theory proposes that economic, cultural, and social environmental drivers play an important role in translating attitudes into behaviors. Please, note that when we call attitude-behavior-context (conditions) theory, attitude refers to all socio-psychological drivers while context to all structural drivers (economy, culture, and social). We take out the "C" component and examine the main country structural according to the environmental behavior literature: socioeconomic development, ecological modernization, challenge-response model, and national culture (Diekmann & Franzen, 1999; Duroy, 2008; Gelissen, 2007; Inglehart, 1995; Milfont, 2012; Morren & Grinstein, 2016; Oreg & Katz-Gerro, 2006; Pisano & Lubell, 2017). The A-B-C model proposes that A-B theories may be directly or indirectly influenced by the environmental decision-making context (C) (Guagnano et al., 1995).

Regarding the last research question, in the third study, we expand our theoretical framework and focus not on individual behavior but on how groups of individuals systematically differ according to their patterns of attitude-behavior, and how countries systematically differ according to the patterns of behavior of their residents. We review the studies regarding systematic variations in the relationship between attitudes and behaviors and how they differ according to the social structures that they find in their countries (Liobikienė et al., 2016; Paço et al., 2013; Welch & Southerton, 2019). However, none of the articles reviewed so far has studied to what extent the attitude-behavior relationship may systematically differ in Europe.

1.5. Research Methods

This thesis undertakes quantitative analysis of data obtained by the Eurobarometer Special Survey series, in the 2017 survey "Attitudes of European citizens toward the environment", as the survey

designed to identify and describe consumers' positions on sustainability (European Commission and European Parliament, Brussels, 2018). Reported individual level environmental factors, social factors and environmental behaviors were captured. However, as the survey was not developed to collect data based on the attitude-behavior theory, we applied exploratory factor analysis (EFA) to uncover the interdependence among indicators to measure the theoretical drivers of pro-environmental behavior. Additionally, we used Harman's single-factor test to check whether common method variance was a threat to our findings' internal validity. In the first article, Chapter 2, the analysis was performed with a multilevel regression model that relates psychological and social environmental drivers with behavior, controlling for the country individuals live in.

In the second article, Chapter 3, to examine the influence of country-level drivers on behavior and attitude-behavior relationships, data retrieved from several secondary sources: World Bank, Human Development Report, Eurostat, Environmental Performance Index, Hofstede's cultural values index. Correlations between individual- and country-level dependent and independent variables had checked before analysis was done. The variance inflation factor for each independent variable was assessed. The multilevel regression model examines the influence of country-level drivers not only on the mean level of environmental behavior but also how country-level drives moderate the influence of psychological environmental drivers on behavior.

In the third article, Chapter 4, to analyze to what extent European residents and countries systematically differ in the attitude-behavior relationship we use a multilevel latent class regression model to simultaneously uncover the individuals' patterns of attitude-behavior relationships and the clustering of countries according to their residents patterns of environmental behavior.

Different statistical models, depending on the research question, were used to study the environmental behavior of Europeans. To understand individual- and country-level drivers' effect, together and separately, multilevel regression model was used and implemented in the R Environment and Language for Data Analysis (R Core Team, 2020) (Chapter 2 and Chapter 3). When studying the unobserved heterogeneity among Europeans, we model heterogeneity with a multilevel latent class regression implemented in LatentGOLD 4.0 statistical software (J. Vermunt & Magidson, 2005) (Chapter 4).

1.6. Outline of the Thesis

This dissertation is structured in five chapters. Following this introduction, Chapter 2 (study one) offers a comprehensive environmental model examining how social and socio-psychological environmental drivers influence environmental behavior bearing in mind that individuals live in different countries. Responsible Environmental Behavior (REB) theoretical framework used in and it draws on norm activation model (NAM), the value-belief-norm (VBN) theory, and theory of planned behavior (TPB). After assessing the effects of individual-level drivers and the role of countries in influencing the environmental behavior of Europeans, reported in Chapter 2, we focus on country-level drivers in Chapter 3.

Chapter 3 focuses on country-level drivers after a detailed literature review on environmental psychology and sociology. We explore the effects of country drivers on behavior after controlling for individual-level drivers using a multilevel regression model to estimate the impact of country-level drivers on both the mean behavior of individuals and on the effect of individual-level environmental drivers (cross-level interactions).

Based on the differences in the attitude-behavior relationships found in Chapter 3, Chapter 4 focuses on how and why attitude-behavior relationships may systematically differ within and across EU countries using a multilevel latent class regression model. Chapter 2, 3, and 4 are written in an article format, starting with the introduction, theoretical framework, research method (or design), presenting results, and finishing with a detailed discussion section and chapter conclusion. Chapter 2 has already been published at the *Sustainability* journal (DOI: 10.3390/su12104307), and Chapter 3 has already been published at the *Environmental Sociology* journal (DOI: 10.1080/23251042.2021.2018123). Finally, Chapter 5 presents a summary and discussion of previous chapters, contribution of this dissertation to the environmental behavior literature, implications, and limitations and suggestions for additional research to improve our understanding of environmental behavior further.

Chapter 2. A Comprehensive Model to Explain Europeans' Environmental Behaviors

2.1. Introduction

Since the 1960s environmental research has focused on environmental degradation and climate change due to human activity (Steg & De Groot, 2012), with environmental behavior coming to be one of the most widely studied topics in the socio-psychological literature (Clayton et al., 2016; Gkargkavouzi et al., 2019). Today, environmental pollution and pollutants originating from human activity—e.g., greenhouse gases (GHGs)—are at historically high levels and are a major influence on

recent climate changes, as evidenced by the increase in surface temperature due to CO2 emissions in the last 38 years (IPCC, 2014).

Climate change, GHGs, and energy use are strongly influenced by lifestyle, behavior, and culture (IPCC, 2014), associated with consumption of, including food, transport, clothing (Hertwich and Peters, 2009), especially in developed countries, whose consumption and lifestyle patterns are especially unsustainable (Reisch and Thøgersen, 2015). To control the negative impact of human activity, the United Nations General Assembly (Desa, 2016) announced 17 sustainable development goals (SDGs) to be achieved by 2030, as solutions to which both civil society and other stakeholders (government, business, etc.,) could contribute, e.g., by reducing and recycling waste and choosing sustainable products (SDG 12 and SDG 14), cycling, walking, and using public transport (SDG 11), and reducing resource consumption (SDG 5 and SDG 6) (Desa, 2016). Consumers, with their actions, undoubtedly influence the innovation path of products and services in many ways and so can help ameliorate current environmental problems.

In the European Union (EU), growing efforts to understand environment–human relationships have led to the development of the European Green Deal, a roadmap to tackle climate and environmental challenges facing the EU and its citizens. This initiative was launched by the European Commission under the assumption that citizens will be the driving force behind a transition to sustainability (Fetting, 2020). Environmental behavior reflects all human activity, since any behavior influences the environment in a positive or negative way (Krajhanzl, 2010). Pro-environmental behavior (Cottrell, 2003; Kollmuss & Agyeman, 2002), eco-friendly behavior (Minton, 1997), ecological behavior (Kaiser and Fuhrer, 2003), and responsible environmental behavior (Hayward, 1990) are theoretical

frameworks that assume that the "responsible environmental behavior" (REB) of citizens takes into account the environmental impact of individual actions (Krajhanzl, 2010; Kollmuss and Agyeman, 2002) as well as consumer endeavors to cultivate environmental awareness (Kurisu, 2015).

Pro-environmental behavior refers to several kinds of behaviors (Alisat and Riemer, 2015). Stern (2000) identified four types: environmental activism, non-activist behaviors in the public sphere, private sphere environmentalism, and other environmentally significant behaviors. Other researchers have developed an environmental action scale (Alisat and Riemer, 2015) or have studied citizens' environmental behavior in public and private contexts (Pisano and Lubell, 2017; Hadler and Haller, 2011). The per capita impact of food, housing, and mobility has also been studied (Gatersleben et al., 2002), as well as private-sphere environmental behaviors (Gkargkavouzi et al., 2019), such as recycling, eco-friendly purchases, car use (López-Mosquera et al., 2015), green consumption (Gilg et al., 2005; He et al., 2019), resource conservation, and recycling (Li et al., 2019).

While much research in psychology, sociology, education, and economics has focused on identifying and understanding the environmental factors underpinning REB in consumers (Hines et al., 1987; Bamber and Möser, 2007; Klöckner, 2013), findings are not conclusive. In this research, we are interested in how socio-psychological environmental factors (Hines et al., 1987; Bamber and Möser, 2007) influence the environmental behavior of Europeans—bearing in mind the different countries—in three specific areas: eco-friendly purchases, public transport use, and reduced resource consumption. In particular, we want to disentangle (1) to what extent the REB theoretical framework explains environmental behaviors in the EU given that Europeans live in different social, political, and economic contexts/countries, (2) to what extent social factors moderate the effects of REB theory

on Europeans' environmental behaviors, and (3) to what extent the situation factor (i.e., country) explains variations in Europeans' environmental behaviors.

2.2. Theoretical Framework

Sustainability, which requires "living within the regenerative capacity of the biosphere" (Wackernagel et al., 2002), aims at achieving a balance between the rates of depletion and renewal of resources in a particular system (Schultz, 2002). One critical barrier to a successful transition to sustainability is an irresponsible human lifestyle. Humans, through overconsumption and overproduction, are contributing to global environmental threats such as climate change, air/noise/marine/agricultural pollution, growing waste, species decline, etc. Environmental issues are related to irresponsible human behaviors that fail to consider the negative effects of actions. To achieve the SDGs, consumers need to take responsibility for the consequences of their environmentally harmful acts of buying and consuming products and producing waste (Clark, 2001). However, in order to configure a pathway to a sustainable future we need to better understand the nature of REB (Kostadinova, 2016; McKenzie-Mohr et al., 1995). REB refers to consumer behavior that both considers the impact of consumer actions on the environment and cultivates environmental awareness (Kurisu, 2015). REB is also labeled in other ways, depending on the origins of the research: pro-environmental behavior (Cottrell, 2003; Kollmuss and Agyeman, 2002), environmentally friendly behavior (Minton, 1997), or ecological behavior (Kaiser and Fuhrer, 2003). REB theory aims to explain the determinants of an individual's actions that directly or indirectly impact the environment (Jensen, 2002); it therefore covers not only eco-friendly purchases (He et al., 2019), but also in-home routines and recycling behaviors that improve sustainability (Stern, 2000; Gilg et al.,

2005; Curtin and Jia, 2020) , support for environmental activism, including lobbying (Hayward, 1990; Curtin and Jia, 2020), and reduced energy consumption (Abrahamse and Steg, 2009). In summary, the REB theoretical framework aims to explain the determinants of individuals' behaviors that lead to a mitigation of negative impacts on the environment in various ways (Kollmuss and Agyeman, 2002). Our goal is to identify the main environmental factors that influence REB in a European context, thereby introducing a comparative setting in which to test the factors that influence REB.

2.2.1. The Responsible Environmental Behavior Theoretical Framework

Early studies have reported a weak relationship between environmental attitudes and behaviors (Weigel et al., 1974). However, human behavior is complex and environmental attitudes are not the only factor affecting environmental behaviors (Hines et al., 1987; Ajzen, 1985). There was little understanding as to which factors were most related to REB (Li et al., 2019) until a first meta-analysis, conducted by Hines et al. (1987) in 1987, found that socio-psychological factors and situational factors were related to environmental behaviors. While situational factors had a direct effect on REB, socio-psychological factors affected behavior through intentions. Even though that model is quite dated (Hsu and Roth, 1998; Thielking and Moore, 2001), scholars continue to work on improving its explanatory capacity (Cottrell, 2003; He et al., 2019).

The theoretical REB framework (Hines et al., 1987; Bamberg and Möser, 2007) draws on Schwartz's norm activation model (NAM) (Schwartz, 1977), the value-belief-norm (VBN) theory (Stern et al., 1999), and Ajzen's theory of planned behavior (TPB) (Ajzen, 1985). The NAM explains individuals' behaviors based on altruistic motives, the VBN theory relates behaviors to moral norms, while the TPB aims to understand factors that influence intentions to behave in particular ways for reasons of

self-interest. The theoretical REB framework thus blends altruistic motives and moral norms (i.e., NAM and VBN) with a rational choice model (i.e., TPB) (Turaga et al., 2010).

The TPB is the most extensively used social cognitive model for predicting individuals' environmental behavior. It is an extension of the theory of reasoned action (TRA) (Ajzen and Fishbein, 1977), which explains observed differences between intentions and behavior. According to the TRA, predicted behavior depends on intention, and intention is determined by an attitude toward a behavior and by social norms. TRA and TPB models conceptualize attitudes toward behavior as an individual's favorable or unfavorable evaluation of a particular behavior and conceptualize subjective (social) norms as individuals' perceptions of social pressures to comply, or not comply, with a particular behavior. TRA assumes that all behaviors are under volitional control; if one has the intention, then the behavior will follow. However, intention is provisional and merely predicts a person's attempt to act, i.e., not necessarily an actual behavior. Unfortunately, not all consumers' behaviors are under volitional control (e.g., well-established habits), so TPB was developed as an extension of the TRA model to take into account individuals' volitional control (perceived behavioral control). According to Ajzen (Ajzen, 1985; 2005), actual behavior is not only a function of intention, but also of an individual's knowledge and ability to behave in a particular way and of their interaction with the context.

Not all behaviors are egotistical, so the theoretical REB model considers the NAM (Schwartz, 1977) and VBN (Stern et al., 1999) as additional building blocks to explain consumers' pro-social behaviors. The NAM explains the feeling of moral obligation generated when an individual's perceptions of another's needs activate an internal structure of values and norms (Schwartz, 1977). In relation to

environmental problems affecting not only current but also future generations, the REB theory predicts that environmental problems will activate personal norms among pro-social consumers. Social norms are strictly related to feelings of guilt regarding behaviors generally agreed to be moral (Davies et al., 2002). Personal norms are expectations about oneself, while social norms are expectations about the group (Morris et al., 2015). Personal norms, as a psychological construct, are distinguished from "awareness of consequences" and "ascription of responsibilities," as the former is represented by knowledge of the interdependence of outcomes related to environmental problems, while the latter—a feeling of moral obligation regarding our actions (Schwartz, 1977)—refers to internalizing the external consequences of our environmental behaviors. The VBN framework proposes that an individual's values, beliefs, and norms influence their environmental behaviors and intentions. Stern et al. (1999) have found that VBN factors explain between 19% and 35% of variance in pro-environmental behaviors. Twenty years after Hines et al.'s first meta-analysis of environmental behaviors (Hines et al., 1987), Bamberg and Möser (2007) found, in their meta-analysis, that factors from the TPB and the NAM explain 27% of variance in pro-environmental behaviors. A more recent meta-analysis by Klöckner (2013) in 2013 found that, as a theoretical framework, 39% of studies used the TPB, 15% used the NAM, 15% used the VBN theory, and the rest combined variables from at least two theories. Morren and Grinstein (2016) used the TPB framework as well as situational factors in their meta-analysis of 2016 to test the moderating role of national culture, reporting that the influence of behavioral control on the intention to behave pro-environmentally was stronger in more developed countries.

Other scholars have used more comprehensive models to explain environmental behaviors, Gkargkavouzi et al. (2019) used self-identity and habits as well as both TPB and VBN factors, finding that self-identity and habits were better predictors than the original TPB and VBN factors. Hadler and Haller (2011) found that environmental knowledge is also an important influence on environmental behavior, supporting the proposition that cognitive factors play a role in environmental behaviors. Recent research has found that attitudes, knowledge, and opinions regarding the environment affect Europeans' environmental behaviors (Pisano and Lubell, 2017; Pirani and Secondi, 2011). In addition to these environment-related factors, research has also found that social indicators, institutional factors, economic factors, social and cultural factors, awareness, emotion, and political orientation may influence environmental behaviors. All this would suggest that a comprehensive theoretical framework for studying environmental behaviors may be so complex that researchers would have to select the environmental factors they want to study in a simplified model that considers all other factors as given (Li et al., 2019).

Our aim is to study the effect of environmental attitudes, attitudes toward environmental behaviors, environmental knowledge, subjective environmental norms, perceived behavioral control, and a set of moderators of these environmental factors, considering the contexts in which different Europeans live. These environmental factors and the associated hypotheses (H1 to H9) are described in what follows.

2.2.2. Socio-Psychological Factors

Cognitive factors refer to knowledge of environmental problems and their consequences but also to knowing how to handle those environmental problems (actions, skills, and knowledge about the

strategy). Individuals with greater knowledge of environmental problems and knowledge of how to handle them are more likely to undertake REB (Hayward, 1990; He et al., 2019; Hines et al., 1987; Hungerford and Volk, 1990). Thus, before they can develop pro-environmental behaviors, individuals need to be aware of environmental problems and of how to tackle them (Hines et al., 1987; Jensen, 2002). If consumers do not have accurate or enough knowledge of the consequences of a particular behavior, they will not be concerned about that behavior (Kurisu, 2015).

Hypothesis 1 (H1): Environmental knowledge is positively correlated with REB.

Attitudes deal with an individual's favorable or unfavorable feelings toward particular aspects of the environment or objects related to the environment (Hines et al., 1987). According to Kurisu (2015), attitudes can be split into two components: environmental attitudes, and attitudes toward environmental behaviors. The former refers to an individual's concerns about environmental problems (Kurisu, 2015), whereas the latter refers to the individual's attitudes toward a particular environmental objective. Perceived behavioral control refers to an individual's perceptions of whether or not they can bring about environmental change through their behavior (Hines et al., 1987). Finally, subjective environmental norms represent environmental values and attitudes of significance to others. We expect others to act morally and they, in turn, expect us to behave in the same way (Davies et al., 2002).

Hypothesis 2 (H2): Environmental attitudes are positively correlated with REB.

Hypothesis 3 (H3): Attitudes toward environmental behaviors are positively correlated with REB.

Hypothesis 4 (H4): Perceived behavioral control is positively correlated with REB.

Hypothesis 5 (H5): Subjective environmental norms are positively correlated with REB.

2.2.3. Social Moderators

Social factors refer to an individual's resources and social categories that may moderate the influence of environmental factors on their behavior. Individuals' social categories consider not only the individual's social position but also age (younger/older) and gender (men/women). The relationship between social factors (age, gender, income, and education) and REB is less significant than the relationship between psychological factors and REB (Hines et al., 1987). According to Ajzen (1985; 2005), social indicators are only of interest if they moderate the effect of socio-psychological factors; accordingly, to examine the moderating effect of social factors on environmental knowledge, environmental attitudes, and perceived behavioral control, we consider age, gender, education, and income as social indicators.

Age. Hines et al. (1987) showed that younger people are more likely to engage in REB than older people, with most studies consistently showing that younger people are more concerned about environmental problems than older people (Cottrell, 2003; Arcury and Christianson, 1990; Liere and Dunlap, 1980; Samdahl and Robertson, 1989; Dietz et al., 1998), but these relationships may vary according to cultural differences (Krettenauer et al., 2019). Younger people are also more likely to have more knowledge of environmental issues than older people (Gendall et al., 1995).

Hypothesis 6a (H6a): The effect of environmental attitudes on REB will be stronger for younger individuals.

Hypothesis 6b (H6b): The effect of environmental knowledge on REB will be stronger for younger individuals.

Gender. Many studies have shown that women are more likely to behave in an environmentally friendly way than men (Barr, 2003; Diamantopoulos et al., 2003; Lee et al., 2013; Mainieri et al., 1997; Olli et al., 2001) and that they have stronger environmental attitudes than men (Arcury and Christianson, 1990; Diamantopoulos et al., 2003; Gilg et al., 2005; Mainieri et al., 1997; Mohai, 1992; Schahn and Holzer, 1990; Stern et al., 1993; Zelezny et al., 2000; Arcury et al., 1987), while other studies show that men may have more knowledge of environmental problems (Gendall et al., 1995; Schahn and Holzer, 1990; Arcury et al., 1987; Mostafa, 2007) than women.

Hypothesis 7a (H7a): The effect of environmental attitudes on REB will be stronger for women.

Hypothesis 7b (H7b): The effect of environmental knowledge on REB will be stronger for men.

Education. Although the evidence suggests that better-educated individuals are more likely to engage in environmentally friendly behaviors, the relationship between education and REB has been reported to be weak (Gatersleben et al., 2002; Hines et al., 1987; Scott and Willits, 1991). Better-educated individuals, nonetheless, show more positive attitudes toward the environment (Diamantopoulos, 2003) and are more likely to have better sources of information, and in consequence, are likely to have better knowledge of environmental problems (Kollmuss and Agyeman, 2002; Liere and Dunlap, 1980; Gendall et al., 1995; Diamantopoulos, 2003; Zsóka et al., 2013; Ostman and Parker, 1987).

Hypothesis 8a (H8a): The effect of environmental attitudes on REB will be stronger for better-educated individuals.

Hypothesis 8b (H8b): The effect of environmental knowledge on REB will be stronger for better-educated individuals.

Income. Economic factors have a strong influence on people's decision-making processes Kollmuss and Agyeman, 2002). However, the relationship between income and REB seems weaker than the relationship between education and REB (Hines et al., 1987). Individuals who have higher incomes are more likely to engage in environmentally friendly behaviors (Scott and Willits, 1991) and to have positive environmental attitudes, as a higher income gives consumers more freedom to develop pro-environmental behaviors (He et al., 2019). Some consumers may not be able to afford particular behaviors if primary needs such as adequate food, etc., are not met (Liere and Dunlap, 1980). Consumers who have higher incomes (Scott and Willits, 1991) and a privileged social position develop stronger and more positive attitudes toward the environment (Gilg et al., 2005; Gifford and Nilsson, 2014; Liere and Dunlap, 1980).

Hypothesis 9a (H9a): The effect of environmental attitudes on REB will be stronger for individuals with higher incomes.

Hypothesis 9b (H9b): The effect of perceived behavioral control on REB will be stronger for individuals with higher incomes.

2.2.4. Situational Factors

According to Hines et al. (1987), situational factors refer to "economic constraints, social pressures, opportunities to choose different actions." Situational factors can positively or negatively affect the behavior of individuals. Note that, although Hines et al. (1987), acknowledged the direct effect of situational factors, they did not provide clear evidence of or explanations for situational factors. Stern (2000) defines external or contextual forces, such as the available technology, laws and regulations, supportive policies, etc., as having a major causal influence on environmental behaviors.

As a situational factor, we examine the country effect, i.e., the impact of residence in differing EU countries. Comparative sustainability studies of ethical consumerism, green consumerism, and environmental behaviors have explored differences in economic development (Ali and Shahzad, 2011; Mufidah et al., 2018) or in individualist/collectivist values (Soyez, 2012) to explain the impact of situational factors on REB (Kollmuss and Agyeman, 2002; Gooch, 1995; Oreg and Katz-Gerro, 2006). Among other factors, country differences in individuals' REB may arise from differences in environmental policies or economic development, or from social and cultural specificities (Oreg and Katz-Gerro, 2006; Bornstein et al., 2005; Miller, 1993; Beaton and Perera, 2012; BIO Intelligence Service, 2012). In this research, we explored country differences in the average behavior of individuals once we took into account their environmental attitudes, environmental knowledge, perceived behavioral control, and subjective environmental norms.

Once we take into account the main effect of the environmental factors—i.e., environmental knowledge, environmental attitudes, attitudes toward environmental behaviors, perceived behavioral control, subjective environmental norms—and the moderating effect of social factors—i.e., age, gender, education and income—on individuals' environmental behaviors, we can expect those behaviors to differ between the 28 EU member states (EU-28) due to situational factors. The corresponding conceptual model and hypotheses is shown in Figure 2.1.

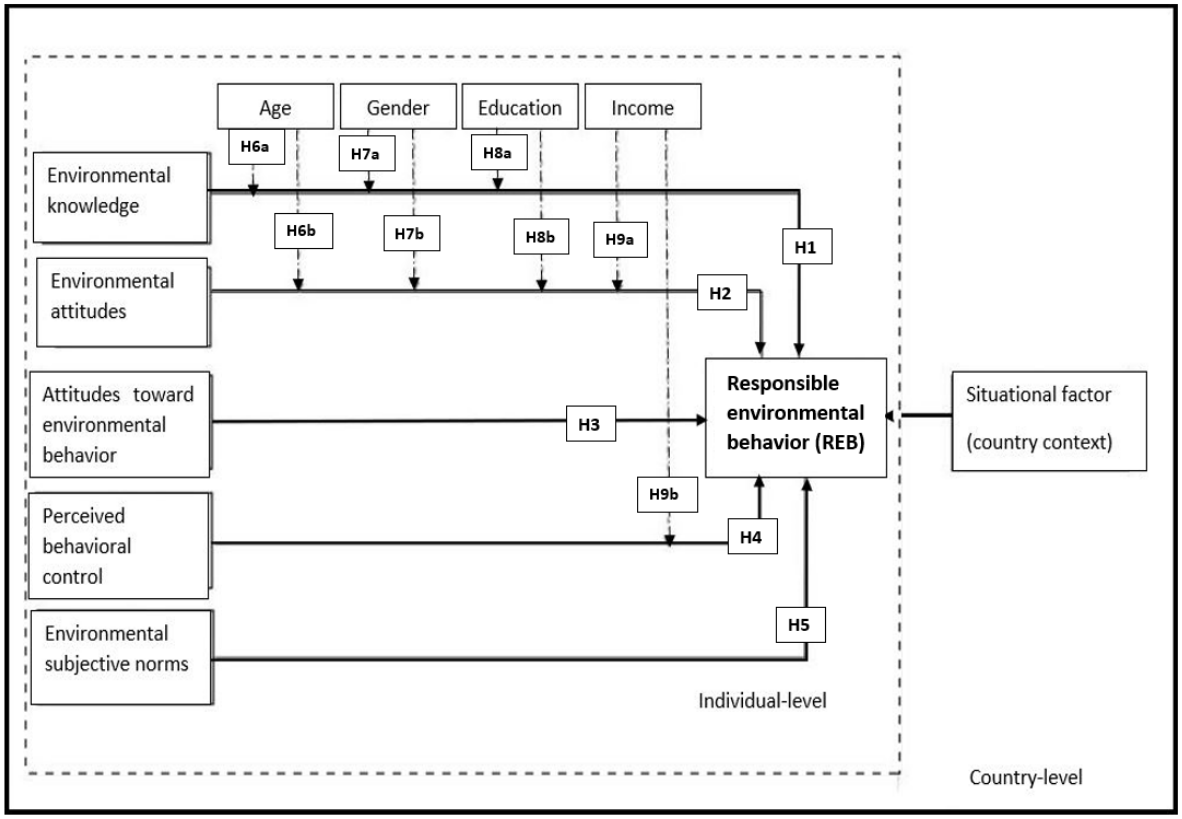

Figure 2.1. Conceptual model

2.3. Research Method

Data were retrieved from Special Eurobarometer 468 (Wave EB88.1) on "Attitudes of European citizens toward the environment" (European Commission and European Parliament, Brussels, 2018). This survey, one of the latest conducted for the EU, is designed to identify and describe consumers' positions on sustainable development. A total of 27,881 respondents from the EU-28 were surveyed between 23 September and 2 October 2017 (European Commission and European Parliament, Brussels, 2018).

2.3.1. Independent Variables

Five independent variables were measured as follows (Table 2.1): environmental knowledge, attitudes split into general environmental attitudes and attitudes toward environmental behaviors

(according to Kurisu (2015), the latter attitudes may be more influential than general environmental attitudes), perceived behavioral control, and subjective environmental norms.

Environmental knowledge. Even though the survey does not provide a measure of Europeans' knowledge of environmental problems, it does offer a battery of questions about the sources of information Europeans use to obtain information on the environment. The survey records three main sources of environmental information among a broad set of alternatives. We assumed that the more sources of information used by Europeans, the better their knowledge. Responses were added up to create a scale of knowledge scored from 0 to 3.

Environmental attitudes. We measured environmental attitudes from the battery of questions regarding Europeans' worries about environmental problems (Hayward, 1990; Kurisu, 2015).

Attitudes toward environmental behaviors. We measured attitudes toward environmental behavior from a set of questions related to Europeans' attitudes toward governmental behaviors regarding environmental issues.

Perceived behavioral control. We measured perceived behavioral control through two questions, one asking about individual roles in protecting the environment, and the other asked about making polluters responsible for damaging the environment. The latter is related to perceived behavioral control because it refers to the fact that individuals can bring about change through their behavior and so should be made responsible for not caring for their environment.

Subjective environmental norms. We measured these as normative statements about what should be done to solve environmental problems (similar to Kurisu's (2015) subjective norms). These questions

are reflected in a battery of questions related to the individual's subjective norms about the environmental expectations of others.

Table 2.1. Main constructs of the responsible environmental behavior (REB) model

Theoretical constructs	Items selected as indicators
Environmental knowledge	QD3.1. National newspapers QD3.2. Regional or local newspapers QD3.3. Magazines QD3.4. Television news QD3.5. The radio QD3.6. Films and documentaries on television QD3.7. Family, friends, neighbors or colleagues QD3.8. Books or scientific publications QD3.9. Brochures or information materials QD3.10. Events (conferences, fairs, exhibitions, festivals, etc.) QD3.11. Museums, national parks or regional parks QD3.12. Online social networks QD3.13. The Internet (other websites, blogs, forums, etc.)
Environmental attitudes	QD5.3. Environmental issues have a direct effect on your daily life. QD5.4. You are worried about the impact on your health of everyday products made of plastic. QD5.5. You are worried about the impact on the environment of everyday products made of plastic. QD5.6. You are worried about the impact on your health of chemicals present in everyday products. QD5.7. You are worried about the impact on the environment of chemicals present in everyday products.
Attitudes toward environmental behaviors	QD9.1. EU environmental legislation is necessary to protect the environment in (our country). QD9.2. The EU should be able to check that EU environmental laws are being applied correctly in (country). QD9.3. The EU should assist non-EU countries to improve their environmental standards.
Perceived behavioral control	QD5.1. As an individual, you can play a role in protecting the environment in (country). QD5.2. The big polluters should be mainly responsible for making good the environmental damage they cause.
Subjective environmental norms	QD15.1. Local authorities should provide more and better collection facilities for plastic waste. QD15.2. People should be educated on how to reduce their plastic waste. QD15.4. Industry and retailers should make an effort to reduce plastic packaging. QD15.5. Products should be designed in a way that facilities the recycling of plastic.

The indicators for environmental attitudes, attitudes toward environmental behaviors, perceived behavioral control, and subjective environmental norms, measured on semantic Likert scales (strongly disagree, tend to disagree, tend to agree, totally agree, don't know) were transformed into numeric measures ranging from 1 (strongly disagree) to 4 (strongly agree), while "don't know" was

coded as a missing value ("N-miss" in the tables below). As mentioned above, for environmental knowledge, responses were scored on a scale from 0 to 3.

2.3.2. Dependent Variables

The dependent variable REB (Table 2.2) was measured from two batteries of questions that asked respondents whether or not they complied with certain environmental behavior. These questions included 15 indicators reflecting a wide variety of contexts measured as 15 dummy indicators. We expected this set of indicators to intercorrelate to form different measures of environmental behavior. We conducted exploratory factor analysis (EFA) to uncover how the indicators clustered together and to judge whether they could be interpreted as particular environmental behaviors.

Table 2.2. Responsible environmental behavior (REB)

Dependent variables	Items
Responsible environmental behavior (REB)	QD4.1. Choosing more environmentally friendly travel (walking, biking, public transport) QD4.2. Avoiding buying overpackaged products QD4.3. Avoiding single-use plastic goods other than plastic bags or bought reusable plastic products QD4.4. Separating most waste for recycling QD4.5. Cutting down on water consumption QD4.6. Cutting down on energy consumption (turning down air conditioning or heating, not leaving appliances on stand-by, buying energy-efficient appliances) QD4.7. Buying products marked with an environmental label QD4.8. Buying local products QD4.9. Using your car less by avoiding unnecessary trips QD19.1. Changing home heating system from a higher-emission (coal, oil or wood) to lower-emission (natural gas, pellet, electricity, solar, etc.) system QD19.2. Replacing older energy-intensive equipment (hotwater boiler, oven, dishwasher, etc.) with more energy efficient equipment (e.g., labelled A+++) QD19.3. Frequently using public transport or bike or walking instead of using a car QD19.4. Buying an electric vehicle (car, motorbike, bike) QD19.5. Buying a low-emission vehicle (e.g., hybrid car) QD19.6. Buying low-emission products to fuel open fire or barbecue (e.g., briquettes instead of coal)

2.3.3. Moderating and Control Variables

The Special Eurobarometer 468 survey covers social indicators such as age, gender, education, income (moderating variables), and community type and household size (control variables). We chose

age and gender as social categories and education and income as resources that moderate the effect of the REB theoretical constructs (socio-psychological factors) on environmental behaviors. To control for age's non-linear effects, age was treated as a categorical indicator with the four levels reported in the Special Eurobarometer 468 survey. Gender was measured as a categorical variable (man/woman). Education level was measured by age when full-time education terminated (as an approximate approach, given that, for instance, some students may finish at the same level despite having different ages). The Special Eurobarometer 468 survey does not directly ask about income, but provides a proxy, as respondents are asked about the frequency of difficulties in paying their bills, a proxy that, while not perfect, can be taken as an approximate indication of income. Household size (Gatersleben et al., 2002; Poortinga et al., 2004)—between 1 and 4—and community type (Bornstein et al., 2005; Dietz et al., 1998; Hsu and Roth, 1998; Liere and Dunlap, 1980)—rural/village to large towns—were the control variables. Although associated with REB, household size and community type were not under investigation in our study. Moderating variables and control variables are shown in Table 2.3. Finally, the situational factor was measured as the EU-28 country in which the European lived.

Table 2.3. Moderating and control variables

Group of variables.	Social indicators	Characteristics	N (Overall = 27,881)	Percentage (%)
Moderating variables	D11r1. Age	15–24 years	2347	8.4
		25–39 years	5791	20.8
		40–54 years	6719	24.1
		55 years and older	13,024	46.7
		N-miss	-	-
	D10. Gender	Man	12,495	44.8
		Woman	15,386	55.2
		N-miss	-	-
	D8. Age education terminated	Mean (SD)	19.639 (5.295)	
		Range	2–71	
		N-miss	728	
	D60. Difficulties to pay bills	Most of the time	2618	9.6
		From time to time	6983	25.5
		Never	17,770	64.9

		N-miss	510	-
Control variables	D25. Community type	Rural/village	8964	32.2
		Small/medium town	11,348	40.7
		Large town	7552	27.1
		N-miss	17	-
	D40R. Household size	One	6406	23.0
		Two	10,127	36.3
		Three	4630	16.6
		Four or more	6716	24.1
		N-miss	2	-

2.3.4. Analysis

As the survey was not developed to collect data about particular theoretical scales of environmental factors and sustainable behaviors (as has been done to measure REB theoretical constructs), we created groups of indicators of environmental factors and behaviors, then conducted EFA to obtain evidence on the discriminant validity of those groups (Wood et al., 2015), so as to reduce the number of indicators to a few environmental factors and behaviors related to the theoretical framework. We tested for evidence of common method variance (Tehseen et al., 2017), since behaviors and environmental factor indicators were provided by the same data source. We conducted Harman's single-factor test (see Table 2 in the Supplementary Appendix) and examined cross-loadings and correlations among behaviors and environmental factors. The first and last tests did not provide any evidence of common method variance. The examination of cross-loadings for the public transport use factor produced the expected results, and for the eco-friendly purchases and reduced resource consumption variables, the behavioral indicators never loaded on the environmental factors.

We adopted a multilevel modeling strategy (Finch et al., 2019; Gelman and Hill, 2007) to relate environmental factors and their social moderators to several environmental behaviors, considering that individuals were naturally clustered in countries with different country-specific living conditions. We were interested in separating out the effect of the individual's environmental factors and social moderators from the effect of living in a particular country on expected behavior. Traditional linear

modeling and structural equation modeling (SEM) do not account for the clustering of individuals in countries when all observations are pooled together. In contrast, multilevel models are a good compromise between pooling and not pooling naturally clustered observations.

2.4. Results

2.4.1. Measuring Psychological Factors

The aim of the EFA was to identify suitable REB constructs to test the REB model for Europe, thereby reducing the original set of indicators to a few factors related to the theoretical constructs. The original set of indicators was then replaced with the set of theoretical constructs formed from the factor scores. The idea was to judge whether the EFA could discriminate among the theoretical constructs obtained from the set of indicators. Principal component analysis (PCA), one of the most commonly used procedures in EFA (Williams et al., 2010), was used to identify the factor structure for the set of indicators and factor scores (Hair et al., 1998). In using PCA to extract the factors, we were aware that we were treating the factors as scales formed by the indicators (formative scales according to partial least squares terminology), not as indicators as observed manifestations of the theoretical constructs (reflective scales).

To judge the suitability of the indicators for EFA, we first checked the normality of the data by plotting a histogram and fitting a normal curve to all the indicators. We then conducted a test of skewness and kurtosis (see Table 1 in the Supplementary Appendix). The non-significant z-statistics for skewness and kurtosis for most indicators suggested that the normality assumption was appropriate for most of the indicator variables (Hair et al., 1998; Hammer and Landau, 1981; Kim, 2013). We next checked suitability for factor analysis (Williams et al., 2010) by confirming

correlation in a correlation matrix and by calculating the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test. Correlation was at least 0.3 for all items, the KMO test was 0.87 and Bartlett's test was $p < 0.001$.

We extracted the factors using PCA and the psycho package implemented in the R Environment and Language for Data Analysis (Makowski, 2018). We used the scree test to determine the number of factors to retain (see Figure 1 in the Supplementary Appendix). The EFA with varimax rotation produced four factors that discriminated among the four socio-psychological environmental factors of interest. Since correlation among factors was below 0.32 when using the oblimin rotation, there was no need to treat the factors as correlated (Tabachnick et al., 2013). For the first four components (factors), the cumulative percentage of variance was 65%. Note that the percentage of explained variance needs to be judged according to the research context, and, in social sciences and humanities, this percentage can be as low as 50–60% (Williams et al., 2010). Before interpreting the factors, we rotated the factor matrix using the varimax procedure (Hair et al., 1998).

Table 2.4 reports the four-factor matrix structure that can be interpreted in terms of environmental attitudes, subjective environmental norms, attitudes toward environmental behaviors, and perceived behavioral control. All loadings were higher than 0.5, so we can assume that the solution discriminates among the four theoretical constructs.

Table 2.4. Exploratory factor analysis for the main constructs of the responsible environmental behavior (REB) model with varimax rotation (extraction method: principal component analysis)

Items	Factor loadings			
	(1) Environmental attitudes	**(2) Subjective environmental norms**	**(3) Attitudes toward environmental behaviors**	**(4) Perceived behavioral control**
QD5.4. You are worried about the impact on your health of everyday products made of plastic.	0.83	-	-	-
QD5.6. You are worried about the impact on your health of chemicals present in everyday products.	0.82	-	-	-
QD5.7. You are worried about the impact on the environment of chemicals present in everyday products.	0.75	-	-	-
QD5.3. Environmental issues have a direct effect on your daily life.	0.74	-	-	-
QD5.5. You are worried about the impact on the environment of everyday products made of plastic.	0.71	-	-	-
QD15.1. Local authorities should provide more and better collection facilities for plastic waste.	-	0.77	-	-
QD15.2. People should be educated on how to reduce their plastic waste.	-	0.74	-	-
QD15.5. Products should be designed in a way that facilitates the recycling of plastic.	-	0.70	-	-
QD15.4. Industry and retailers should make an effort to reduce plastic packaging.	-	0.68	-	-
QD9.2. The EU should be able to check that EU environmental laws are being applied correctly in (country).	-	-	0.84	-
QD9.1. EU environmental legislation is necessary to protect the environment in (country).	-	-	0.84	-
QD9.3. The EU should assist non-EU countries to improve their environmental standards.	-	-	0.70	-
QD5.2. The big polluters should be mainly responsible for making good the environmental damage they cause.	-	-	-	0.72
QD5.1. As an individual, you can play a role in protecting the environment in (country).	-	-	-	0.59

To examine construct validity, we examined the standardized factor loadings of the EFA and the construct reliabilities of the theoretical constructs. Cronbach's alpha was above 0.7 (Cortina, 1993) for environmental attitudes ($\alpha = 0.87$), subjective environmental norms ($\alpha = 0.78$) and attitudes toward environmental behaviors ($\alpha = 0.76$), but was below 0.7 for perceived behavioral control ($\alpha = 0.43$). The reason for the low Cronbach's alpha seems to be the small number of items in the factor: while we only had two items (derived from the Eurobarometer survey) to measure perceived behavioral control, it has been suggested that the minimum number of items should be three (Cortina, 1993; Streiner, 2003; Tavakol and Dennick, 2011). Overall, the construct validity of the instrument can be judged acceptable, considering that the indicators come from a general survey.

2.4.2. Measuring European Environmental Behavior

For our aim of discriminating among classes of behavior, we wanted to reduce the original set of indicators to a few factors that could be interpreted as particular environmental behaviors. We replaced the original set of indicators with a set of behaviors formed with the factor scores, again using PCA and varimax rotation to identify the structure (Hair et al., 1998) and again checking the assumptions. The KMO and Bartlett's test values (0.79 and $p < 0.001$, respectively) were found to be significant, indicating the factor test to be suitable.

In interpreting the factor structure, we deleted three items with factor loadings lower than 0.5 (QD4.4, QD19.1, and QD19.6 in Table 2.2). The remaining 12 items were grouped into four factors (Table 2.5).

Table 2.5. Factor matrix structure for responsible environmental behavior (REB) with varimax rotation

(extraction method: principal component analysis)

Items	Factor loadings			
	(1) Public transport use	**(2) Eco-friendly purchasing**	**(3) Reduced resource consumption**	**(4) Eco-car purchase**
QD19.3. Frequently using public transport or biking or walking instead of using a car	0.81	-	-	-
QD4.1. Choosing more environmentally friendly travel (walking, biking, public transport)	0.76	-	-	-
QD4.9. Using your car less by avoiding unnecessary trips	0.56	-	-	-
QD4.2. Avoided buying overpackaged products	-	0.64	-	-
QD4.8. Buying local products	-	0.63	-	-
QD4.7. Buying products marked with an environmental label	-	0.63	-	-
QD4.3. Avoiding single-use plastic goods other than plastic bags or bought reusable plastic products	-	0.54	-	-
QD4.5. Cutting down on water consumption	-	-	0.72	-
QD4.6. Cutting down on energy consumption (turning down air conditioning or heating, not leaving appliances on stand-by, buying energy-efficient appliances)	-	-	0.70	-
QD19.2. Replacing older energy-intensive equipment (hotwater boiler, oven, dishwasher, etc.,) with more energy efficient equipment (e.g., labelled A+++)	-	-	0.54	-
QD19.5. Buying a low-emission vehicle (e.g., hybrid car)	-	-	-	0.73
QD19.4. Buying an electric vehicle (car, motorbike, bike)	-	-	-	0.72

The first four factors explained 49% of the variance. According to Kurisu's (2015) detailed classification of 200 pro-environmental behavior items summarized from governmental and academic studies, those factors were labelled as follows: public transport use, eco-friendly purchasing, reduced resource consumption and, finally, eco-car purchase. However, since we decided to take into consideration only behaviors that could be repeated frequently, as has been proposed in previous research (Kurisu, 2015), eco-car purchase was excluded as not being a routine activity.

2.4.3. Hypothesis Testing

To test our hypotheses taking into account the contexts in which Europeans live, we used multilevel regression analysis, as this kind of modeling allows inferences to be made regarding the source of

variation in the outcome measure (Bryer, 2014; Gelman and Hill, 2007; Plant, 2012). As mentioned, while REB is determined by socio-psychological factors at the individual level, we can also expect heterogeneity among EU countries: individuals are nested within nations and their environmental behaviors will not only be the result of social properties but also of contextual factors that they cannot control directly. To estimate the model, we used the lme4 package implemented in the R Environment and Language for Data Analysis (Bates, 2010).

Before implementing the analysis, we standardized the education moderating variable. Table 2.6 shows the results of the multilevel regression analysis conducted for the three behavioral factors, i.e., public transport use, eco-friendly purchasing and reduced resource consumption. We also tested multicollinearity—which measures the extent to which one variable can be explained by the other variables—by computing the variance inflation factor (VIF) for each of the regressors in Table 2.6, resulting in values for our regressors ranging from 1.005 to 1.4, below the usual threshold of 10 for VIF.

Table 2.6 reports test findings for four models (M0 to M3) for public transport use, eco-friendly purchasing, and reduced resource consumption. M0 refers to the null model that allows the constant term to vary by country; M1 includes only control variables (community type and household size); M2 includes theoretical constructs, i.e., environmental knowledge, socio-psychological factors (environmental attitudes, attitudes toward environmental behaviors, subjective environmental norms and perceived behavioral control), and the two control variables; and finally, M3 includes all the above variables plus the four social factors (age, gender, education, and income) as moderating variables. The variance explained by countries (random variation) and the intra-class correlation

(ICC) are shown in the random-effects section of Table 2.6. The intercepts and the coefficients of variables were considered as fixed (Gelman and Hill, 2007). To compare models we used the Analysis of Variance (ANOVA) test, reporting the results at the bottom of Table 2.6 along with model fit statistics (Akaike's information criterion, AIC, and Bayesian information criterion, BIC)

Table 2.6. Multilevel regression results

Environmental behaviors.	**Eco-friendly purchasing**				**Public transport use**				**Reduced resource consumption**			
Models	M0	M1	M2	M3	M0	M1	M2	M3	M0	M1	M2	M3
Predictors	Estimates (*p*)				Estimates (*p*)				Estimates (*p*)			
Intercept	0.04	–0.02	0	–0.28 ***	0.02	–.11 *	–.09	0.15 **	.06	–00.04	–0.03	–0.36 ***
Community type (small/middle)	-	–0.05 ***	–0.05 ***	–0.06 ***	-	0.11 ***	0.10 ***	0.10 ***	-	0.00	0.00	–0.00
Community type (large)	-	−0.03	–0.05 ***	–0.07 ***	-	0.31 ***	0.28 ***	0.26 ***	-	0.01	–0.01	–0.0.01
Household size (2)	-	0.11 ***	0.09 ***	0.09 ***	-	–.02	–0.04 *	–0.04 *	-	0.12 ***	0.10 ***	0.09 ***
Household size (3)	-	0.13 ***	0.09 ***	0.08 ***	-	0.00	–0.03	–0.06 **	-	0.13 ***	0.10 ***	0.13 ***
Household size (4, 4 +)	-	0.10 ***	0.06 **	0.05 *	-	0.02	–0.01	–0.05 *	-	0.12 ***	00.09 ***	0.13 ***
Environmental knowledge (EK)	-	-	0.15 ***	0.08 **	-	-	0.13 ***	0.24 ***	-	-	0.11 ***	0.05 *
Environmental attitude (EA)	-	-	0.13 ***	0.08 *	-	-	0.07 ***	0.06	-	-	0.10 ***	0.09 **
Attitudes toward environmental behaviors (ATEB)	-	-	0.05 ***	0.05 ***	-	-	0.06 ***	0.06 ***	-	-	0.04 ***	0.04 ***
Perceived behavioral control (PBC)	-	-	0.10 ***	0.03	-	-	0.07 ***	0.04	-	-	0.06 ***	0.07 **
Subjective environmental norms	-	-	0.10 ***	0.10 ***	-	-	0.04 ***	0.04 ***	-	-	0.07 ***	0.06 ***
Age: 25–39 years	-	-	-	0.12 ***	-	-	-	–0.25 ***	-	-	-	0.25 ***
Age: 40–54 years	-	-	-	0.14 ***	-	-	-	–0.30 ***	-	-	-	0.33 ***
Age: 55 years and older	-	-	-	0.11 ***	-	-	-	–0.29 ***	-	-	-	0.32 ***
EA * Age:25–39 years	-	-	-	–0.01	-	-	-	0.03	-	-	-	–0.00
EA * Age:40–54 years	-	-	-	–0.01	-	-	-	0.06 *	-	-	-	0.01
EA * Age:55 years and older	-	-	-	–0.01	-	-	-	0.06 *	-	-	-	0.01
EK * Age:25–39 years	-	-	-	0.04	-	-	-	–0.14 ***	-	-	-	0.06 *
EK * Age:40–54 years	-	-	-	0.05	-	-	-	–0.15 ***	-	-	-	.04
EK * Age:55 years and older	-	-	-	0.03	-	-	-	–0.14 ***	-	-	-	0.06 **
Gender (woman)	-	-	-	0.13 ***	-	-	-	0.05 ***	-	-	-	–.02
EA * Gender (woman)	-	-	-	0.02	-	-	-	–0.02	-	-	-	–0.01
EK * Gender (woman)	-	-	-	0.06 ***	-	-	-	0.02	-	-	-	0.01
Education	-	-	-	0.07 ***	-	-	-	0.05 ***	-	-	-	0.04 ***
EA * Education	-	-	-	0.01 *	-	-	-	–0.00	-	-	-	0.00
EK * Education	-	-	-	0.01	-	-	-	0.02 **	-	-	-	–0.00
Difficulties to pay bills (Df) (from time to time)	-	-	-	0.08 **	-	-	-	0.00	-	-	-	0.03
Difficulties to pay bills (Df) (never)	-	-	-	0.14 ***	-	-	-	0.02	-	-	-	0.07 **
EA * (Df) (from time to time)	-	-	-	0.01	-	-	-	–0.02	-	-	-	0.00
EA * (Df) (never)	-	-	-	0.05 *	-	-	-	–0.02	-	-	-	0.00
PBC * (Df) (from time to time)	-	-	-	0.04	-	-	-	0.03	-	-	-	–0.03
PBC * (Df) (never)	-	-	-	0.08 ***	-	-	-	0.03	-	-	-	–0.01
Random effects												
$\sigma 2$	0.93	0.93	0.86	0.85	0.98	0.97	0.93	0.92	0.99	0.99	0.95	0.94
τ_{00}	0.10	0.10	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.04	0.03	0.03
ICC	0.09	0.10	0.09	0.07	0.05	0.06	0.05	0.05	0.04	0.04	0.03	0.03

Marginal R^2	0	0.003	0.072	0.090	0	0.014	0.05	0.062	0	0.002	0.038	0.049
Conditional R^2	0.094	0.10	0.152	0.156	0.054	0.069	0.097	0.104	0.037	.040	0.071	0.081
Model fit statistics												
	M0	**M1**	**M2**	**M3**	**M0**	**M1**	**M2**	**M3**	**M0**	**M1**	**M2**	**M3**
AIC (Akaike's Information Criterion)	61,909	61,853	60178	59835	63111	62806	61991	61765	63322	63276	62465	62280
BIC (Bayesian Information Criterion)	61,933	61,917	60282	60107	63135	62870	62095	62037	63346	63340	62569	62553
Deviance	61,903	61,837	60152	59767	63105	62790	61965	61697	63316	63260	62439	62212
Chisq Chi		65.413	1685.719	384.793		315.25	824.48	268.25		55.873	821.000	226.931
Pr (>Chisq)		***	***	***		***	***	***		***	***	***
N (Observations): 28 countries (22346)												

Note: Significance codes: 0 < ** *< 0.001 < ** < 0.01 < * < 0.05. Social-psychological environmental factors are factor scores. Other numerical variables have been standardized, so all numerical variables have zero mean.

2.4.3.1. Findings for Eco-Friendly Purchasing

The null model (M0) explained 9% (ICC = 0.09) of the variance in Europeans' purchase of eco-friendly products. The conditional R2 in model M1 with controls (community type and household composition) rose from 0.094 to 0.010 (ΔRC2 = 0.006). After introducing the main theoretical constructs (environmental knowledge, environmental attitudes, attitudes toward environmental behaviors, perceived behavioral control, and subjective environmental norms) and controls into model M2, the conditional R2 rose from 0.010 to 0.152 (ΔRC2 = 0.052). The ANOVA test suggests that model M1 was better than the null model M0 and that model M2 was better than model M1. For model M3, which additionally included the moderating effects of age, gender, education, and income, the conditional R2 rose from 0.152 to 0.156. The ANOVA test suggests that model M3 was better than model M2.

Model M3 showed that, except for perceived behavioral control, all other main constructs were positively and significantly related to eco-friendly purchasing. The higher the values for environmental knowledge (β = 0.08), environmental attitudes (β = 0.08), attitudes toward environmental behaviors (β = 0.05), and subjective environmental norms (β = 0.10), the greater the likelihood of eco-friendly purchasing. Therefore, for eco-friendly purchasing, hypotheses H1, H2, H3, and H5 were supported, but not H4.

Among the moderating variables, age had no significant effect on eco-friendly purchasing, and, in consequence, H6a and H6b were not supported. Regarding gender, being female had a positive and significant moderating effect on environmental knowledge (β = 0.06) but no effect on environmental attitudes; accordingly, neither H7a nor H7b were supported. Education level had a positive and significant moderating effect only on the effect of environmental attitudes (β = 0.01) on behavior; in consequence, H8a found empirical support but not H8b. The income indicator had a positive and significant moderating effect on the effect of perceived behavioral control (β = 0.08) and environmental attitudes (β = 0.06), so H9a and H9b both found empirical support.

Figure 2.2 reports the predicted random effects by country for the eco-friendly purchasing in 95% prediction intervals. Considering individual-level variables, eco-friendly purchasing was highest in Sweden, Austria, Germany, and Finland, and lowest in Portugal, Poland, Spain, and Cyprus.

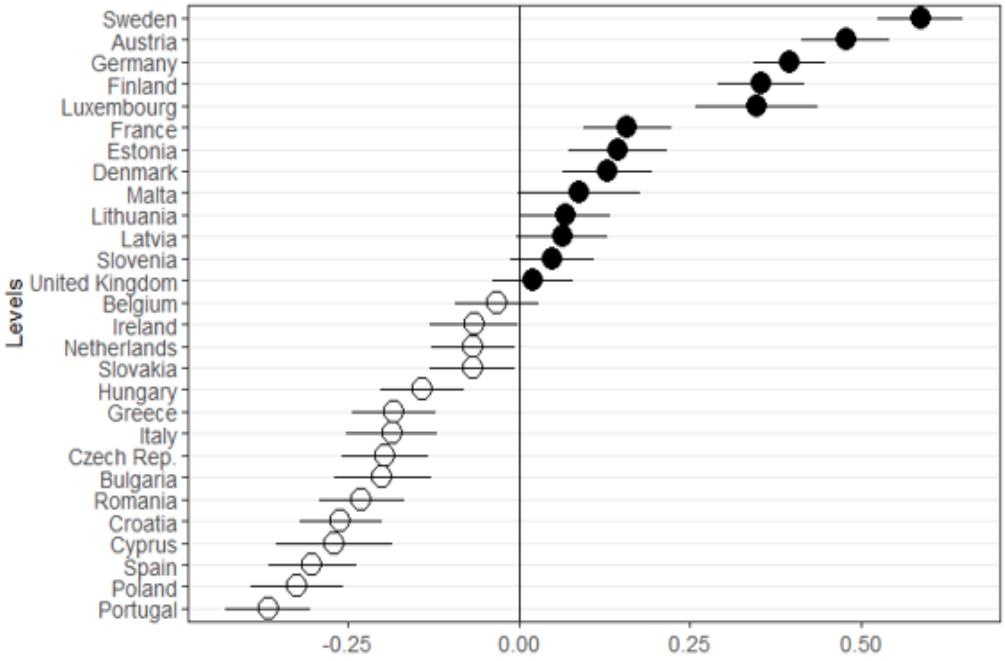

Figure 2.2. Predicted random effects for eco-friendly purchasing

2.4.3.2. Findings for Public Transport Use

The null model (M0) explained 5% of the variance (ICC = 0.05) in Europeans' public transport use. In model M1, the conditional R2 rose from 0.054 to 0.069 (ΔRC2 = 0.015). In model M2, with theoretical constructs included in the REB model, the conditional R2 rose to 0.097 (ΔRC2 = 0.028). The ANOVA test suggests that model M1 was better than the null model M0 and model M2 was better than model M1. Model M3, which included the moderating variables, produced a higher conditional R2 of 0.104. The ANOVA test suggests that model M3 was better than model M2.

Model M3 showed that, except for perceived behavioral control and environmental attitudes, all the other main constructs were positively and significantly related to public transport use. The higher the values for environmental knowledge (β = 0.24), attitudes toward environmental behaviors (β = 0.06) and subjective environmental norms (β = 0.04), the greater the use of public transport. Therefore, hypotheses H1, H3, H5 were supported, but not H2 or H4.

Among the moderating variables, age showed a significant and negative moderating effect of environmental knowledge on public transport use for all age brackets, and a significant and positive moderating effect of environmental attitudes on public transport use for almost all age brackets. Therefore, H6b was supported but not H6a. No moderating effect was found for gender, so H7a and H7b were not supported. Education level only moderated the effect of environmental knowledge (β = 0.02) on behavior, and, in consequence, H8b was supported, but not H8a. Interestingly, the proxy for income level did not have a significant effect, so neither H9a nor H9b were supported.

Figure 2.3 reports predicted random effects by country for public transport use in 95% prediction intervals. Taking into account the individual-level variables, public transport use was highest in the Netherlands, Sweden, Latvia, Belgium, and Germany, and lowest in Cyprus, Portugal, Lithuania, Greece, and Bulgaria.

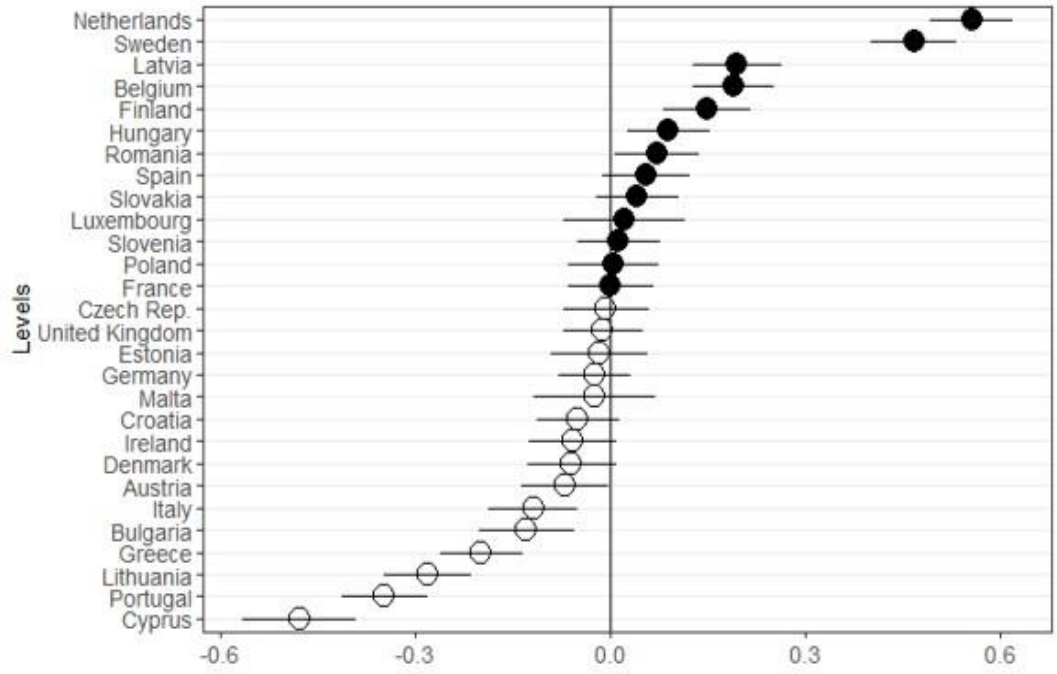

Figure 2.3. Predicted random effects for public transport use

2.4.3.3. Findings for Reduced Resource Consumption

The null model (M0) explained 4% of the variance (ICC = 0.04) in Europeans' reduced resource consumption. In model M1, the conditional R2 rose from 0.037 to 0.40 (ΔRC2 = 0.003). In model M2, the conditional R2 rose to 0.071 (ΔRC2 = 0.031). The ANOVA test suggests that model M1

was better than M0 and that model M2 was better than model M1. For model M3, the conditional R2 rose to 0.081 (ΔRC2 = 0.005), with the ANOVA test suggesting that model M3 was better than model M2.

Model M3 showed that all five main theoretical constructs, i.e., environmental knowledge (β = 0.11), environmental attitudes (β = 0.09), attitudes toward environmental behaviors (β = 0.04), perceived behavioral control (β = 0.07), and environmental subjective norms (β = 0.06), were positively and significantly related to reduced resource consumption. Therefore, hypotheses H1, H2, H3, H4, and H5 were all supported. Among the moderating social indicators, age, but not gender, education, or income, positively moderated the effect of environmental attitudes and knowledge; consequently, H6a, H6b, H7a, H7b, H8a, H8b, H9a, and H9b were not supported.

Figure 2.4 reports predicted random effects by country for reduced resource consumption in 95% prediction intervals. Taking into account individual-level variables, reduced resource consumption was highest in Malta, Belgium, Denmark, and Spain and lowest in Lithuania, Croatia, and Estonia.

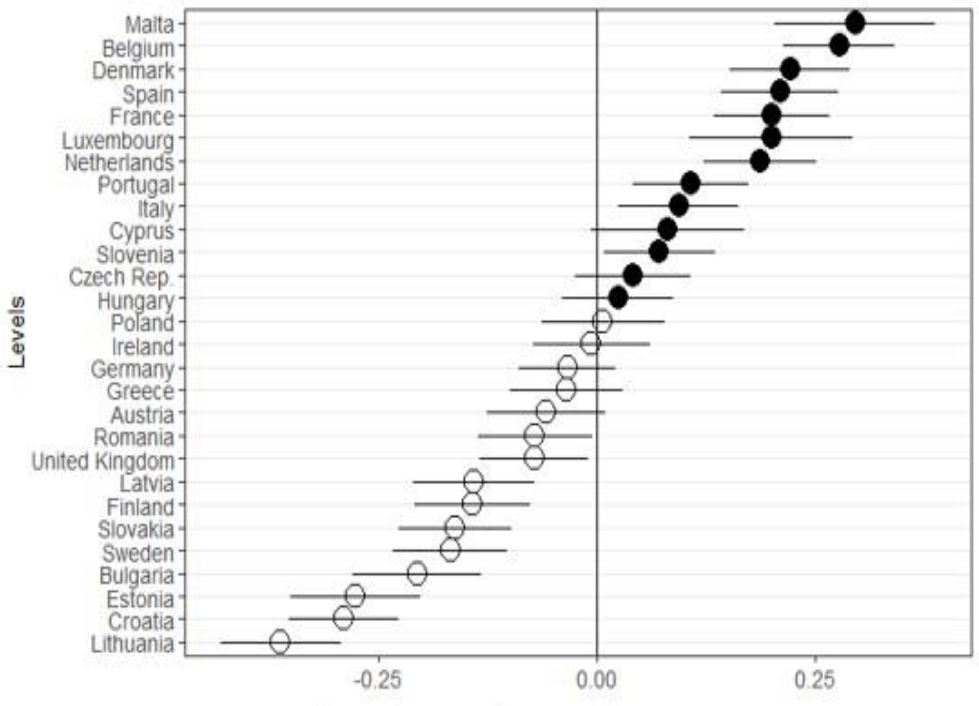

Figure 2.4. Predicted random effects of reduced resource consumption

Table 2.7 shows a summary of our results, indicating which hypotheses have been accepted.

Table 2.7. Hypothesis testing results

Hypotheses	Eco-friendly purchasing	Public transport use	Reduced resource consumption
H1: Environmental knowledge is positively related to REB.	✓	✓	✓
H2: Environmental attitudes are positively related to REB.	✓		✓
H3: Attitudes toward environmental behaviors are positively related to REB.	✓	✓	✓
H4: Perceived behavioral control is positively related to REB.			✓
H5: Environmental subjective norms are positively related to REB.	✓	✓	✓
H6a: The effects of environmental attitudes on REB are stronger for younger individuals.			
H6b: The effects of environmental knowledge on REB are stronger for younger individuals.		✓	
H7a: The effects of environmental attitudes on REB are stronger for women.			
H7b: The effects of environmental knowledge on REB are stronger for men.			
H8a: The effects of environmental attitudes on REB are stronger for better-educated individuals.	✓		
H8b: The effects of environmental knowledge on REB are stronger for better-educated individuals.		✓	
H9a: The effects of environmental attitudes on REB are stronger for individuals with higher incomes.	✓		
H9b: The effects of perceived behavioral control on REB are stronger for individuals with higher incomes.	✓		

2.5. Discussion

Our first research question asked to what extent the REB theory (Cottrell, 2003; Cottrell and Graefe, 1997; Diekmann and Preisendörfer, 1998; Hines et al., 1987; Hsu and Roth, 1998; Thielking and Moore, 2001) in terms of environmental attitudes, attitudes toward environmental behaviors (Bamberg and Möser, 2007; Cottrell, 2003; He et al., 2019; Hines et al., 1987; Hsu and Roth, 1998; Kaiser et al., 2005; Mufidah et al., 2018; Thielking and Moore, 2001; Weigel et al., 1974), and subjective norms (Bamberg and Möser, 2007; Kaiser et al., 2005; Mufidah et al., 2018) explained Europeans' environmental behaviors considering the country context. Findings indicate that knowledge, attitudes, and subjective norms all have a positive and significant effect on reduced resource consumption (Kurisu, 2015). The REB theory partially explains the eco-friendly purchases and public transport use in that only knowledge, attitudes, and subjective norms have a positive effect. The effect of perceived behavioral control on eco-friendly purchasing was moderated by income, meaning that only relatively well-off Europeans feel in control of their

behaviors and are motivated to buy more eco-friendly products, while the effect of perceived behavioral control on public transport use was neither significant nor moderating.

Even though there were slight differences in predictive capacity, generally speaking the REB model explains our three pro-environmental behaviors (public transport use, eco-friendly purchasing, and reduced resource consumption). Previous findings suggest that different sets of variables may be related to different environmental behavior patterns (Balderjahn, 1988; McKenzie-Mohr et al., 1995). In fact, in relation to ecologically responsible public transport use and eco-friendly purchasing, the same sets of theoretical constructs had different effects on the two types of behavior (Balderjahn, 1988).

Our findings indicate that environmental knowledge predicts public transport use better than subjective norms, attitudes, and perceived behavioral control. Therefore, in directing environmental behaviors toward public transport use, environmental policies should direct attention not only to the existence of environmental problems and the benefits of using public transport but should also use a broader set of media (Hines et al., 1987).

Considering subjective norms, our study adds support to previous research findings that these norms are weak direct predictors of environmental behaviors (Davies et al., 2002; Mufidah et al., 2018). In fact, researchers have found that, while the indirect effect of values on behaviors is significant, it is lower than felt responsibility or environmental attitudes (Punzo et al., 2019). However, its effect regarding buying eco-friendly goods is stronger, and this implies that the effect of subjective environmental norms cannot be generalized; the effect, rather, depends on the behavior considered. In measuring Europeans' subjective norms about what should be done about environmental problems, we provided a broader explanation for the injunctive dimension (what ought to be) of social norms. Future theoretical REB frameworks should bear in mind that the contribution of the descriptive (what is) dimension of social norms may differ depending on the behavior studied.

Contrary to previous findings (Hines et al., 1987; Weigel et al., 1974), we find that environmental attitudes are a better predictor of environmental behaviors than attitudes toward environmental behaviors. The reason could be that we measured attitudes toward environmental behaviors using

indicators related to governmental REB, whereas previous findings have shown that attitudes toward environmental behaviors are better predictors when measured according to target behaviors (Kollmuss and Agyeman, 2002; Kurisu, 2015).

Perceived behavioral control is an essential determinant of certain types of behavior—more so than other socio-psychological factors (Ajzen, 2005; Hines et al., 1987). Our findings suggest that perceived behavioral control may not be the most powerful predictor of behavior, except for the case of reduced resource consumption (Abrahamse and Steg, 2009) and for better-off individuals buying eco-friendly goods. In fact, researchers have found that perceived environmental control is related to behavior only in developed countries (Morren and Grinstein, 2016). Our findings provide evidence that perceptions of being in control may depend on life circumstances, although it should be noted that an acknowledged limitation of our measure was that we measured perceived behavioral control using just two items. Research so far, however, has shown that even well-established perceived behavioral control scales do not agree in relation to their predictive power regarding target behaviors (Huebner and Lipsey, 1981). In consequence, our results for perceived behavioral control are not entirely unexpected.

Our second research question asked to what extent social factors moderate Europeans' environmental behaviors, considering variance between countries. We included social categories (age and gender) and resource indicators (education and income) that, according to Ajzen (2005), could moderate the effect of theoretical constructs. The results indicate that the moderating effect of the indicators varies depending on the environmental behavior. The relationship between environmental knowledge and public transport use is stronger among younger individuals, while that between environmental attitudes and public transport use is stronger among older individuals. For eco-friendly purchasing, the relationship between environmental attitudes and perceived behavioral control is stronger among better-off individuals. The effect of environmental knowledge on eco-friendly purchases is stronger for women than for men. As far as education is concerned, the results suggest that the relationship between environmental attitudes and eco-friendly purchasing and between environmental knowledge and public transport use are both stronger for better-educated individuals. Nevertheless, no moderating effects of the four

indicators of age, gender, education, and income are found between environmental knowledge, environmental attitudes, or perceived behavioral control and reduced resource consumption.

Among previous studies that have examined the impact of social indicators on attitudes or behaviors, a few studies, without being entirely comprehensive, have considered the moderating effect of social indicators on the REB model. Dagher, Itani, and Kassar (2015) studied the moderating effect of gender on the relationship between environmental attitudes and behaviors, while other researchers studied the moderating effect of education, gender, and income on environmental knowledge regarding eco-friendly purchase intentions (He et al., 2019; Chekima et al., 2016) and the moderating effect of income on attitudes, perceived behavioral control, and personal responsibility regarding eco-friendly purchasing intentions (He et al., 2019). Our study contributes to current knowledge by providing evidence that the impact of social moderators in explaining REB depends on the type of environmental behavior being studied, while also pointing to the need to extend research to the relationship between socio-psychological factors and environmental behaviors.

Apart from their moderating effect, the indicators of social position and social categories also have a direct effect on REB. Regarding age, while older people are more likely to reduce resource consumption and buy eco-friendly goods, younger people are more likely to use public transport. Hines et al. (1987) reported that younger people are more likely to engage in REB than older people, whereas we found support only for younger people's public transport use. The reason may be that public transport behavior also includes walking and cycling, more typical of younger individuals. Younger people may also use public transport more because they are less well-off and because they have a greater need for mobility (Lee et al., 2013), while older people may, for reasons of comfort, prefer to use private transport over public transport.

Women are more likely to engage in REB according to our findings, except for reduced resource consumption, adding support to other research (Barr, 2003; Lee et al., 2013; Mainieri et al., 1997; Olli et al., 2001; Zelezny et al., 2000) that reports that they use public transport more and purchase eco-friendly products more than men. Our findings suggest that education is positively related to all the studied environmental behaviors, adding support to previous research findings

(Gatersleben et al., 2002; Gifford and Nilsson, 2014; Hines et al., 1987). Our findings also positively relate income level to eco-friendly purchasing; the reason may be that eco-friendly products may be more costly than ordinary products and, as a small luxury, may only be considered affordable by better-off people.

The REB model, with its main environmental constructs and moderating and control indicators, and considering country-level variance, explains around 10%–15% of variance in the sample of environmental behaviors. Although this explained variation is low, previous research has found that the REB model only explains, at best, around 30% of variance (Davies et al., 2002; Hayward, 1990; He et al., 2019; Hsu and Roth, 1998; Thielking and Moore, 2001; Tonglet and Phillips, 2004] or even less than 30% of variance (Cottrell, 2003; Davies et al., 2002; Diamantopoulos et al., 2003). This low level is considered to be the result of a weak link between environmental intentions and behaviors: intention is a powerful predictor of behavior only when an individual is genuinely in control of their behaviors and the temporal distance between intention and behavior is short (Ajzen, 1985; 2005; Bamberg and Möser, 2007; Hines et al., 1987; Kurisu, 2015).

Our final research question asked to what extent the situational factor (i.e., country) explained Europeans' environmental behaviors. Leaving aside individual-level variance, country-level variance has quite a notable effect in explaining European environmental behaviors. In this study we focused on determining whether a country impacts on individual behaviors, but not the reason why (a topic that merits further investigation), i.e., we wanted to depict the differential effect of countries on environmental behaviors, which is shown in the EU-28 heat map depicted in Figure 2.5. A dendrogram depicts heterogeneity between countries according to mean values for the three studied environmental behaviors (public transport use, eco-friendly purchasing and reduced resource consumption). The colors reflect values for the countries, ranging from blue to red tones (higher to lower mean values, respectively) in accordance with differences in country random effects.

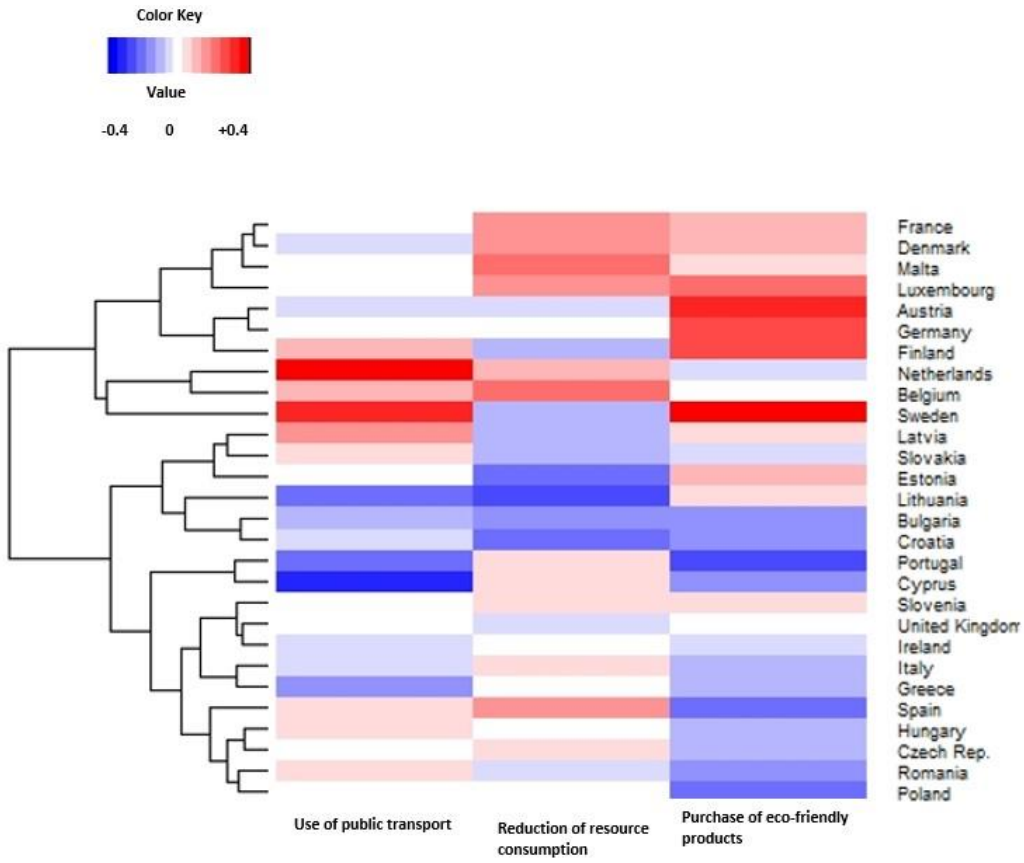

Figure 2.5. Distribution of country effects and country clustering for three environmental behaviors

According to the heat map, countries showing a similar behavioral effect on individuals can be clustered into two main groups: France, Denmark, Malta, Luxembourg, Austria, Germany, Finland, the Netherlands, Belgium, and Sweden versus Latvia, Slovakia, Estonia, Lithuania, Bulgaria, Croatia, Portugal, Cyprus, Slovenia, United Kingdom, Ireland, Italy, Greece, Spain, Hungary, Czech Republic, Romania, and Poland. The first group clusters together countries where citizens REB is greater, given the same social properties of individuals, while the opposite (i.e., lesser REB) is the case with the second group. The reason can be found in different political/governmental/economic policies, different macroeconomic uncertainties or conditions, different cultures and values (Miller, 1993), and different institutional factors (e.g., the quality and availability of public transport in different regions) (Kurisu, 2015). Future studies need to examine the possible reasons behind REB clusters of EU countries, and should include not only individual-level predictors but also country-level predictors, given that countries have a direct impact on shaping individual and collective behaviors.

One of the limitations of this study was that, since we used a secondary database, we could not decide how the theoretical constructs were measured. However, the secondary data enabled us to describe the behavior of European citizens under a REB perspective. Our analysis was rendered more meaningful by using multilevel regression analysis (rather than traditional regression), as it enabled us to describe the behavior of European citizens at two levels in conjunction, i.e., at the country level and at the individual level.

The findings described in this research have several implications for policymakers. First, the same environmental programs may have different outcomes, depending on the country where the program is implemented. Attention needs to be focused on the general effects (European Commission) and particular effects (national policymakers) of environmental factors on pro-environmental behaviors. The findings suggest that, for the same level of environmental attitudes, attitudes toward environmental behaviors, environmental knowledge, subjective environmental norms, and perceived behavioral control, Europeans' pro-environmental behaviors may vary according to the country in which they live.

Second, policymakers need to consider that the emphasis on pro-environmental factors needs to differ depending on the behavior to be changed. Nonetheless, regarding the subjective environmental norms, policies should exploit its strong generic effect on all actions, while the impact of other factors differs according to the behaviors considered. For instance, environmental policies aimed at increasing a sense of responsibility to the environment (reducing plastic waste generally, firms reducing packaging and designing recyclable goods) have a strong impact on eco-friendly purchasing (Punzo et al., 2019). The fact that the effect of subjective environmental norms is reduced by half, however, when it comes to reducing resource consumption and using public transport suggests that EU policies should be aimed at discouraging the purchase of overpackaged products but also at providing non-plastic packaging alternatives. For instance, policies could foster buying km0 products, especially as it would also bring tangible benefits to local producers. Nonetheless, those policies would have a minor impact on the reduction in resource consumption and in public transport use.

The EU could also take advantage of the positive attitudes of Europeans toward EU policies regarding protection of the environment, leveraging them to lead national governments to comply with environmental regulations and directives. For instance, information campaigns that show how the EU helps reduce harmful emissions and mitigate damage to nature and biodiversity through controls and sanctions imposed on national governments would push national governments to improve their environmental standards, which is likely to have a direct effect on all pro-environmental behaviors.

Promoting pro-environment attitudes among Europeans will generally have the greatest impact on environmental behaviors. However, age is one factor that may moderate the impact of climate change policy instruments (Kotchen et al., 2013). For instance, public transport use is not likely to increase among older individuals with a less well-developed ecological attitude. Therefore, the choice of media sources used to inform Europeans is likely to have a significant impact on using public transport and so should especially target educated young Europeans. Likewise, concerning eco-friendly purchases, while information through many sources may not have a significant impact, policies should be targeted especially to women, while better knowledge will have the greatest impact on older Europeans in terms of reducing resource consumption. As for perceptions of behavioral control, the impact of this factor is mainly on reduced resource consumption. It could mean, for instance, that individuals are more likely to replace domestic appliances with more energy-efficient appliances. Policies aimed at encouraging purchases of energy-efficient appliances will have a general effect on Europeans, whether these be subsidies for efficient appliances or additional taxes on non-efficient appliances. However, it needs to be borne in mind that only individuals without financial problems feel they can afford eco-friendly products. In contrast, income has little impact on public transport.

2.6. Conclusions

We explored to what extent the REB theoretical framework explains the environmental behaviors of Europeans living in different social, cultural, and economic contexts (i.e., countries). The REB theory fully explains the reduced resource consumption but only partially explains eco-friendly purchasing and public transport use by Europeans. The moderating roles of resources (education and income) and social categories (age and gender) on environmental factors follow a similar pattern, suggesting that the REB model should be extended to include resources and social categories that explain the impact of environmental factors on the REB model. Even more, particular models to study environmental behaviors need to be developed to better understand the REB model. For instance, the inclusion of situational factors (like countries) could represent an opportunity to further understand and explain environmental behaviors.

Chapter 3. Is Pro-environmentalism a Privilege? Country Development Factors as Moderators of Socio-psychological Drivers of Pro-environmental Behavior

3.1. Introduction

The advancement of knowledge on the environmental behavior of individuals requires innovative ways of looking at the phenomenon of interest and of testing novel theories in different socioeconomic/political and temporal contexts. Hypotheses rejected in one context may be supported in another, and even the way an ecological variable influences the relationship between behavior and certain individual-level drivers may change according to the context (Duncan et al., 1998). This way of accumulating knowledge makes theories stronger and makes it possible to develop models that better explain particular behaviors according to specific contexts.

The environmental behavior of individuals depends not only on their social and psychological properties (Bohr & Dunlap, 2017), but also on their contextual situation, i.e., on drivers that operate simultaneously at the individual and country levels. Most research to date has been conducted into individual-level drivers operating in a particular environmental context (Bamberg and Möser 2007; Hines et al. 1987; Klöckner 2013; Morren and Grinstein 2016). However, country-level drivers are particularly important when we want to explain how the effect of individual-level drivers varies depending on the situational context (i.e., the country in which the individual lives). Understanding environmental behaviors, drivers, and limitations is such a complex task that analysis through a single theory is impossible (Hadler & Haller, 2011; Kollmuss & Agyeman, 2002). Therefore, rather than adhere to a specific viewpoint, to answer our research questions regarding drivers behind environmental behaviors, we derive our research hypotheses from several different theories (Duroy, 2008; Gelissen, 2007; Pirani & Secondi, 2011; Pisano & Lubell, 2017).

In this research, we were interested in exploring environmental behaviors of European Union (EU) citizens according to psychological, sociological, and economic theories. By focusing on

data for the EU, rather than on data for Organisation for Economic Co-operation and Development (OECD) countries (Oreg and Katz-Gerro 2006; Pisano and Lubell 2017), we were able to study how theoretical drivers operate in countries that, although heterogeneous, share a common institutional framework. We explored how country-level drivers could explain behavioral differences between Europeans, not only in terms of their mean behavior, but also in terms of their impact on the relationship between attitudinal constructs and behavior. In particular, we wanted to answer the following research questions: (1) To what extent does the country context account for observed variations in Europeans' pro-environmental behaviors? (2) To what extent do individual-level drivers explain Europeans' pro-environmental behaviors? (3) To what extent do country-level drivers explain differences in Europeans' mean pro-environmental behaviors? (4) To what extent do country-level drivers moderate the effects of individual-level drivers on Europeans' pro-environmental behaviors?

3.2. Theoretical framework

The focus of the current research is to uncover the effect of country-level drivers on individuals' environmental behavior controlling for the individual-level drivers. For that reason, we first briefly describe the individual-level drivers most commonly used in environmental behavior studies, and then present country-level drivers that, according to several theories, may explain differences in (1) individuals' environmental behaviors, and (2) the relationship between individual-level drivers and behaviors.

3.2.1. Individual-level drivers of pro-environmental behaviors

Four meta-analyses of studies of environmental behaviors (Bamberg & Möser, 2007; Hines et al., 1987; Klöckner, 2013; Morren & Grinstein, 2016) have identified three theoretical frameworks used in most research, namely, the norm-activation model (Schwartz, 1977), the value-belief-norm theory (P. C. Stern et al., 1999), and also the theory of planned behavior (Ajzen, 1985). Today, any comprehensive theoretical environmental behavior framework will integrate moral motivations into the rational-choice model underpinning the theory of planned behavior to explore

their relationship with environmental behavior (Turaga et al., 2010). For the purpose of our study, we briefly describe the individual-level drivers commonly used in those theories.

Perceived behavioral control. Behaviors are influenced by perceptions of social reality; they also have a direct impact on intentions to behave in a particular way, and consequently, on the actual behaviors, as acknowledged by rational choice models (Ajzen, 1985, 2005), including environmental behavior (Bamberg & Möser, 2007; He et al., 2019; Hines et al., 1987; Kaiser et al., 2005; Mufidah et al., 2018). We would expect that the greater the perceived behavioral control, the more individuals will engage in pro-environmental behaviors (Hypothesis 1a).

Environmental attitudes. Attitudes refer to an individual's favorable or unfavorable feelings towards particular aspects of the environment or objects related to the environment. The intensity of the impact of environmental attitudes on behaviors depends on whether attitudes are measured as a general attitude or as specific to a particular environmental behavior (Gifford and Sussman 2012). According to Kurisu (2015) and Hines and his colleagues (Hines et al., 1987), attitudes can be split into environmental attitudes and attitudes towards environmental behaviors – reflecting, respectively, the affective and conative dimensions of attitudes, and positively and significantly affecting pro-environmental behaviors (Bamberg and Möser 2007; He et al. 2019; Hines et al. 1987; Kaiser et al. 2005; Pisano and Hidalgo 2013). We therefore propose that the more favorable the environmental attitudes of individuals, the more pro-environmental their behaviors (Hypothesis 1b), and that the more favorable the attitudes towards environmental behaviors of individuals, the more pro-environmental their behaviors (Hypothesis 1c).

Subjective environmental norms. Social norms are "the grammar of society" (Bicchieri, 2005), specifying what is acceptable and not acceptable within a social group, i.e., what is expected of others and what is expected of us (Young, 2015). Personal norms are expectations about the self that derive from the social norms of the groups we identify with (Morris et al., 2015). In relation to the environment, research has found that subjective environmental norms positively and significantly affect environmental behaviors (Bamberg & Möser, 2007; Kaiser et al., 2005; Mufidah et al., 2018), including within the EU (Liobikienė et al., 2016). Consequently, we would

expect subjective environmental norms to be positively correlated to pro-environmental behaviors (Hypothesis 1d).

Environmental knowledge. Better informed individuals are reported to demonstrate more pro-environmental behaviors (Ostman & Parker, 1987). If knowledge and information are lacking, then intentions to perform a particular behavior may not be realized (Ajzen, 1985, 2005). A cognitive dimension is therefore essential to understanding environmental behaviors (Hayward 1990; He et al. 2019; Hines et al. 1987; Hungerford and Volk 1990; Pisano and Hidalgo 2013). Therefore, we suggest that environmental knowledge is positively related to individuals' pro-environmental behaviors (Hypothesis 1e).

3.2.2. Country-level drivers of pro-environmental behaviors

According to the attitude-behavior-context theory (Guagnano et al., 1995), economic, social, cultural, and structural drivers play crucial context-related roles in translating attitudes into behaviors (Black et al., 1985; Guagnano et al., 1995; Guerin et al., 2001). Country-level drivers may influence citizens' capacity to behave ecologically or act altruistically (Bornstein et al., 2005) to the benefit of society (Thøgersen 2010; Neuvonen et al. 2014). According to Guagnano: "Attitude theory needs to be modified to include not only the perception of external conditions but the external conditions themselves" (Guagnano et al., 1995, p. 715). Therefore, we suggest that the impacts of individual-level drivers and social position on environmental behaviors need to be examined separately and in interaction with country-level factors.

Regarding socioeconomic development, national wealth and ecological modernization theories broaden perspectives on the individual-level theoretical framework (Spaargaren & Mol, 1992). Affluent countries tend to be more innovative in disseminating new environmental technologies (Jänicke, 2007; Mol, 2002). Additionally, according to the ecological modernization theory, environmental innovation can achieve a win-win situation of economic growth and reduced environmental degradation (Røpke, 2005, p. 268). Thus, country affluence favors both eco-innovation and smart environmental regulation (Husted, 2005).

Affluence. It has been argued that demands to improve the quality of the environment grow with increased wealth (Diekmann & Franzen, 1999; Franzen, 2003). Consequently, researchers suggest

that there will be a shift from materialistic to post-materialistic values once a certain level of wealth is achieved (Diekmann & Franzen, 1999). People living in less economically developed nations are more likely to be preoccupied with present survival, and may be less willing to pay for future generations' environmental protections. In comparisons of environmentalism across countries, environmental drivers and behaviors have been found to be positively correlated with country-level affluence (Duroy, 2008; Hadler & Haller, 2011; Hannibal et al., 2016; Knight, 2016; Pirani & Secondi, 2011; Pisano & Lubell, 2017), with recent studies using per capita gross domestic product (GDP) (Gelissen, 2007; Givens & Jorgenson, 2011; Inglehart, 1995; Knight, 2016; Mostafa, 2012; Pisano & Lubell, 2017) as a proxy for national wealth, given the information it yields on the size and performance of an economy (Callen, 2020). According to this hypothesis, the more affluent a country, the more citizens will engage in pro-environmental behaviors (Hypothesis 2a).

Education. As measured by GDP alone, country affluence does not necessarily imply progress (McCann & McCloskey, 2003, p. 25). In the last 60 years, GDP has been used as a proxy for economic wealth and social progress, yet does not properly reflect social wellbeing (Stiglitz, 2009). However, a country's education level is an indicator of investment in human capital that boosts specialization and productivity (Ozturk, 2008). Country affluence and education level have been found to influence individual-level environmental drivers and behaviors (Duroy, 2008; Hannibal et al., 2016; Knight, 2016; Morren & Grinstein, 2016). Therefore, we would expect the education level of a country to positively correlate with its citizens' pro-environmental behaviors (Hypothesis 2b).

Income inequality. Reducing income inequality is essential for human development and social progress (Bilan et al., 2020), as pro-environmental behaviors may depend on a country's income and how income is distributed among citizens. Although a high income may point to a capacity to pay for environmental improvements, greater income inequality may reduce a country's overall willingness to pay. In affluent countries, income inequality results in a gap between a country's ability and willingness to pay for environmental protection (Magnani, 2000). We therefore

hypothesize that the level of income inequality of a country is negatively associated with individuals' pro-environmental behaviors (Hypothesis 2c).

Environmental issues. It has been found that support for environmental protection results from a shift from materialistic to post-materialistic values in post-industrialized nations (Inglehart & Baker, 2000; Nový et al., 2017). As societies become more affluent, and once primary (housing and food) needs have been met, citizens are likely to become more concerned about issues such as environmental quality and are more likely to support environmental protection (Inglehart, 1995). In fact, Hannibal, Liu, and Vedlitz (2016) have found evidence that environmental concerns regarding local environmental incidents and air pollution are correlated with country affluence. However, contradicting the affluence hypothesis, environmental concerns about the local environment have also been found to be negatively correlated with country affluence (Dunlap & Mertig, 1995). The fact that environmental degradation is, broadly speaking, more severe in the global south than in the global north may motivate citizens in less-developed countries to be more environmentally active (Escobar, 2006). Since ecological concerns are viewed as global, cross-national differences cannot be explained only by post-materialism or the affluence hypothesis (Dunlap & Mertig, 1997; Gelissen, 2007). The challenge-response model (Inglehart 1995), which reflects objective environmental issues and subjective values, proposes that the severity of local environmental issues can explain citizens' environmental support. We therefore suggest that the more severe the environmental issues faced by a country, the more pro-environmental the behavior of its citizens (Hypothesis 2d).

3.2.3. The moderating effect of country-level drivers on individual-level drivers

The strength of the attitude-to-behavior chain in individuals is not likely to be homogenous, as behaviors are likely to vary according to the country of residence (Guagnano et al., 1995). Research has found, for instance, that this chain is stronger in more developed countries (Pisano & Lubell, 2017). In particular, the association between environmental attitudes and willingness to pay for environmental protection is stronger in more affluent countries (Duroy, 2008; Franzen & Meyer, 2010; Israel & Levinson, 2004). Furthermore, research examining differences in support for environmental improvements across nations has found that the human development

level of a country moderates the attitude-to-intention relationship (Liu & Sibley, 2012), while environmental attitudes, measured as environmental concerns, are correlated with country affluence, education level, and beliefs and values (Hannibal et al., 2016).

Socioeconomic development has also been found to reduce the impact of subjective environmental norms on pro-environmental behaviors. In less affluent EU countries, individuals may feel more morally responsible for others regarding environmentally friendly behaviors (Liobikienė et al., 2016). It has been found that income inequality reduces the impact of attitudes on environmental behaviors (Magnani, 2000), while it has been reported that the strength of the relationship between consumers' recycling intentions and perceived behavioral control is undermined by a perceived lack of facilities (Chen & Tung, 2010). We consequently propose that, in more socioeconomically developed countries (with greater affluence, higher education levels, and less income inequality), relationships will be stronger between: (a) perceived behavioral control and pro-environmental behaviors (Hypothesis 3a), (b) environmental attitudes and pro-environmental behaviors (Hypothesis 3b), and (c) attitudes towards environmental behaviors and pro-environmental behaviors (Hypothesis 3c), while, in contrast, the relationship will be weaker between subjective environmental norms and pro-environmental behaviors (Hypothesis 3d).

Cultural values. National cultural values have emerged as a new research focus for environmental behaviors (Milfont, 2012). When comparing a country's impact on individual behaviors, cultural dimensions are measured at the country rather than individual level (Oreg & Katz-Gerro, 2006, p. 466). A recent meta-analysis has shown that country characteristics and national cultures play a moderating role in explaining differences in environmental engagement across countries (Morren & Grinstein, 2016). In particular, Hofstede's individualism versus collectivism index has become a critical element in much environmental research (Milfont, 2012; Sarigöllü, 2009; Soyez, 2012). This same index has also been found to be related to post-materialistic values, with collectivist cultures found to be more "we'-conscious, and individualistic cultures to be more "I'-conscious (Hofstede 2001, 226-227).

Environmental behaviors are often characterized as pro-social, in that collective motivations seem to outweigh individual motivations, while attitudes toward environmental behaviors can be

expected to be affected by a nation's cultural orientation (Sarigöllü, 2009). Individualism, which reflects "a society in which the ties between individuals are loose" (Hofstede, 2001, p. 225), hurts knowledge and subjective environmental norms (Liobikienė et al., 2016). Collectivism correlates better than individualism with a general index of sustainability (Gouveia, 2002; Park et al., 2007), with citizens from collectivist cultures more likely to hold stronger environmental attitudes (Gouveia, 2002). We can therefore expect that, in collectivist cultures, there will be a strong effect (1) of environmental attitudes on pro-environmental behaviors (Hypothesis 4a), (2) of attitudes toward environmental behaviors on pro-environmental behaviors (Hypothesis 4b), (3) of subjective environmental norms on pro-environmental behaviors (Hypothesis 4c), and (4) of environmental knowledge on pro-environmental behaviors (Hypothesis 4d).

3.3. Research design

3.3.1. Data

The analysis was conducted using data from the 2017 Special Eurobarometer 468 survey on European citizens' attitudes towards the environment, available from the GESIS data center (European Commission and European Parliament, Brussels, 2018). The sample includes 27 881 individuals living in the EU – as composed of 28 member states, including, at that time, the UK[1] – surveyed between 23 September and 2 October 2017. Sampling of the target population (individuals aged 15 years and over) was based on a standard multistage probability procedure, and interviews were conducted using computer-assisted personal interview techniques.

3.3.2. Measurements

Pro-environmental behaviors as the dependent variable

The dependent variable – individual pro-environmental behaviors – was measured from two batteries of questions that asked respondents whether or not they complied with any of the 15 environmental practices during the past six months (QD4) and past two years (QD19), with only one battery (not both) tied to individuals' affluence (for instance, the questions regarding buying less polluting products, versus using less polluting services) (see Supplementary Appendix, Table 3). Scoring was between 0 and 15 (mean Cronbach's alpha .68), for an overall mean score of 3.87

and variance of 0.874 (see Supplementary Appendix, Table 4). As with all sum score scales, this is a kind of restricted latent variable model in which the loadings are constrained to be 1 and the items' variance to be equal. The main difference between sum scores and factor scores is that a sum score scale does not analyze the scale's internal structure, only its reliability through Cronbach's alpha (McNeish & Wolf, 2020).[2] However, using sum score scales is appropriate when we are interested not so much in the structure of the environmental behavior (types of behavior), but in its intensity: the higher the score, the greater the intensity. In this research, we are interested in how country-level drivers influence the intensity of environmental behavior, directly and indirectly, after controlling for individual-level drivers and social indicators.

Individual-level independent variables

Individual-level independent drivers were measured on semantic Likert scales ('strongly disagree', 'tend to disagree', 'tend to agree', 'strongly agree', 'don't know'), while environmental knowledge was measured on a scale from 0 to 3.

We conducted exploratory factor analysis (EFA) to obtain evidence on the indicators' ability to discriminate between the individual level drivers (Wood et al., 2015). Factors were extracted using principal component analysis (PCA) and varimax rotation, aided by the *psycho* package (Makowski, 2018) implemented in the R Environment and Language for Data Analysis (R Core Team, 2020).[3] The scree test was used to determine the number of factors to retain (see Supplementary Appendix, Figure 1). For the first four components, the cumulative percentage of variance was 65%; note that the portion of explained variance needs to be judged according to the research context, which, in social sciences and humanities, can be as low as 50%-60% (Williams et al., 2010).

Figure 3.1 depicts the four-factor matrix structure that can be interpreted in terms of environmental attitudes (EA), subjective environmental norms (SEN), attitudes toward environmental behaviors (ATEB) and perceived behavioral control (PBC). Since all loadings were higher than 0.5, we can assume that the solution could discriminate among the four theoretical constructs (see Supplementary Appendix, Table 6).

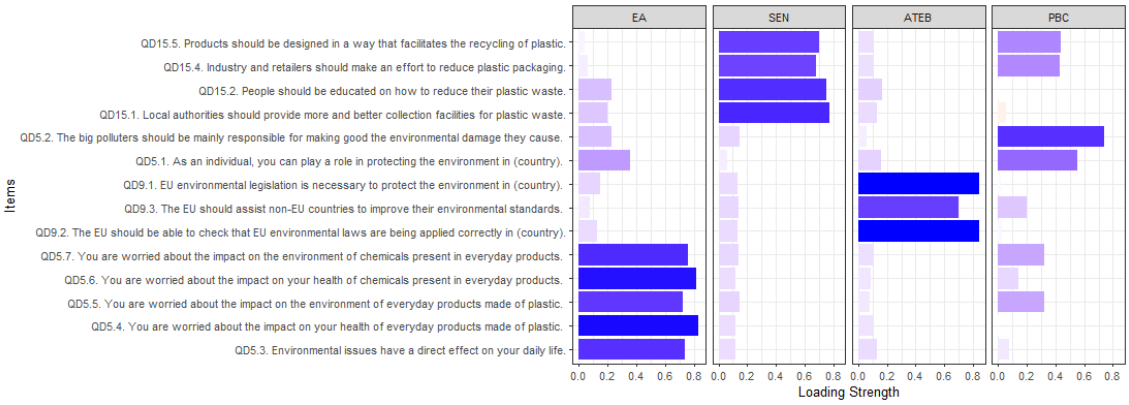

Figure 3. 1. Association between theoretical constructs and the original drivers according to exploratory factor analysis with varimax rotation (extraction method: principal component analysis)

Perceived behavioral control was measured through two questions: one asking about individual roles in protecting the environment, and the other asking about making polluters pay for environmental damage (the latter question reflecting the fact that since behaviors can instigate change, individuals should be made responsible for changing others' behavior). Thus, attributing responsibility to polluters is an indirect way of exercising behavioral control on others' behavior. Nevertheless, we recognize that this is a limitation due to the data available, even though its loading in this factor is the highest (see Figure 3.1 above).

Environmental attitudes and attitudes toward environmental behaviors were measured from questions on concerns regarding environmental problems (Hayward, 1990; Kurisu, 2015) and from questions on Europeans' attitudes to governmental behaviors regarding environmental issues, respectively. Even though environmental concerns are usually measured at a more general level, the EFA was clear in that all worries formed a factor (see Figure 3.1 above). This is a measurement limitation due to the data available.

Subjective environmental norms were measured (similar to subjective norms) as normative statements about what should be done to solve environmental problems, with questions reflecting environmental expectations regarding others. This item measures how individuals believe that administrations, firms, and other people should behave regarding plastic use, a limited set of subjective norms that loaded highest as a unique factor (see Figure 3.1 above).

Finally, even though the survey does not measure Europeans' understanding of environmental issues, regarding environmental knowledge, it does include a battery of questions on the information sources that Europeans use to obtain information on environmental issues, listing three main sources of environmental information among a broad set of alternatives. We assumed that the more sources of information Europeans use, the greater the chance that they will be better informed. Although it is a crude measure of environmental knowledge, it is the best available from the survey. Responses were added up to create a scale of knowledge scored from 0 to 3 (see Supplementary Appendix, Table 5, for individual-level independent variables).

Figure 3.2 reports descriptive statistics for individual-level pro-environmental behaviors and theoretical construct scores for each of the EU countries. Compared to countries located in the south and southeast of Europe, Scandinavian countries scored higher for pro-environmental behaviors, environmental knowledge, and perceived behavioral control, and lower for environmental attitudes, attitudes toward environmental behaviors, and subjective environmental norms.

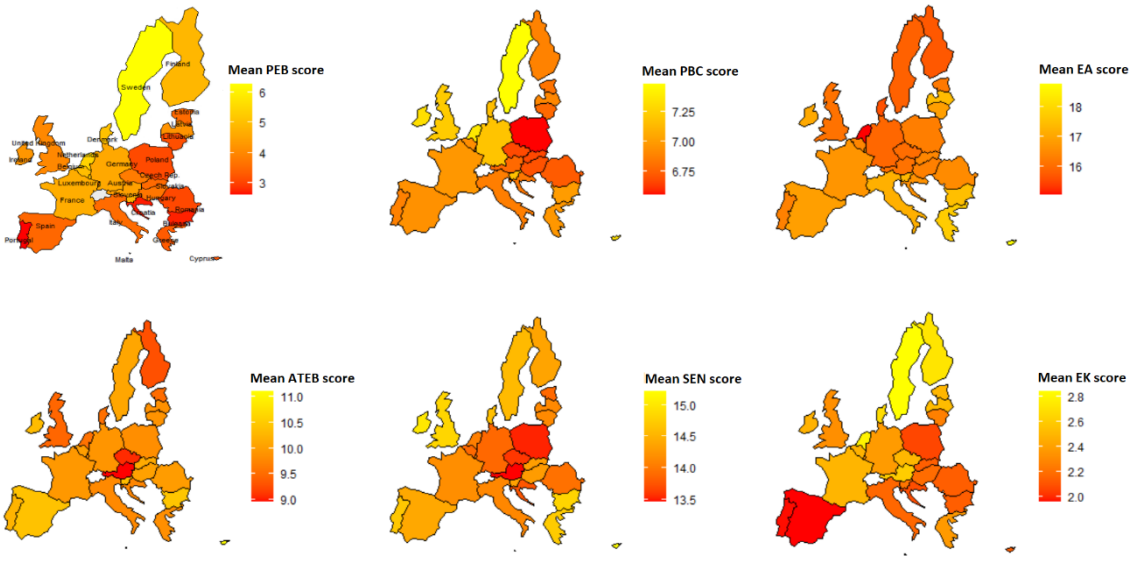

Figure 3.2. Individual-level pro-environmental behaviors and theoretical construct scores

Individual-level social indicators

We chose age and gender as social categories, and education level and income as positional categories associated with general environmental behaviors. Social categories have been shown to have a lesser capacity for predicting environmental behaviors than psychological categories

(Diamantopoulos et al., 2003; Hines et al., 1987). At the individual level, well-educated and high-income older women have been profiled as more likely to behave pro-environmentally (Guerin et al. 2001; Pirani and Secondi 2011).

Age (four categories) was treated as a categorical indicator to control for non-linear effects (Kaplan & Kaplan, 2002). Gender was recorded as woman or man. Education level was measured according to age on terminating full-time education level (an approximation, given that students of different ages may finish at the same level). While the Eurobarometer survey does not directly ask about income, a question on the frequency of difficulties in paying bills was taken as an imperfect proxy. The bar charts in Figure 3.3 depict the distribution of individual-level social indicator categories (for full details, see Supplementary Appendix, Table 7). At the individual level, all continuous variables were centered and missing values were excluded.

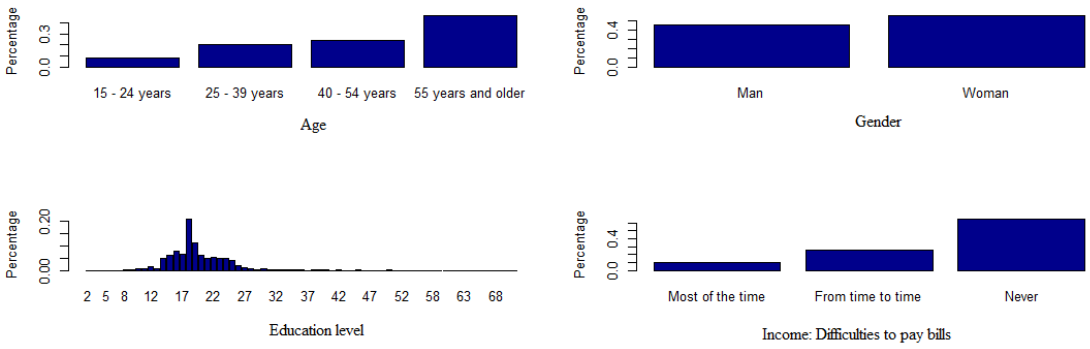

Figure 3.3. Individual-level social indicators: age, gender, education level and income

Country-level drivers

Country affluence was measured from per capita GDP data for 2017 (expressed in terms of purchasing power parity (PPP) in USD), as sourced from the World Development Indicators (World Bank, 2017).

Country education level was measured from the 2017 Education Index, sourced from the Human Development Report dataset (United Nations Development Programme, Human Development Reports, 2020), and comprising mean years of schooling for adults, and expected years of schooling for children. The index is scored between 0 and 1, with higher scores reflecting higher educational levels.

Income inequality was measured using the 2017 Gini Index obtained from the Eurostat database (Eurostat, 2020). Scores range between 0 (lowest inequality) and 100 (highest inequality).

Environmental issues were measured from the Environmental Performance Index, produced jointly by Yale and Columbia Universities in collaboration with the World Economic Forum and published every two years. We used scores for EU countries for 2016 (the year closest to the Eurobarometer survey). The 2016 Environmental Performance Index has 19 indicators organized into several weighted categories (health, air quality, sanitation and drinking water, water resources, agriculture, forests, fisheries, biodiversity, habitat, climate, and energy). Scores range from 0 to 100 (Hsu et al., 2016), with higher scores indicating fewer environmental issues (i.e., greater environmental sustainability).

The moderating effect of culture, expressed as individualism versus collectivism, was measured according to Hofstede's index (Hofstede 2001; 2020). Values range from 0 to 100, with higher scores indicating greater individualism and lower scores indicating greater collectivism. Note that because of unavailable individualism-collectivism data, Cyprus was excluded from the multilevel analysis, conducted for just 27 of the EU countries (see Supplementary Appendix, Table 8).

Before estimating the multilevel regression model, GDP per capita was logged to address positive skewness at the country level. In addition, the Gini Index scores, Environmental Performance Index scores, and individualism-collectivism scores were divided by 100 to report scores using the same scale as the Education Index (0 to 1).

3.3.3. Statistical analysis

Before testing our hypotheses using the multilevel regression analysis, we checked correlations between individual-level and country-level dependent and independent variables. Figure 3.4 depicts the correlation matrix for individual-level variables (n=22 504) and country-level variables (n=27). Correlations in all cases were below 0.55. The highest country-level correlation was between the Education Index and an individualism score (r= .54).

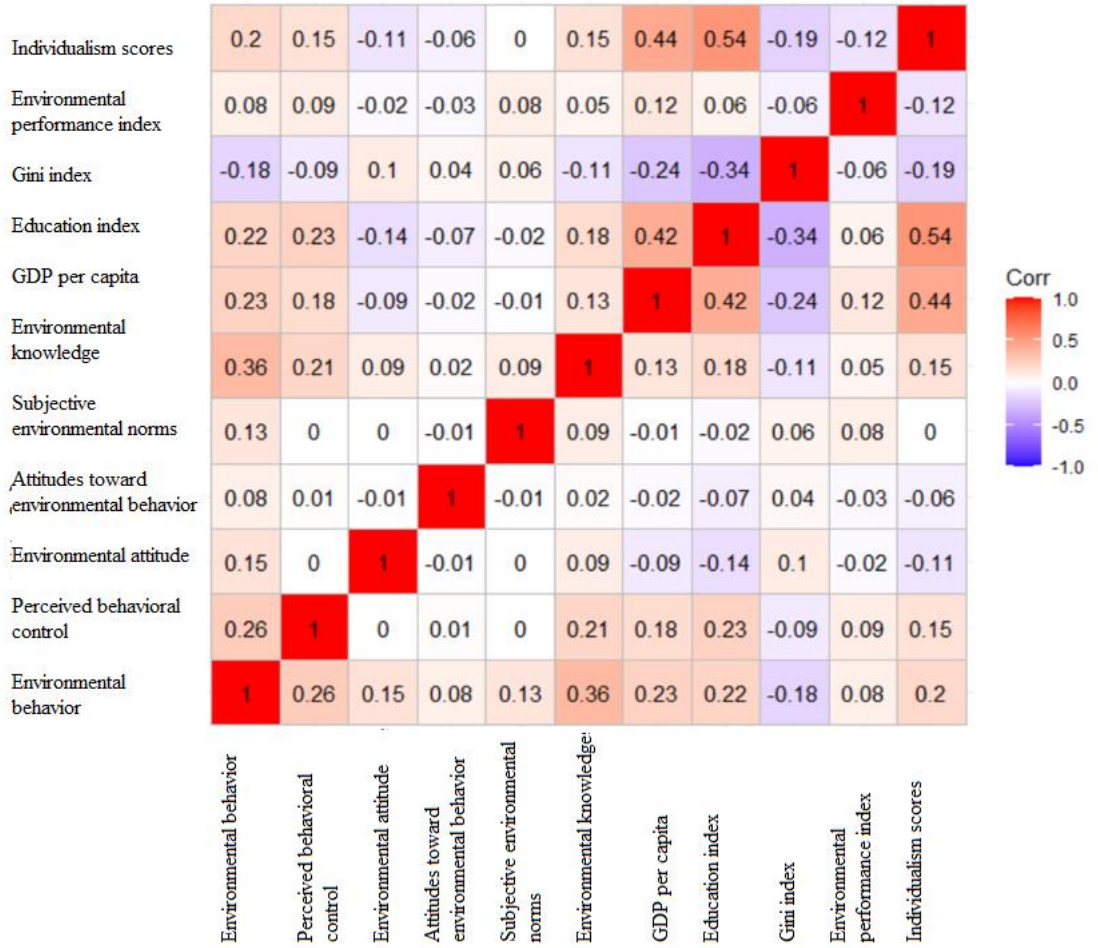

Figure 3.4. Correlation matrix for independent and dependent variables at the country and individual levels

To test the influence of individual-level theoretical constructs and country-level variables on mean behavior of European, we adopted a multilevel modelling strategy (Finch et al., 2019; Gelman & Hill, 2006). Multilevel models decompose a sample's variance into parts (variance related to individuals and variance related to countries), allowing inferences to be made regarding sources of variation in the outcome of interest (Gelman & Hill, 2006; Plant, 2012). The multilevel model was estimated using the *lme4* package (Bates, 2010) implemented in the R Environment and Language for Data Analysis (R Core Team, 2020). Restricted maximum likelihood (REML) was used to estimate the parameters (Finch et al., 2019, pp. 23–26). The variance inflation factor (VIF) for each independent variable indicated that multicollinearity was not an issue (range from 1.0 to 1.3).

Before we report the results, in relation to the risk of incurring in an ecological fallacy, i.e., an incorrect assumption about individual behavior based on aggregate data for a group (Greenland & Morgenstern, 1989; Morgenstern & Thomas, 1993), we consider this risk to be very low. Certainly, if we were predicting the behavior of individuals from country-level drivers, without controlling for the fact that countries may differ regarding individual-level drivers and social indicators, then the ecological fallacy could indeed be an issue. However, in this research we control for individual-level drivers and social indicators, before unpacking the residual contextual effect, and therefore, explain the pro-environmental behavior that individual-level drivers fail to account for.

3.4. Results

We first built the null model (M0), which allows the constant term to vary by country (Table 3.1), for use as a benchmark for further model fitting. To test our hypotheses, we then built four models (M1 to M4) as follows: M1, individual-level drivers (perceived behavioral control, environmental attitudes; attitudes towards environmental behaviors, subjective environmental norms, environmental knowledge); M2, individual-level drivers plus individual-level social indicators (age, gender, education level, income); M3, individual-level drivers and social indicators plus country-level drivers (affluence, education level, income inequality, and environmental issues); M4, culture and random slopes for the five individual-level drivers and their interactions with culture (individualistic orientation) and country-level drivers, so as to test their moderating role on cross-level interactions (Table 3.1). Reported at the bottom of Table 3.1 are model fit statistics: Akaike information criterion (AIC), Bayesian information criterion (BIC), and analysis of variance (ANOVA).

Table 3.1. Multilevel regression results

	Pro-environmental behavior				
Models	**M0**	**M1**	**M2**	**M3**	**M4**
Predictors	Estimates(p)				
Intercept (confidence interval)	4.09*** (3.74-4.44)	4.00*** (3.70-4.30)	3.23*** (2.92 – 3.51)	-8.70** (-16.35 – -2.48)	-5.97 (-14.97 – -0.48)
Perceived behavioral control (PBC)		0.35*** (0.32 – 0.38)	0.33*** (0.29 – 0.36)	0.33*** (0.29 – 0.36)	-3.35** (-5.63 – -1.08)
Environmental attitude (EA)		0.47*** (0.44 – 0.50)	0.45*** (0.42 – 0.48)	0.45*** (0.42 – 0.48)	-1.67 (-4.06 – 0.72)
Attitude toward environmental behaviors (ATEB)		0.22*** (0.19 – 0.25)	0.21*** (0.18 – 0.24)	0.21*** (0.18 – 0.24)	-1.90* (-3.77 – -0.03)
Subjective environmental norms (SEN)		0.32*** (0.29 – 0.35)	0.30*** (0.27 – 0.33)	0.30*** (0.27 – 0.33)	-1.88 (-4.08 – 0.33)
Environmental knowledge (EK)		0.67*** (0.64 – 0.71)	0.64*** (0.60 – 0.67)	0.64*** (0.60 – 0.67)	0.52*** (0.29 – 0.74)
Age: 25-39 years			0.30*** (0.18 – 0.42)	0.30*** (0.18 – 0.42)	0.31*** (0.19 – 0.43)
Age: 40-54 years			0.45*** (0.33 – 0.56)	0.45*** (0.33 – 0.56)	0.44*** (0.32 – 0.56)
Age: 55 years and older			0.32*** (0.21 – 0.43)	0.32*** (0.21 – 0.43)	0.30*** (0.19 – 0.41)
Gender (woman)			0.21*** (0.15 – 0.26)	0.21*** (0.15 – 0.26)	0.20*** (0.14 – 0.25)
Education level			0.27*** (0.24 – 0.30)	0.27*** (0.24 – 0.30)	0.27*** (0.24 – 0.30)
Income: difficulties to pay bills, from time to time			0.22*** (0.10 – 0.33)	0.22*** (0.10 – 0.33)	0.19** (0.07 – 0.30)
Income: difficulties to pay bills, never			0.44*** (0.33-0.55)	0.43*** (0.32-0.55)	0.42*** (0.30-0.53)
Country affluence (GDP)				1.16*** (0.66 – 1.65)	0.99*** (0.44 – 1.53)
Country education (Education Index)				1.58 (-1.69 – 4.86)	0.39 (-3.26 – 4.05)
Country income inequality (Gini Index)				-5.81** (-9.91 – -1.70)	-5.78** (-9.95 – -1.61)
Country environmental issues (Environmental Performance Index)				0.88 (-4.87 – 6.64)	1.57 (-4.47 – 7.62)
Culture (individualism score)					0.87 (-0.28 – 2.03)
Country affluence:PBC					0.18 (-0.03 – 0.39)
Country affluence:EA					0.20 (-0.01 – 0.41)
Country affluence:ATEB					0.18* (0.01 – 0.35)
Country affluence:SEN					0.23* (0.03 – 0.42)
Country education:PBC					1.91** (0.56 – 3.26)
Country education:EA					0.25 (-1.14 – 1.64)
Country education:ATEB					-0.00 (-1.07 – 1.06)
Country education:SEN					-0.12 (-1.39 – 1.15)

Country income inequality:PBC					0.56 (-1.11 – 2.23)
Country income inequality:EA					-0.60 (-2.17 – 0.97)
Country income inequality:ATEB					0.81 (-0.39 – 2.01)
Country income inequality:SEN					-0.36 (-1.81 – 1.08)
Culture (individualism score):EA					-0.08 (-0.50 – 0.34)
Culture (individualism score):ATEB					-0.09 (-0.40 – 0.22)
Culture (individualism score):SEN					-0.04 (-0.42 – 0.34)
Culture (individualism score):EK					0.22 (-0.15 – 0.59)
Random effects					
σ2	5.98	4.96	4.85	4.85	4.77
τ_{00}	0.86country	0.61country	0.48country	0.16country	0.16country
ICC	0.13	0.11	0.09	0.03	0.03
Marginal R^2	0	0.161	0.186	0.257	0.270
Conditional R^2	0.126	0.252	0.259	0.280	0.293
Model fit statistics					
	M0	**M1**	**M2**	**M3**	**M4**
AIC	104227	100023	99547	99521	99319
BIC	104251	100087	99667	99673	99648
Deviance	104221	100007	99517	99483	99237
Anova Chisq Chi		4214.1	489.62	34.204	245.45
Anova Pr(>Chisq)		***	***	***	***
N (observations): 27 countries (22504)					

Note: Significance levels: 0 <***< 0.001< **<0.01<*<0.05

3.4.1. To what extent does the country context account for observed variations in Europeans' pro-environmental behaviors?

To quantify variations in clusters of observations, we used the intraclass correlation coefficient (ICC), which reflects the proportion of total variance accounted for by individual countries (Roberts, 2000). A low value indicates that differences among countries are small in relation to global variation in the sample (Finch et al., 2019, p. 25). Shown in the bottom part of Table 3.1 (random effects section) are the ICC and country random variation values. The null model (M0) shows country heterogeneity in behaviors. The ICC suggests that country differences explain 13% of sample variance, suggesting the need to use a multilevel model, so that contextual variables can explain variations between countries in terms of individual pro-environmental behaviors.

3.4.2. To what extent do individual-level drivers explain Europeans' pro-environmental behaviors?

Model M1 includes the five individual-level theoretical constructs. Comparing M0 and M1 using ANOVA, the latter is better at explaining general pro-environmental behaviors. M1 shows that higher values for perceived behavioral control (β=.35), environmental attitudes (β=.47), attitudes toward environmental behaviors (β=.22), subjective environmental norms (β=0.32), and environmental knowledge (β=.67) are related to more pro-environmental behaviors.

Model M2 adds in the individual's social and positional indicators (age, gender, education level, and income), and according to the ANOVA test (and also the AIC and BIC), better explains behaviors than M1 ($p<.001$). In M2, all the social indicators show the expected results: pro-environmental behaviors are positively associated with being female, higher education levels, higher income levels, and older age categories. However, those variables explain only a small amount of variance (2.5%) compared to the individual-level drivers (16.1%).

Those findings support our individual-level hypotheses H1a, H1b, H1c, H1d, and H1e. Thus, for those models, environmental knowledge is the most significant driver of pro-environmental behaviors at the individual level. Furthermore, when individual-level social indicators are included, the total variance between countries is reduced (from 0.86 to 0.48), although variability between countries continues to be significant (ICC=.09).

3.4.3. To what extent do country-level drivers explain differences in Europeans' mean pro-environmental behaviors?

M3 includes contextual-level country drivers (affluence, education level, income inequality, and environmental issues). The ANOVA test suggests that M3 is better than M2 ($p<.001$), and the ICC falls to 0.03. The country-level variables lead to a 32% reduction in variance in M3 over M2. Controlling for the effect of all the country-level drivers, affluence (GDP Per Capita) is significantly and positively related (β=1.16) to the dependent variable. In contrast, income inequality (Gini Index) is significantly and negatively related (β =-5.81) to the same variable. High-income equality and a high economic level in a country positively impact on individuals'

pro-environmental behaviors, whereas country environmental issues and education level have no impact. Therefore, H2a and H2c are supported, whereas H2b and H2d are not supported.

3.4.4. To what extent do country-level drivers moderate the effects of individual-level drivers on Europeans' pro-environmental behaviors?

Finally, M4 takes into account the moderating effect of country-level drivers on individual-level drivers. Although the ICC does not change (it remains at 0.03), marginal R-squared increases by .013 units (to 0.270) and conditional R-squared increases by .013 units (to 0.293). The ANOVA test suggests that M4 is better than M3 (the AIC and BIC values decrease). With the moderating effects of the country-level drivers, individual-level drivers, with the exception of environmental knowledge, are either no longer significant or change sign, while the impacts of social indicators and country-level drivers remain the same.

Only two country-level drivers are found to moderate the effect of individual-level drivers, namely, country affluence and education level. In more affluent countries, the impact of attitudes toward environmental behaviors and subjective environmental norms on environmental behaviors is stronger (β=0.18 and β=0.23, respectively). Affluence, in contrast, does not moderate the impact of environmental attitudes or perceived behavioral control on pro-environmental behaviors. Although the expected direction of the moderating effect of affluence on subjective environmental norms was expected to be negative, we find the opposite to be the case. Country education level, however, has a significant indirect effect on pro-environmental behaviors through perceived behavioral control (β=1.91). Thus, H3a and H3c are partially supported, whereas H3b and H3d are not supported.

Finally, regarding the moderating role of culture, results showed that individualism has neither a direct nor indirect effect on pro-environmental behaviors. Therefore, the cultural hypotheses (H4a, H4b, H4c, and H4d) are not supported.

Figure 3.5, which graphically depicts the indirect impact of a country's affluence (GDP per capita) and education level on pro-environmental behaviors, shows the predicted impact measured at the mean level for each country (for one standard deviation above or below the mean). Panel A

describes the impact of the country's affluence on the effect of attitudes towards environmental behaviors on pro-environmental behaviors. With a mean score centered at zero, the effect of their country's affluence on attitudes towards environmental behaviors is less for individuals with a lower score than for individuals with a higher score. In more affluent countries, stronger attitudes toward environmental behaviors are transformed into higher pro-environmental behavior scores. In other words, the effect of attitudes toward environmental behavior grows with a country's level of affluence.

In contrast, the effect of a country's affluence on subjective environmental norms (Panel B) is not as strong, and likewise for the effect of country education level on perceived behavioral control: for low scores, it makes no difference whether a person lives in an affluent country, but for high scores, it matters significantly (the slope is greater). In conclusion, for individuals living in an affluent country with high scores for attitudes towards environmental behaviors and subjective environmental norms, there is a greater difference in their impact on environmental behaviors. For individuals with high perceived behavioral control scores, living in a country with a higher level of education favors pro-environmental practices (Panel C).

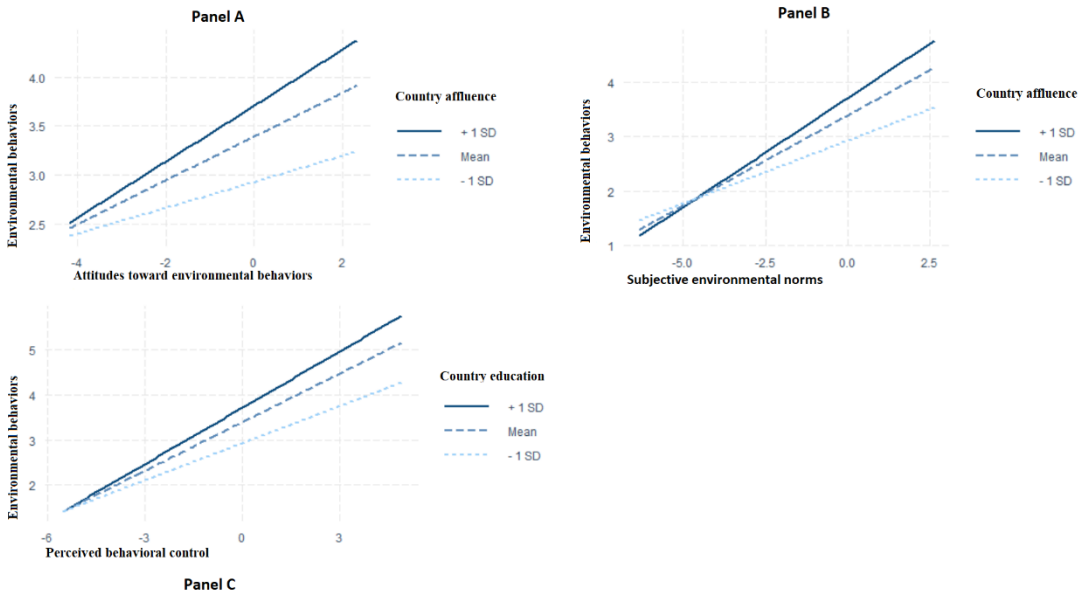

Figure 3.5. The indirect effect of country affluence and education level on pro-environmental behaviors

3.5. Discussion

Our findings reveal that Europeans with higher levels of greater perceived control, environmental attitudes, attitudes toward environmental behaviors, subjective environmental norms, and environmental knowledge behave more pro-environmentally. In terms of a social description, across all EU countries, older, well-educated, and affluent women exhibit higher pro-environmental behaviors. Research to date into the effect of individual-level drivers on pro-environmental behaviors across nations have also found a positive impact for attitudes (Guerin et al. 2001; Hadler and Haller 2011; Oreg and Katz-Gerro 2006; Pirani and Secondi 2011; Pisano and Lubell 2017), subjective environmental norms (Ruiz de Maya et al., 2011), environmental knowledge (Pirani & Secondi, 2011), being a woman (Hadler and Haller 2011; Pisano and Lubell 2017; Zelezny et al. 2000), personal affluence (Fairbrother, 2013; Guerin et al., 2001; Pirani & Secondi, 2011), being older (Guerin et al., 2001; M. Wiernik et al., 2013), and being better educated (Guerin et al. 2001; Pirani and Secondi 2011; Pisano and Lubell 2017).

At the country level, we found that, after controlling for individual-level drivers, the mean pro-environmental behavior of citizens from more affluent nations was greater than for citizens from less affluent countries. Our findings support the affluence hypothesis, suggesting that behaviors that reduce the environmental footprint are driven by individual decisions and result from a country's economic capacity to behave pro-environmentally (Diekmann & Franzen, 1999, p. 541). People in affluent countries can afford to spend more resources on improving their environment and reducing their carbon footprint (Diekmann & Franzen, 1999, p. 547). Additionally, more affluent countries offer more opportunities for pro-environmental action through specific budgets, an essential factor in improving the quality of the environment (Dalton, 2005; Duroy, 2008; Franzen, 2003; Franzen & Meyer, 2010; Freymeyer & Johnson, 2010; Hadler & Haller, 2011; Inglehart, 1995; Kemmelmeier et al., 2002; Oreg & Katz-Gerro, 2006; Pirani & Secondi, 2011; Pisano & Lubell, 2017).

However, contradicting previous research (Duroy, 2008; Magnani, 2000), we found that income inequality directly impacted on behavior. On average, citizens of nations with greater income

equality behave more pro-environmentally than citizens in countries with lower income equality. Unequally distributed incomes within nations result in unequal production and distribution of goods and services (Boyce, 2007), and affect consumer behaviors regarding sustainable choices. Higher (lower) affluence and less (more) income inequality in a country increase the market in sustainable products and, consequently, positively (negatively) affect access to those products, and may even cause their price to go down (up) (Thøgersen, 2005). Therefore, policymakers need to consider that affluence and more equal income distribution will foster a nation's overall sustainability.

Contrary to previous research (Pisano and Lubell 2017), our findings do not support the environmental degradation hypothesis, as we found no significant relationship between a country's environmental issues and pro-environmental behaviors. Even so, respondents living in more affluent countries tend to behave more pro-environmentally, irrespective of their country's environmental issues (Freymeyer & Johnson, 2010). In fact, previous research has described an inconsistent relationship between environmental issues and environmental practices. While a positive relationship has been reported between urbanization, country income, and environmental pollution (Sun et al. 2019), environmental degradation has been found to be negatively related to pro-environmental behavior across 30 mostly higher income and largely industrialized countries (Pisano and Lubell 2017). Other research referring to 50 nations has found no relationship between environmental issues and willingness to pay for environmental protection (Gelissen 2007). Inconsistent results may stem from country selection, i.e., less developed, developing, or developed countries. Even though environmental issues may exist in societies of the global north that motivate their citizens to be concerned about environmental issues, this challenge-response seems to be less harmful in situations of economic modernization and the delocalization of most pollutant activities. In fact, most industrialized countries have achieved substantial improvements in environmental quality since 1970 (Inglehart 1995).

Future studies could focus on sub-dimensions of the Environmental Performance Index, to test how they relate to specific pro-environmental behaviors. Objective environmental problems and

perceptions of their criticality are also important; for this reason, the perceived risk associated with specific environmental issues could also be the object of future studies.

Contrary to what we hypothesized, there was no significant moderating effect of a collectivist versus individualist cultural orientation on environmental attitudes, environmental attitudes towards behaviors, subjective environmental norms, or environmental knowledge. This may be because there was insufficient variation in the data available to us: all the EU countries are individualist cultures with only small differences between them. In fact, when studying the determinants of green purchasing behavior, Liobikienè, Mandravickaitè, and Bernatoinenè (2016) did not find any significant effect of the studied cultural dimensions.

Another significant contribution of this study is how it uncovers the influence of country-level drivers on attitude-behavior relationships. Interestingly, the impact of attitudes towards environmental behaviors and subjective environmental norms on pro-environmental behaviors is higher in more economically developed countries. That means that, for the same attitudes towards environmental behaviors or subjective environmental norms, and especially for Europeans with scores higher than the mean, the impact on behaviors is greater in more developed EU countries (see Figure 3.5). Even though the shape of the attitude-behavior relationship according to income in our study is similar to that reported by Pisano and Lubell (2017), the influence is less strong; nonetheless, this difference is only to be expected as EU income differences are not so marked as in the International Social Survey Programme sample used by those authors. Note that environmental attitudes, measured as environmental concerns, were not correlated with country affluence and education level, contrary to the findings of Hannibal and colleagues (Hannibal et al., 2016).

Our study also disaggregates the effect of socioeconomic development on attitude-behavior relationships, not only in relation to income, but also income inequality, country education level, and collectivism values. We found that a country's education level enhances perceived behavioral control in pro-environmental behaviors. Thus, for the same perceived behavioral control level, the impact on pro-environmental behavior is greater in EU countries with a higher education level, particularly for Europeans with scores above the mean. Therefore, for Europeans living in more

socioeconomically developed countries, perceived behavioral control, attitudes towards environmental behaviors, and subjective environmental norms will have a higher impact on pro-environmental behaviors. These findings are consistent with literature on the attitude-behavior (Pisano & Lubell, 2017), attitude-intention (Liu & Sibley, 2012), and perceived behavioral control and intention (Morren & Grinstein, 2016) relationships. Consumers living in more socioeconomically developed countries may have fewer external barriers to behaving pro-environmentally, making it easier to transform environmental attitudes into behavior (Pisano & Lubell, 2017).

3.5.1. Limitations

This research has some limitations. First, the measurement of individual-level drivers is limited due to the data available, even though the EFA reports evidence of their discriminant validity. Second, although the focus is cross-national analysis, the EU countries share an institutional framework and, consequently, the findings may not be generalizable to other institutional setting or less developed countries. Third, since we have examined self-reported individual environmental behaviors, results presumably may differ when behaviors are observed (Ajzen, 1985), when behaviors refer to the public sphere (Hadler & Haller, 2011; Pisano & Lubell, 2017), or when research measures particular behavioral domains (Duroy, 2008).

3.5.2. Future research

The pro-environmental score is a sum of 15 indicators, only some of which are very much tied to affluence (e.g., purchasing less polluting products, but not necessarily using services that pollute less). As wealthy individuals living in affluent countries do not concerns about making ends meet, they can afford to behave in more environmentally friendly ways. However, to test whether post-materialist values in more affluent countries are correlated to pro-environmental behaviors, we plan to conduct further research to measure environmental behavior for items that only reflect affluence, and so test whether both individual and country affluence levels are related to pro-environmental behaviors.[4]

Further research could also consider meso-level variables, such as municipality characteristics, tax benefits, negative incentives, and tax rebates (Vig & Kraft, 2012). Other factors that could be considered include the rise of green parties (Inglehart, 1995), recent political history (ex-communist versus capitalist societies) (Kemmelmeier et al., 2002), the number of non-governmental organizations, and the level of democracy (Hadler & Haller, 2011). Finally, it would also be useful to view change over time by conducting longitudinal studies investigating the moderating effect of advances in socioeconomic development on the impact that individual-level factors may have on environmental behavior.

3.6. Conclusion

We have contributed to the development of a more nuanced theory of the attitude-behavior-context model in researching a context reflecting only EU countries. We find that, in the EU, country socioeconomic development level influences Europeans' mean pro-environmental behavior and attitude-behavior relationships. A disaggregated analysis of the meaning of the country socioeconomic development (affluence, education level, and income (in)equality) shows that income is not as statistically significant as it has been found in research conducted with more heterogeneous sets of countries. Nevertheless, income inequality and education level are highly influential concerning perceived behavioral control, while affluence influences attitudes towards environmental behaviors and social environmental norms. That means that the influence of country development on behavior, through social-psychological drivers, may follow a different pattern and operate under other socioeconomic mechanisms in more developed compared to less developed countries. For instance, perceived behavioral control is an intrinsic motivator of behavior that helps citizens interpret reality and influences their ability to change – yet a better education level may lead to a different interpretation of reality. Income is not enough in itself to change perceptions of reality, but income can be transformed into cultural capital, through a better education level, and so can bring about change in socially ingrained habits, skills, and attitudes regarding the environment.

Chapter 4. Environmental behavior patterns across clusters of European Union countries: Uncovering heterogeneity in the attitude-behavior-context relationship

4.1. Introduction

Research into sustainable consumption and environmental behaviors has to date been conducted in single countries (He et al., 2019; Pisano & Hidalgo, 2013; Sun et al., 2019) or in sets of highly heterogeneous countries (Oreg & Katz-Gerro, 2006; Pisano & Lubell, 2017; Wang, 2017). It has also focused on the mean influence of sociopsychological drivers of environmental behaviors (Hines et al., 1987; Klöckner, 2013; Morren & Grinstein, 2016) and how country-level drivers moderate their influence. In the latter case, the attitude-behavior framework has been further developed, as the attitude-behavior-conditions (A-B-C) framework, to include the influence of context on individual-level drivers of sustainable environmental behaviors (Black et al., 1985; Guagnano et al., 1995; Pisano & Lubell, 2017; Wang et al., 2021; Wang, 2017).

Few studies have closely examined the existence of individual and contextual heterogeneity in the A-B-C relationship. The relationship between attitude and behavior depends not only on the context, it also systematically differs among groups of individuals, giving birth to a set of A-B-C relationships, in plural. This fact is of particular importance for policy makers. Consequently, to be able to design better environmental policies, the European Union (EU) needs to know how Europeans systematically differ in their behaviors and how heterogeneity could be reduced to a few sets of countries. According to Aldrich and associates (2007), individuals need to be classified according to different behavior patterns and expected responsiveness to government policies. Hence, the design of environmental policies that are well grounded in Europeans' behaviors and expected responses requires exploration of systematic unobserved heterogeneity in sustainability patterns and systematic differences between EU countries.

We understand the EU to be composed of individuals with different attitude-behavior patterns based in country clusters that differ in terms of their environmental practices. Our study thus aims

to uncover systematic differences in individual-level drivers of environmental behaviors and their distribution over EU countries. We also explore how individual environmental behavior patterns are related to social position (social categories and resources) and how country clusters reflect their socioeconomic development and culture.

The remainder of this paper is structured as follows. Section 2 introduces the theoretical background, focused mainly on the A-B-C environmental model. Section 3 describes our methodology, data and analyses. Section 4 reports our results. Section 5 discusses our findings, implications and limitations. Finally, we conclude with a brief summary.

4.2. Theoretical framework

4.2.1. Attitude-behavior-context model

While early research into the relationship between individuals' inner sociopsychological processes and environmental behaviors assumed a direct relationship between attitudes and behaviors (Fishbein & Ajzen, 1975; Schwartz, 1970; Kollmuss & Agyeman, 2002), further research has provided evidence that the relationship is more complex (Gupta & Ogden, 2006, 2009; Oskamp et al., 1991; Wiederhold & Martinez, 2018). Since the attitude-behavior relationship would seem to depend on other individual- and contextual-level drivers, Guagnano and associates (1995) proposed the attitude-behavior-conditions (A-B-C) model to explain the social mechanisms that connect sociopsychological drivers with contextual or ecological drivers. Note that, below we refer to the broader concept of 'context' rather than 'conditions'.

Environmental behavior nowadays is understood to reflect a combination of individual-level rational and pro-social motivations. Rational behavior is when, under ordinary conditions, individuals act according to their own best interests. Pro-social behavior reflects an individual's personal connection with their social and natural contexts and with future generations. Depending on the individual, rational motivations may influence behavior more than pro-social motivations and vice versa.

Environmental psychology models explaining attitudes and behaviors have been constructed from the theory of planned behavior (TPB) (Ajzen, 1985), the norm-activation model (NAM)

(Schwartz, 1977), the new environmental paradigm (NEP) (Dunlap & Liere, 1978) and the value-belief-norm theory (VBN) (Stern et al., 1999). Research has found that knowledge of environmental problems and of their consequences and possible solutions (actions, skills and strategies) influence environmental behaviors (He et al., 2019; Jiménez Sánchez & Lafuente, 2010; Pisano & Hidalgo, 2013). Attitudes to the environment, which reflect favorable or unfavorable feelings towards particular aspects or objects related to the environment (Gifford & Sussman, 2012), can be split into two components (Kurisu, 2015): environmental attitudes and attitudes toward environmental behaviors. Perceived behavioral control refers to an individual's perceptions of whether their behavior can bring about environmental change (Ajzen, 1985, 2005). Finally, subjective environmental norms represent environmental values and attitudes regarding others, i.e., expectations that people will act morally (Morris et al., 2015). Consequently, we can expect individuals with differing levels of those five theoretical constructs (i.e., sociopsychological predictors) – environmental knowledge, environmental attitudes, attitudes toward environmental behaviors, perceived behavioral control and subjective environmental norms – to systematically differ in their behaviors.

Hypothesis H1: Europeans systematically differ in their environmental behaviors.

While psychological research has focused on attitudes and behaviors, sociological research has studied how individual's social position (based on social categories and resources) and living in different societies shape the behavior of individuals (Bourdieu, 1979; Giddens, 1984). Sociological research acknowledges that individuals have the capacity to act independently of what is expected from their social position and make choices that explain behavioral variations – variations not accounted for by temporal social structures (Katz-Gerro et al., 2020). Consequently, while individuals holding particular social positions may have similar behaviors, agency differences may account for different attitudes regarding the environment. The agency-structure opposition upholds the homology hypothesis regarding the environment, i.e., that systematic differences in behaviors reflect differing attitudes and social positions of individuals (Gifford & Sussman, 2012; Kollmuss & Agyeman, 2002).

To explain discrepancies, therefore, we need to account for social differences that explain the social mechanisms underpinning sustainable behaviors (Guagnano et al., 1995). Consequently, researchers have tried to identify the social categories, resources and that not only influence behavior but that modify the impact of rational and pro-social motivations on environmental behaviors (Ertz et al., 2016; Geiger et al., 2019; He et al., 2019).

Hypothesis H2: Europeans' environmental behaviors differ systematically depending on their social position.

Furthermore, the social structures that limit or benefit individuals may have several social levels. Black and associates (1985) examined the indirect effect of market drivers (e.g., fuel price fluctuations) on the relationship between energy-saving attitudes and behaviors. Two years later, the first meta-analysis of research into environmental behaviors proposed that situational drivers (e.g., economic constraints, social pressures and opportunities to choose different actions) may directly influence such behaviors (Hines et al., 1987). However, neither of those studies proposed a clear and detailed theoretical framework that usefully blended individual and contextual levels. It was Stern and Oskamp (1987) who developed the first comprehensive theoretical framework that considered the relationship between individual and contextual drivers and individual behaviors; this framework was popularized by Guagnano and associates as the A-B-C model (1995). According to this theoretical framework, environmental behavior (B) is the outcome of both personal attitudes (A) and conditions (C) – what we refer to more generically as context, i.e., the socioeconomic setting in which consumers operate (Black et al., 1985), at the micro- (individual and family), meso- (community) and macro-level (country) (Guagnano et al., 1995; Olli et al., 2001). Consequently, the A-B-C model proposes that the attitude-behavior relationship may be moderated by the environmental decision-making context. Twenty years on, this model has proved useful in explaining private and public pro-environmental behaviors (Dhir et al., 2021; Ertz et al., 2016; Xu et al., 2017).

4.4.2. Differing A-B-C model context levels

In the first A-B-C study, Guagnano and associates (1995) analyzed the impact of the household presence of a recycling bin (a structural driver), finding that bin presence directly and indirectly

promoted recycling behaviors, given the same motivations: “This relationship indicates that the effect of providing bins was to remove a major barrier to action consistent with pre-existing attitudes” (Guagnano et al., 1995, p. 713).

Heath and Gifford (2002), in a study framed within the TPB (Ajzen, 1985), analyzed the direct and indirect impacts of a university travel pass aimed at reducing student car use; not only did public transport use increase significantly, attitudes and beliefs concerning public transport also changed for the better. This finding would suggest that contextual drivers may positively moderate the effect of attitudes on behaviors.

At the macro-level, external drivers are broadly classified as physical, financial, legal and societal factors (Guagnano et al., 1995). An individual’s behavior may thus be affected by a country’s affluence, income inequality, environmental regulations, taxation, infrastructures and culture, to just name a few factors (Welch & Southerton, 2019, p. 33). For example, studies have shown that the influence of environmental values on behavior is different in Japan and in the Netherlands (Aoyagi-Usui et al., 2003), that the influence of environmental concerns on behavior is stronger in the USA than in India (Muralidharan et al., 2016) and that the relationship between environmental values, attitudes and behaviors differs between England, Germany, Portugal and Spain – countries with different structural conditions in terms of economic development, social context and cultural values (Paço et al., 2013). Similar differences have been reported for the EU countries (Liobikienė et al., 2016). Consequently, we can hypothesize as follows:

Hypothesis H3: The environmental behavior patterns of Europeans differ systematically in their distribution among country clusters.

Hypothesis H4: The environmental behaviors of EU countries differ systematically according to country socioeconomic development and culture.

4.2.3. Heterogeneity in the attitude-behavior relationship

Few studies have closely examined individual and contextual heterogeneity in the A-B-C model. One exception – suggesting the importance of studying contextual heterogeneity – is a study by Dolnicar and Grün (2009), who, in testing the hypothesis that individuals differ systematically in their environmental behaviors depending on situational contexts, found systematic differences

(reflected in six behavioral patterns) in attitude-behavior relationships in everyday life that changed depending on the context: everyday life or holidays. Farizo and associates (2014) studied water protection preferences in England and Wales, finding that heterogeneity could be reduced to five behavior patterns shaped by the living conditions of individuals and suggesting, furthermore, that similarities and differences in behaviors may be geographically distributed.

Consequently, to identify suitable strategies to improve environmental sustainability, the extent to which environmental behaviors are context-dependent is both of theoretical interest and of paramount importance (Dolnicar & Grün, 2009). However, none of the studies reviewed so far have analyzed how and why attitude-behavior relationships may systematically differ within and across EU countries (Telesiene & Gross, 2017; Schaffrin & Schmidt-Catran, 2017).

4.3. Methodology

4.3.1. Data

Data was provided by the 2017 Special Eurobarometer 468 public opinion survey on the environment carried out in the 27 EU member states[1] plus the UK (EU27+UK) and available from the GESIS data center (European Commission and European Parliament, Brussels, 2018). The sample includes data on 27,881 individuals aged $\geq$15 years surveyed between 23 September and 2 October 2017. Individuals were sampled according to a standard multistage probability procedure and interviews were conducted using computer-assisted personal interview techniques.

4.3.2. A-B-C model measures

Individual environmental behaviors

Individual environmental behaviors – the dependent variable – were measured from two batteries of questions regarding 15 environmental practices (see Supplementary Appendix Table 3), with scores for all the items summed between 0 and 15. Overall mean score was 3.869 and variance was 0.874 (Cronbach's alpha .68).

[1] Austria, Belgium, Bulgaria, Cyprus, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

Individual sociopsychological predictors

The five predictors were measured as follows. Environmental attitudes and attitudes towards environmental behaviors were measured from questions regarding individuals' concerns about environmental problems (Hayward, 1990; Kurisu, 2015) and their attitudes to governmental environmental policies. Perceived behavioral control was measured through two indicators: a question regarding role in protecting the environment and a question regarding whether polluters should pay for environmental damage. The latter question reflected the fact that, since behaviors can instigate change, individuals should be made responsible for changing their behavior. Subjective environmental norms were measured (in a similar way to Kurisu (2015)) as normative statements about what should be done to solve environmental problems, with questions reflecting environmental expectations regarding others. Finally, environmental knowledge reflected three main information sources from a broad set of alternative sources, with more sources indicating better environmental knowledge (scored 0 to 3). Any 'don't know' response was coded as a missing value (see Supplementary Appendix Table 5 for individual-level independent variables). Table 4.1 reports descriptive statistics for individual environmental behaviors for the EU27+UK. Compared to countries located in the south and southeast of Europe, Scandinavian countries obtained higher scores for environmental behaviors, perceived behavioral control and environmental knowledge, and lower scores for environmental attitudes, attitudes toward environmental behaviors and subjective environmental norms. So, at first sight, our results may represent two groups: southern-eastern and northern-western.

Table 4.1. Mean individual environmental behavior and theoretical construct (predictor) scores for EU27+UK

Country	Environmental behaviors	Perceived behavioral control	Environmental attitudes	Attitudes towards environmental behaviors	Subjective environmental norms	Environmental knowledge
Austria	4.407	6.778	16.076	8.961	13.460	2.602
Belgium	4.932	6.929	16.408	9.986	13.881	2.476
Bulgaria	2.749	6.991	17.467	10.432	14.797	2.132
Cyprus	3.179	7.320	18.756	11.089	15.211	2.137
Croatia	2.661	6.834	16.616	9.740	13.750	2.082
Czech Republic	3.713	6.674	15.995	9.062	13.589	2.496
Denmark	5.089	7.154	15.594	9.531	14.607	2.674

Estonia	3.703	6.815	16.184	9.496	13.874	2.494
Finland	4.941	6.878	15.687	9.270	14.357	2.717
France	4.686	6.967	16.669	9.926	14.166	2.489
Germany	4.580	7.182	15.904	9.895	13.875	2.373
Greece	3.287	6.970	17.732	9.834	14.713	2.368
Hungary	3.693	6.698	16.301	10.022	14.286	2.182
Ireland	4.252	7.314	17.048	10.313	14.991	2.474
Italy	3.614	6.859	17.170	9.768	14.111	2.162
Latvia	4.209	6.898	17.408	9.856	14.126	2.520
Lithuania	3.113	6.778	16.851	9.870	14.133	2.256
Luxembourg	5.165	6.979	16.942	9.827	14.071	2.331
Malta	4.796	7.223	17.891	9.872	14.595	2.310
Netherlands	5.371	7.366	15.044	9.546	14.046	2.784
Poland	3.094	6.557	16.265	9.823	13.520	2.059
Portugal	2.609	6.875	16.313	10.231	14.677	1.967
Romania	3.079	6.728	16.491	9.965	13.937	2.132
Slovakia	3.559	6.668	16.418	10.122	14.307	2.136
Slovenia	4.679	7.166	17.323	10.322	14.343	2.219
Spain	3.494	6.944	16.854	10.389	14.393	1.959
Sweden	6.256	7.476	15.821	10.073	14.557	2.840
United Kingdom	4.107	7.213	16.073	9.448	14.819	2.321
EU27+UK overall	3.869	6.933	16.427	9.832	14.187	2.287

As the Eurobarometer survey was not developed to collect data on particular theoretical drivers, we conducted exploratory factor analysis (EFA) to obtain evidence for the capacity of indicators to discriminate among individual-level drivers (Wood et al., 2015). Factors were extracted using principal component analysis (PCA) and varimax rotation, aided by the 'psycho' package (Makowski, 2018) implemented in the R Environment and Language for Data Analysis (R Core Team, 2020). The scree test was used to determine the number of factors to retain (see Supplementary Appendix Figure 1). For the first four components, the cumulative percentage of variance was 65%. Note that the portion of explained variance needs to be judged according to the research context, and can be as low as 50%-60% in social sciences and humanities (Williams et al., 2010). We found that the four-factor matrix structure could be interpreted in terms of environmental attitudes, subjective environmental norms, attitudes toward environmental behaviors, and perceived behavioral control. All loadings were higher than 0.5, so we could assume that the solution discriminates among those four theoretical constructs (see Supplementary Appendix Table 6).

Individual social indicators

The social indicators used to control for the social composition of the sample were age (15-24, 25-39, 40-54, ≥55 years), gender (men, women), education level (≥15, 16-19, ≥20 years, still studying, no full-time education), income measured by proxy according to difficulty paying bills (most of the time, from time to time, never), community type (rural area or village, small/middle town, large town), and household size (1, 2, 3, ≥4 persons).

Country drivers

A country's economic development was measured as per capita gross domestic product (GDP) for 2017 (expressed in terms of purchasing power parity in USD), sourced from the World Development Indicators (World Bank, n.d.). Educational development, reflecting mean years of education for adults and expected years of education for children, was scored according to the 2017 Education Index – sourced from the Human Development Report dataset (United Nations Development Programme, Human Development Reports, 2020) – between 0 and 1 (low and high educational development, respectively). Income inequality was scored using the 2017 Gini Index (Eurostat, 2020) between 0 and 100 (low and highest inequality, respectively). Data on local environmental issues was obtained from the Environmental Performance Index, jointly published every two years by Yale and Columbia Universities in collaboration with the World Economic Forum. Scores range from 0 to 100 (Hsu et al., 2016), with higher scores indicating greater environmental sustainability (i.e., fewer environmental issues). For the EU countries scores were taken for 2016 (the year closest to the Eurobarometer survey), for 19 indicators organized into several weighted categories (health, air quality, sanitation and drinking water, water resources, agriculture, forests, fisheries, biodiversity, habitat, climate, and energy). Finally, as a reflection of culture, individualism-collectivism was measured using Hofstede's index (Hofstede, 2001; 2020). Values range from 0 to 100, with higher scores indicating greater individualism (see Supplementary Appendix Table 8).

4.3.3. Analysis

To avoid biased estimators and inconsistent results (Ortega-Egea et al., 2014), we used a multilevel latent class regression model that systematically considered attitude-behavior

relationships to differ across clusters of individuals. EU countries could be expected to systematically differ according to the distribution of individual behavior patterns. Ordinary regression-based studies ignore heterogeneity across individuals, leading to inconsistent model parameters and probability estimates, while multi-group structural equation modelling (SEM) methods allow researchers to account for observed but not unobserved heterogeneity (Ortega-Egea et al., 2014).

Model-based segmentation procedures comprised latent class regression modelling (for sociology, see Vermunt, 2003) and mixture modelling (for marketing and consumer research, see Wedel and Kamakura, 2012). Vermunt (2003) proposed a multilevel extension of latent class regression to simultaneously identify clusters of individuals, homogenous within individual-level patterns, whose distribution differed across clusters of countries. Nesting individuals within countries makes it possible to consider that countries belonging to different clusters will differ in terms of the distribution of individual-level patterns. The multilevel latent class regression model consisted of mixed behavior patterns at the individual level and mixed distributions of those patterns within countries. In this model, regression parameters are allowed to differ across individual patterns and across their distributions in country clusters (level 2 units).

We used LatentGOLD 4.0 statistical software (J. K. Vermunt & Magidson, 2005) to estimate our model parameters. The dependent variable (individual environmental behaviors), as a summation index, was modelled following Poisson regression (Faria & Gonçalves, 2013), whereas the theoretical predictors were assumed to follow a normal distribution. Individual-level social indicators were treated as inactive covariates and were assumed to follow a multinominal distribution. Clusters of individuals, reflecting environmental behavior patterns, were described using social indicators, while clusters of countries were described using country-level drivers.

4.4. Results

4.4.1. Model selection

After several estimates of the 21 models that combine individual-level environmental behavior patterns and country-level clusters (Table 4.2), the best overall model was selected according to

the lowest Bayesian information criterion (BIC) value (highlighted in bold in Table 4.2) based on log-likelihood (J. K. Vermunt & Magidson, 2005). The BIC value decreased until a model reflecting four patterns was obtained and then increased for models with more than four patterns. The same trend was found for country clusters. The best model thus had four individual-level environmental behavior patterns and four country-level clusters. Missing values were removed using list-wise deletion, leaving 23,854 individuals out of the original sample of 27,881 individuals.

Table 4.2. Model selection (Bayesian information criterion): Environmental behavior patterns and country clusters

Patterns	Clusters				
	1	2	3	4	5
1[a]	105448				
2	104314	102849	102466	102349	102355
3	104182	102775	102345	102242	102233
4	104166	102724	102313	**102205**	102216
5	104185	102734	102325	102223	102248

[a] If the number of consumer patterns is 1, by definition the number of country clusters is restricted to 1 (Bijmolt et al., 2004) in terms of considering the multilevel property of individual-level observations.

4.4.2. To what extent do Europeans systematically differ in their environmental behaviors?

In seeking systematic differences between Europeans (hypothesis H1), the individual-level latent class regression models linked environmental behaviors to the five predictors (environmental attitudes, attitudes toward environmental behaviors, perceived behavioral control, subjective environmental norms and environmental knowledge). Posterior membership probabilities were estimated from the model parameters and used to classify individuals in one and only one pattern of behavior, i.e., in the cluster for which posterior probability was highest (J. K. Vermunt & Magidson, 2005).

Table 4.3 depicts the strength of the attitude-behavior relationships for each of the four environmental behavior patterns; the upper part reports pattern size, predictive capacity (R^2) and mean environmental score for each behavior pattern, and the lower part, which shows the association of predictors with behaviors, reports the Wald statistic reflecting different attitude-behavior relationship strengths across the EU. Note that we can reject the null hypothesis for all the predictors except for attitudes toward environmental behavior; thus, hypothesis H1 is largely supported, as Europeans systematically differ in terms of the strength of the attitude-behavior relationship, except for attitudes toward environmental behaviors.

Overall, the explanatory capacity of the model was satisfactory (R^2=0.51) according to standards (usually around 0.3) in environmental behavior studies (see He et al., 2019 and Klöckner, 2013). However, it varied depending on behavior patterns: explanatory capacity was highest (R^2=0.60) for pattern 4 (with the lowest mean behavioral score, 2.09) and lowest (R^2=0.15) for pattern 3 (with the highest mean environmental score, 6.06).

Table 4.3. Europeans' environmental behavior patterns

	Pattern 1 (Pre-environmentalist)	Pattern 2 (Less-environmentalist)	Pattern 3 (Environmentalist)	Pattern 4 (Non-environmentalist)	Sample	
Class size	0.4720	0.3274	0.1545	0.0460	1.0000	
R^2	0.3033	0.1824	0.1500	0.6014	0.5066	
Mean environmental behavior score	4.3463	2.8649	6.0605	2.0945		
Theoretical constructs (predictors)					Wald (=)	p
Intercept	1.3804	0.9858	1.7733	0.1844	572.5518	<0.0001
Perceived behavioral control (exp((β))	0.1330 (1.14)	0.0252 (1.03)	0.0899 (1.09)	0.8396 (2.32)	52.9108	<0.0001
Environmental attitudes (exp((β))	0.1238 (1.13)	0.0915 (1.10)	0.0992 (1.10)	0.7524 (2.12)	16.2952	<0.0001
Attitudes toward environmental behaviors (exp((β))	0.0546 (1.06)	0.0641 (1.07)	0.0623 (1.06)	0.0885 (1.09)	0.7227	0.87

Subjective environmental norms (exp((β))	0.0935 (1.10)	0.0525 (1.05)	0.1159 (1.12)	0.4975 (1.64)	24.7374	<0.0001
Environmental knowledge (exp((β))	0.2779 (1.32)	0.2686 (1.31)	0.0252 (1.03)	-0.1407 (0.87)	167.6259	<0.0001

According to the upper part of Table 4.3, environmental behavior patterns can be interpreted as follows: pattern 1 (47.2% of Europeans) is characterized by the second-highest environmental behavior score (4.35) and moderate predictive capacity (R^2=0.30); pattern 2 (32.7% of Europeans) is characterized by a low environmental behavior score (2.86) and low predictive capacity (R^2=0.18); pattern 3 (15.4% of Europeans) has the highest environmental behavior score (6.06) and the lowest predictive capacity (R^2=0.15); finally, pattern 4 (4.6% of Europeans) has the lowest environmental behavior score (2.09) and the highest predictive capacity (R^2=0.60). We labelled the four patterns according to environmental behavior scores (highest to lowest) as 'environmentalist' (pattern 3), 'pre-environmentalist' (pattern 1); 'less-environmentalist' (pattern 2) and 'non-environmentalist' (pattern 4), representing 15.4%, 47.2%, 32.7% and 4.6% of Europeans, respectively.

Since we modelled environmental behavior following a Poisson distribution, to better interpret the impact of parameters on the expected number of environmental behaviors, we transformed the β into exp(β) parameters, interpreted as the relative impact of an environmental driver. For the environmentalists (with the highest behavioral score), all predictors increased behavioral score from 3% to 12%; for the pre-environmentalists, while there was only a marginal increase for most predictors, environmental knowledge increased the overall score by 32% ; for less-environmentalists, environmental knowledge increased the behavioral score by 31%, while the other predictors produced a 3%-10% increase; finally, for non-environmentalists (with the lowest behavioral score), the predictors with the greatest impact were environmental attitudes, perceived behavioral control and subjective environmental norms (112%, 132% and 64% increases, respectively), while there was only a marginal increase (9%) in attitudes toward environmental

behaviors and a decrease of 13% for environmental knowledge. We therefore found support for hypothesis H1.

4.4.3. To what extent do Europeans' environmental behaviors differ systematically depending on their social position?

Table 4.4 shows the chi-square of independence tests and the row profiles of the social indicators. Rejecting the null hypothesis, we found a significant relationship between behavior patterns and social indicators (age, gender, education, income, area of residence and household size). Thus, hypothesis H2 was supported.

Table 4.4. Associations between Europeans' environmental behavior patterns and social position indicators

Behavior patterns (class size)		Environmentalist (0.1545)	Pre-environmentalist (0.4720)	Less-environmentalist (0.3274)	Non-environmentalist (0.0460)	p
Inactive covariates						
Age	15-24 years	12%	45%	**37%**	**6%**	<0.001
	25-39 years	14%	45%	36%	5%	
	40-54 years	15%	46%	34%	5%	
	≥55 years	**17%**	**49%**	30%	4%	
Gender	Man	**16%**	**48%**	31%	**5%**	<0.001
	Woman	15%	47%	**34%**	4%	
Education (age on terminating full-time education)	≤15 years	12%	45%	**38%**	5%	<0.001
	16-19 years	13%	46%	36%	5%	
	≥20 years	**20%**	50%	26%	4%	
	Still studying	15%	48%	32%	5%	
	No full-time education	18%	**53%**	21%	**8%**	
Income (difficulties paying bills)	Most of the time	7%	31%	**53%**	**9%**	< 0.001
	From time to time	10%	40%	44%	6%	
	Never	**18%**	**52%**	26%	4%	
Community type	Rural area/village	16%	47%	32%	**5%**	<0.001

	Small/medium town	**16%**	**49%**	31%	4%	
	Large town	14%	44%	**37%**	5%	
Household size	1	**17%**	**51%**	28%	4%	<0.001
	2	**17%**	48%	30%	**5%**	
	3	13%	44%	**38%**	**5%**	
	≥4	14%	44%	37%	**5%**	

Table 4.4 also provides evidence on how social indicators systematically differed in the distribution of social categories across environmental patterns. To determine whether a row profile was overrepresented in an environmental behavior pattern, we compared each social category row profile with each pattern size: a higher row profile value meant that the category level was over-represented in the pattern (see patterns in boldface).

According to Table 4.4, therefore, the four environmental behavior patterns can be broadly profiled as follows: environmentalists are mainly men, aged ≥55 years, well educated, with a high income, who live alone in a small/medium town; pre-environmentalists have a similar profile, except that most such individuals did not receive full-time education; less-environmentalists are mainly women, aged 15-24 years, have a lower education level and income than the environmentalists and live in large towns in households of three people; finally, non-environmentalists have a similar profile to less-environmentalists, except that they are mainly men, without full-time education, have a low income (they struggle to pay bills) and live in a rural area/village in households of three people.

4.4.4. To what extent do the environmental behaviors of Europeans differ systematically in their distribution among country clusters?

Table 4.5 depicts country cluster sizes and the distribution of environmental behavior patterns in the clusters. Four countries were classified in cluster 1 (Belgium, Luxembourg, the Netherlands, Sweden), seven in cluster 2 (Austria, Denmark, Finland, France, Germany, Malta, Slovenia), ten in cluster 3 (Czech Republic, Estonia, Italy, Ireland, Hungary, Latvia, Poland, Spain, Slovakia, United Kingdom) and seven in cluster 4 (Bulgaria, Croatia, Cyprus, Greece, Lithuania, Portugal,

Romania). We therefore found support for hypothesis H3 that proposes that European patterns of environmental behaviors systematically differ in their distribution among clusters of countries. In Table 4.5, the environmental behavior patterns over-represented in each country cluster are indicated in boldface.

Table 4.5. EU27+UK country clusters reflecting the distribution of environmental behavior patterns

	Country cluster			
Behavior pattern (cluster size %)	1 Green (14%)	2 Pre-green (25%)	3 Brown (36%)	4 Grey (25%)
Environmentalist	**0.5294**	0.1815	0.0761	0.0188
Pre-environmentalist	**0.4698**	**0.7745**	**0.5050**	0.1244
Less-environmentalist	0.0006	0.0010	**0.3942**	**0.7506**
Non-environmentalist	0.0002	0.0430	0.0247	0.1061
Country-mean environmental score	5.2571	4.5669	3.8421	3.0289

The country clusters were labelled as follows: cluster 1 (n=4), formed of 53% environmentalists and 47% pre-environmentalists, was labelled ‘green’; cluster 2 (n=7), formed mainly of pre-environmentalists (77%) and environmentalists (18%), was labelled ‘pre-green’; cluster 3 (n= 10, the largest cluster), formed mainly of pre-environmentalists (50%) and less-environmentalists (39%), was labelled ‘brown’. Finally, cluster 4 (n=7), formed mainly of less-environmentalists (75%), non-environmentalists (11%) and pre-environmentalists (12%), was labelled ‘grey’.

Figure 4.1 represents the distribution of the four environmental behavior patterns in the four European country clusters.

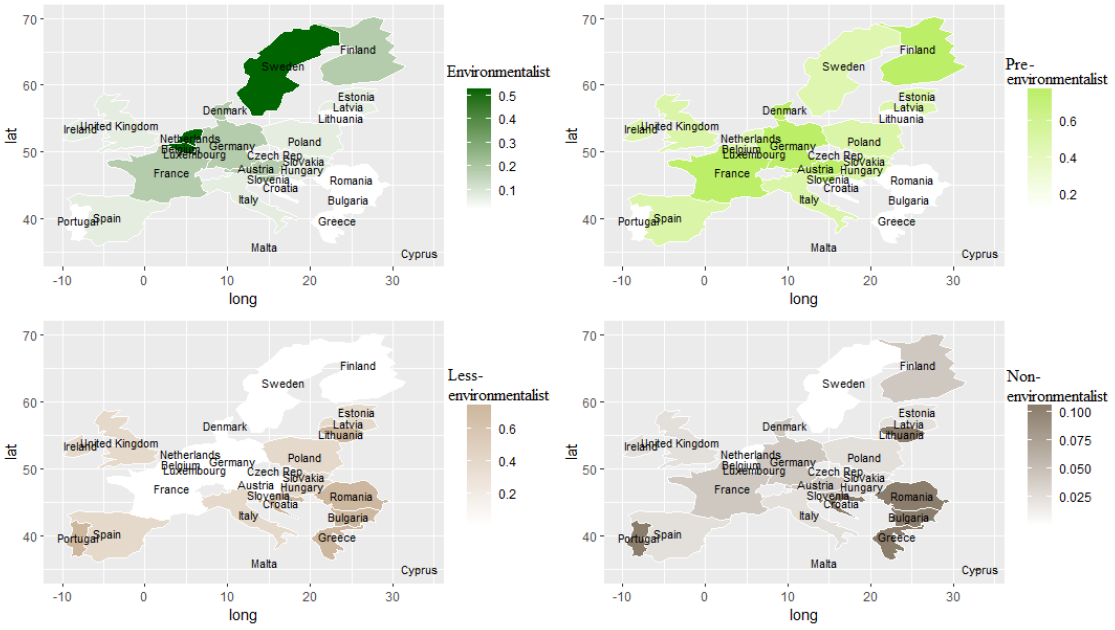

Figure 4.1. Distribution of four environmental behavior patterns across four EU27+UK country clusters

4.4.5. To what extent do the environmental behaviors of EU countries differ systematically according to country socioeconomic development and culture?

Table 4.6 reports t-test results jointly with mean country-level indicator values. We found that score differences across country clusters were statistically meaningful for all five country-level drivers: economic development, educational development, income inequality, environmental performance and individualism-collectivism. We thus reject the null hypothesis and find support for hypothesis H4.

Table 4.6. EU27+UK country socioeconomic development and culture indicators

	Country clusters				
	Green	Pre-green	Brown	Grey	p
Economic development: per capita GDP in USD	61075.91	48236.83	39930.11	29024.67	<0.001
Educational development: Education Index	0.89	0.89	0.86	0.81	<0.001
Income inequality: Gini Index	27.57	27.22	30.09	34.12	<0.001
Environment: Environmental Performance Index	84.45	87.87	85.74	85.24	<0.001
Individualism score	73.27	59.52	67.25	35.54	<0.001
Country-mean environmental score	5.2571	4.5669	3.8421	3.0289	

In terms of evidence of systematic differences in country-level indicators, the mean values for each country cluster in Table 4.6 indicate the following (highest to lowest environmental scores): green countries have the highest economic development score, high income equality (the lowest the index the more equally distributed the income) and educational scores and the highest individualism scores, but have the lowest environmental performance score; pre-green countries have the highest educational and environmental performance scores, the second-highest economic development score, the lowest income inequality score, and the second-lowest individualism score; brown countries have low economic and educational development scores, greater income inequality and higher environmental performance and individualism scores; finally, grey countries have the lowest economic and educational development scores, the second-lowest environmental performance score, the highest income inequality score and the lowest individualism score.

4.5. Discussion

Research into the A-B-C relationship has typically focused on the effect of theoretical drivers on individuals behavior and the moderating effect of social factors, while other research has focused on how contextual drivers directly influences behaviors and moderate the impact of individual-level sociopsychological predictors (He et al., 2019; Pisano & Lubell, 2017; Wang, 2017). However, our focus is on to what extent environmental behaviors of Europeans systematically differ according to the A-B-C model and to what extent systematic differences among European countries can be reduced to a few clusters with similar environmental behaviors within them, and different between them.

We selected the best model in a single step using multilevel latent class regression analysis (Vermunt, 2003; Vermunt & Magidson 2005; Bijmolt et al., 2004), grouping Europeans according to their behavior and sensitivity to five sociopsychological predictors (environmental attitudes, attitudes toward environmental behaviors, perceived behavioral control, subjective environmental norms and environmental knowledge). Clusters of countries were identified according to

distributions of environmental behavior patterns; i.e., countries belonging to the same country cluster reflect a similar within-country distribution of individual environmental behaviors.

In identifying four attitude-behavior relationship patterns for Europeans we found support for the hypothesis that Europeans systematically differ in that relationship. Patterns were labelled according to behavior scores – from more (higher scoring) to less (lower scoring) environmental behaviors – as environmentalist, pre-environmentalist, less-environmentalist and non-environmentalist. All environmental patterns were related to individuals' social position, as expected, but the predictive capacity of the model was not as expected. The predictive capacity of the attitude-behavior model was lowest for the environmentalists and highest for the non-environmentalists. This surprising attitude-behavior relationship suggests that sociopsychological drivers have a greater impact on the behaviors of less environmentally oriented Europeans than on the behaviors of more environmentally oriented Europeans.

We therefore found support for the proposition that individuals classified in each environmental behavior pattern varied systematically according to their social position (social categories and resources). This finding is consistent with previous studies suggesting that environmentalists are mostly men (Mostafa, 2007), older (Finisterra do Paço et al., 2009; Golob & Kronegger, 2019), wealthier (do Paço & Raposo, 2009; Rowlands et al., 2003) and well educated (Golob & Kronegger, 2019; Ortega-Egea et al., 2014) and live in small households (Poortinga et al., 2004) in small/medium towns (Berenguer et al., 2005).

In uncovering environmental behavior patterns, we identified four clusters of EU countries that varied according to the distribution of those patterns. We thus found support for the proposition that EU countries systematically differ according to the distribution of individual environmental behavior patterns. Thus, patterns with higher scores were overrepresented in country clusters with higher economic, educational and individualism scores and lower income inequality score, supporting the proposition that culture and country development have an undeniable effect on behaviors (Liobikienė et al., 2016; Milfont, 2012; Morren & Grinstein, 2016; Pisano & Lubell, 2017; Soyez, 2012). Environmentalists and non-environmentalists were mainly found in the country clusters classified as green (Belgium, Luxembourg, the Netherlands, and Sweden) and

grey (Bulgaria, Croatia, Cyprus, Greece, Lithuania, Portugal, and Romania), respectively – two contrasting country clusters with important differences in terms of socioeconomic development and culture. In a word, countries' structural drivers were correlated with environmentalism level. Previous studies have reported that western and northern EU countries are more pro-environmental than southern and central EU countries, which, in turn, are more pro-environmental than eastern EU countries (Bozonnet, 2017; Butkeviciene & Morkevicius, 2017).

To date, we have identified no study underpinned by systematic statistical analysis that questions this reality that breaks with stereotypes about EU sustainability as a whole. Our results show, for instance, that Malta, a southern European island, is greener than Ireland, the United Kingdom and northern European countries. Such findings would suggest that further research is needed to find additional support for the environmental behaviors of Europeans.

Another interesting finding was that environmental knowledge had a negative effect on environmental behaviors for non-environmentalists, refocusing our attention on the context drivers in the A-B-C model. Non-environmentalists were located mostly in grey countries, with the lowest educational scores. Possible explanations are that the negative effect of environmental knowledge on environmental behaviors may stem from information misinterpreted or misunderstood due to a lower educational level or to media misinformation; furthermore, grey countries had the highest collectivism scores, which means that more importance may be attached to information transmitted by family, friends, neighbors and colleagues. Future studies should therefore consider the educational level and culture orientation of individuals in investigating the specific effects of different information sources on environmental behaviors, so as to identify patterns that can be focused on by customized policies to foster sustainability behaviors.

The patterns of the attitude-behavior relationship suggest that sociopsychological predictors have less explanatory power for environmentalists and more explanatory power for non-environmentalists. The first study that used the A-B-C model identified a similar pattern (Guagnano et al., 1995), finding that the importance of sociopsychological predictors may be reduced by favorable pro-environmental settings. The NAM (Schwartz, 1977), for instance, was less significant in explaining behavior in households with recycling bins (Guagnano et al., 1995).

We suggest, therefore, in line with other authors (Gupta & Ogden, 2006, 2009; Oskamp et al., 1991; Wiederhold & Martinez, 2018), that the strength of the effect of attitudes on behavior depends on contextual drivers and the social position of individuals.

The shape of attitude-behavior relationships may be grounded in theories of motivations, intrinsic motivators (attitudes) and extrinsic motivators (incentives). Similar attitudes may lead people to the same environmental behaviors in the same context – whether the social context (doing as other people do) or the economic context (responding to external incentives). However, similar attitudes may also lead people to behave differently in different country contexts. The motivation crowding-out theory suggests that external incentives, whether positive or negative, may undermine intrinsic motivations (Bruno et al., 2017; Hui-Chun & Wen-Jing, 2020). Research has also found that the influence of internal motivators diminishes once people get used to external social or economic motivators (Frey, 1997; Rommel et al., 2015; Heyman & Ariely, 2004).

4.5.1. Limitations

Our study has some limitations that open up opportunities for future research. The first limitation is inherent to using secondary data: we had no power to determine environmental indicators of individual-level behaviors and predictors and so were constrained in how they were measured. A second limitation, also depending on the first one, concerns the aggregate nature of the A-B-C model, which only reflects research into private-sphere and not public-sphere environmental behaviors.

4.5.2. Future research

Attitude-behavior theories such as the NAM (Schwartz, 1977), the TPB (Ajzen, 1985) and the VBN (Stern et al., 1999) could be applied to further explore this topic, broadening studies to include other attitude variables that depend on specific behaviors. Heterogeneity in theories could also be examined in more detail using a hybrid multilevel causal model (Lamberti et al., 2017, 2021). A final suggestion is that more detailed analyses could delve into the influence of political history, law, taxation and international relationships on the A-B-C model (Bodur & Sarigöllü, 2005; Dolnicar & Grün, 2009; Ortega-Egea et al., 2014).

4.7. Summary

Our study is, as far as we are aware, the first study examining how Europeans systematically differ in their environmental behaviors and their attitude-behavior relationships depending on their EU country context. We contribute to sustainability knowledge by providing evidence of socially distributed heterogenous attitude-behavior relationships, of a heterogenous mix of behaviors in different EU countries and of EU country clusters with similar country-level drivers and distributions of individual-level environmental behavior patterns. We also provide an explanation for heterogenous attitude-behavior relationships based on the crowding-out effect of external motivators.

Since environmental behaviors are the outcome of internal and external drivers, interventions need to be tailored according to the attitudinal and contextual limitations or opportunities for individuals to behave pro-environmentally. Indirectly or directly incorporating contextual drivers in attitude-behavior relationships is essential to the design of more focused environmental policies. Our findings, we hope, will help policymakers design better environmental action plans that consider systematic differences in the individual environmental behaviors of Europeans and their distribution across EU countries.

Chapter 5. Discussion

This doctoral dissertation aimed to better understand the factors behind Europeans' environmental behavior by analyzing the relationship between socio-psychological drivers and social structures that influence environmental behavior. The theoretical framework is built from environmental psychology, sociology, and economy to reveal unobserved heterogeneity in European behavior. In this general discussion, we first relate the theoretical framework and findings of three articles already presented. Then, the contributions to knowledge are highlighted, and we discuss several policy implications. Finally, we close this dissertation by presenting the limitations and directions for future research.

5.1. General Discussion

The first study, "A Comprehensive Model to Explain Europeans' Environmental Behaviors", describes and tests a comprehensive conceptual model for explaining Europeans environmental behavior. It starts by reviewing the most accepted and used theories in the environmental behavior literature such as TRA, TPB, NAM, VBN. These theories inform the comprehensive responsible environmental behavior (REB) theoretical framework (Hines et al., 1987) that we use to disentangle the effect of socio-psychological environmental drivers from the social structures that constrain Europeans' environmental behavior (i.e., Europeans enjoy different social positions and live the different countries (EU28). We also test how the effect of the main socio-psychological environmental drivers—environmental knowledge, environmental attitudes, attitudes toward environmental behaviors, perceived behavioral control, and subjective environmental norms—varies according to social categories (age and gender) and indicators of social position (education and income). Finally, we extend the model to test whether the social indicators moderate the relationship between socio-psychological environmental factors and environmental behavior.

The first descriptive analysis of European environmental behavior suggests an inverse pattern: countries with a higher environmental score show a lower environmental attitude, and vice versa. To disentangle this apparent contradiction, we applied a theoretical framework that links behavior to the environmental drivers, social indicators, and country social structures. We identified three

types of environmental behaviors: eco-friendly purchasing, public transport use, and reduced resource consumption. Results showed that socio-psychological environmental drivers explained behaviors well, even though there were slight differences in their predictive capacity. Interestingly, the effect of perceived behavioral control on eco-friendly purchasing was moderated by income, while perceived behavioral control on public transport use was neither significant nor moderating. Thus, the moderating effect of social indicators on socio-psychological environmental drivers varies depending on the actual environmental behavior.

After a detailed examination of the relationship between socio-psychological drivers and social indicators, this study finishes questioning the contextual social structures. The multilevel regression result in this study showed that the country in which Europeans live influences their behavior. Therefore, country-level social structures explain European environmental behaviors' heterogeneity after controlling for individual-level environmental drives and social indicators because they live in social contexts that constrain their behavior. Thus, the second study aimed to explain how the social structures constrain European behaviors. Based on the unexplained country-level variance found in the first study, the second addresses the influence of country-level drivers on individuals' behavior: "Is pro-environmentalism a privilege? Country development factors as moderators of socio-psychological drivers of pro-environmental behaviors". The theoretical framework of the second study presents several social constraints at the country level: the challenge-response model, the socio-economic development, the national wealth, the national culture, and the ecological modernization theories. Finally, we measure to what extent country-level drivers may influence both environmental behavior and the relationship between individual-level environmental drivers and environmental behavior.

Results from this study showed that Europeans living in a county with higher levels of economic development and less income inequality are more likely to act environmentally friendly. Nevertheless, national culture and local environmental problems did not influence environmental behavior. We found that greater social pressure in more economically developed countries will drive citizens to behave more environmentally. Economic development increases the relationship between attitude towards governmental actions to environmental behavior and environmental

behaviors. Individuals in less socioeconomically developed countries may see governmental environmental investments as unnecessary since their primary focus is on their material needs. Even in the USA, low-income groups blame environmental policies as if those policies were the reason for economic inequality and high unemployment (Vig & Kraft, 2012). However, there was no influence of national culture and local environmental problems on environmental behavior.

In sum, the findings indicate that individual-level drivers' effect on environmental behavior varies according to nations' socio-economic development (Pisano & Lubell, 2017; Wang, 2017). Thus, in more developed countries, the influence of country development on behavior, through socio-psychological drivers, may follow a different pattern and is operated by another socioeconomic mechanism. These differences in attitude-behavior-context bring us to the last study.

By now, we have paid attention to theoretical drivers of environmental behavior and the effect of the individual- and country-level drivers on behavior and their interactions. We concluded that environmental behavior theories should consider the context where behavior and attitude-behavior relationships occur. However, the studies reported here suggest the existence of heterogeneity between and within Europeans and European countries in the attitude-behavior-context triangle. Unfortunately, no study exists examining the systematic heterogeneity in environmental behavior theory across Europeans and European countries. Hence, this last study, "Environmental behavior patterns across clusters of European Union countries: Uncovering the heterogeneity in the attitude-behavior-context relationship", aims to examine the systematic heterogeneity among Europeans and how this heterogeneity is distributed across European countries. When not qualified, an attitude refers to all individual-level drivers, while context refers to country-level drivers or social structures that constrain behavior. Unfortunately, no study exists examining the systematic heterogeneity in environmental behavior theory across Europeans and European countries.

This study has uncovered four behavioral patterns (environmentalists, going-environmentalists, less-environmentalists, and non-environmentalists) distributed into four latent country clusters (green, going-green, brown, and grey). Europeans systematically differ in the strength of the attitude-behavior relationships, except for attitudes toward environmental behavior. Besides, we

found that European patterns of environmental behavior systematically vary according to their attitudes, social position and contextual drivers.

Environmentalists can be profiled as older (Finisterra do Paço et al., 2009; Golob & Kronegger, 2019), man (Mostafa, 2007), well educated (Golob & Kronegger, 2019; Ortega-Egea et al., 2014), high income level (do Paço & Raposo, 2009; Rowlands et al., 2003), living in a small or middle town (Berenguer et al., 2005), with few people at home (Poortinga et al., 2004). Environmentalists are overrepresented in the country clusters with the higher economic, educational development level, higher individualism scores and lower-income inequality scores so culture and country development have an indeclinable effect (Liobikienė et al., 2016; Milfont, 2012; Morren & Grinstein, 2016; Pisano & Lubell, 2017; Soyez, 2012).

However, environmentalists seem to be less driven by their internal socio-psychological drivers (their agency), but more by their social position, culture, and development level of the country where they live (the social structures that constrain behavior). The attitude-behavior relationship is the weakest for the environmentalist (the pattern with the highest environmental behavior) group. Attitudes have less explanatory power of behaviors, whereas this relation is reversed for the non-environmentalist (the pattern with the lowest environmental behavior). The evolution of the attitude-behavior relationships seems to result from the "motivation crowing theory". Studies based on motivation crowding theory found that external incentives may crowd out internal drivers for behavior (Bruno et al., 2017). Once Europeans get used to behaving environmentally friendly due to their country constraints, it supersedes their internal environmental drivers.

5.2. Contributions to Knowledge

This doctoral dissertation provides several theoretical and methodological contributions to our knowledge of the environmental behavior of Europeans. Previous findings suggest that different sets of variables may be related to various environmental behavior patterns (Balderjahn, 1988; McKenzie-Mohr et al., 1995). In the first study reported in Chapter 2, we found evidence that helps to generalize the knowledge. Results showed that responsible environmental behavior

theory explains reduced resource consumption but partially explains Europeans' eco-friendly purchasing and public transport use.

Regarding the moderating role of social indicators on the environmental behavior models, there were only a few studies, without being entirely comprehensive in their aim (Chekima et al., 2016; Dagher et al., 2015; He et al., 2019). Those studies assessed the direct influence of social indicators and socio-psychological environmental drivers on environmental behavior. Hence, Chapter 2 contributes to current knowledge by providing evidence that the moderating effect of social factors on the socio-psychological drivers differs from the environmental behavior. For example, although perceived behavioral control was seen as an essential influence on environmental behavior, its effect was moderated by income for eco-friendly purchasing. So, theoretically, Chapter 2 points to the need to extend environmental behavior models by studying social factors as moderators.

Regarding the second study, Chapter 3, we analyzed the effect of country-level drivers on individuals' mean behavior and on the impact of socio-psychological drivers. So far, explaining cross-national differences in individual environmental behaviors is usually grounded in large sets of highly heterogeneous countries (Oreg & Katz-Gerro, 2006; Pisano & Lubell, 2017; Y. Wang, 2017). Consequently, research findings may overestimate or underestimate the effect of environmental variables of interest when analyzing cross-level interactions. Besides, a hypothesis rejected in one context may be supported in another context. Therefore, our contribution to the environmental behavior literature with the study reported in Chapter 3 provides accumulating knowledge by focusing on EU countries, although heterogeneous, share a common institutional framework. This way of getting knowledge makes theories stronger and makes it possible to develop models that better explain particular behaviors according to specific contexts. Also, less developed countries tend to be featured by measurement errors in national accounts and other data (Barro, 2000; UN Environment, 2019). Thus, focusing on EU countries makes it possible to reduce the heterogeneity that may inflate estimators' variability, leading researchers to wrong conclusions.

Another significant contribution of the second study, Chapter 3, is uncovering the influence of country-level drivers on attitude-behavior relationships. Contrasting with previous studies (Pisano & Lubell, 2017; Y. Wang, 2017), this study disaggregates the effect of the developing index (income, income inequality, educational development, and culture) on attitude-behavior relationships.

Finally, our last study, reported in Chapter 4, contributes to our sustainable consumption knowledge providing evidence that Europeans systematically differ regarding their attitude-behavior relationship. The heterogeneity of European environmental behaviors can be summarized into four behavioral patterns across Europe. At the same time, the distribution of these four patterns among the 28 countries can be summarized into four groups of countries that differ in their socio-economic development. Although previous findings reported that Western and Northern European countries are more environmentalist than others (Bozonnet, 2017; Butkeviciene & Morkevicius, 2017), no study has systematically analyzed the heterogeneity of Europeans and how this is distributed among countries. We have contributed with a multilevel latent class regression model to systematically study European environmental behavior heterogeneity. Furthermore, we have explained the heterogenous attitude-behavior relationship based on the crowding-out effect of external motivators.

5.3. Implications

The findings of this dissertation have several implications for policymakers. Specifically, the first study, reported in Chapter 2, showed that environmental knowledge explains public transport use better than other environmental drivers. Thus, environmental policies should direct their attention to the benefits of using public transport using a broader set of media. Europeans have positive attitudes toward EU policies regarding the protection of the environment. The EU should take advantage of that support and leverage them to lead national governments to comply with environmental regulations and directives.

The second study, reported in Chapter 3, found evidence that supports the affluence hypothesis, suggesting that people living in wealthy countries can afford to spend more resources on

improving their environment and reducing their carbon footprint. Richer countries offer more opportunities to their citizens to act environmentally. Governments may work with private sectors to improve their resources and develop green economies based on advanced and clean technologies. Besides, income inequality directly influences environmental behavior, and the educational development of a country moderates the effect of perceived behavioral control on behavior. Accordingly, governments should reduce income differences and increase the level of educational development in their country.

The third study, reported in Chapter 4, clearly indicates that the same environmental programs will have different outcomes. Therefore, attention needs to focus on the general (the European Commission) and particular effects (national policymakers) of environmental factors on environmental behaviors.

Generally speaking, policymakers need to consider that the emphasis on socio-psychological factors depends on the behavior and context. Overall, governments should make an effort to improve their socio-economic development levels to foster sustainability but not neglect assessing the effect of incentives that may reduce the effect of socio-psychological environmental factors on environmental behavior.

5.4. Limitations and Directions for Future Research

Some limitations can be identified for this dissertation as well as future research ideas. First, this dissertation is only limited to Europe. The EU represents an excellent opportunity for studying the effect of country-level drivers on individuals' behaviors, as it is heterogeneous but within a common basic institutional framework. However, future studies should focus their attention on developing and underdeveloped countries.

Second, the fact that we used secondary data limits the measurement of theoretical constructs. For instance, subjective environmental norms this dissertation used only injunctive dimension (what ought to be). Still, future frameworks should bear in mind the descriptive dimension (what is) of social norms to study. Attitudes toward environmental behavior were measured using indicators related to governmental environmental behaviors but not target behaviors. Regarding

environmental knowledge, we created a scale of knowledge instead of looking at the specific effect of each source. Future studies need to disaggregate the sources of knowledge. Our reported results in Chapter 4 show that environmental knowledge has negatively influenced environmental behavior in grey countries (low educational and high collectivistic country group: Bulgaria, Croatia, Cyprus, Greece, Lithuania, Portugal, and Romania). Therefore, we need to understand the effect of specific knowledge sources on particular environmental behaviors in different contexts to detect the disinformation on sustainability and to find a way to improve it.

Third, since we have examined self-reported individual environmental behaviors through Eurobarometer, results presumably may differ when behaviors are observed, not self-reported (Ajzen, 1985), when behaviors refer to the public sphere (Hadler & Haller, 2011; Pisano & Lubell, 2017), or when research measures particular behavioral domains (Duroy, 2008).

Fourth, considering country-level data, the Environmental Performance Index was used in an aggregated way. Future studies may focus on its sub-dimensions and test how they relate to specific environmental behaviors. Finally, as this dissertation only used objective problems, may future studies investigate the perceived risk associated with environmental issues.

Future research could include more social structures that constraints behavior such as municipality characteristics, tax benefits, adverse incentives, or tax rebates (Vig & Kraft, 2012). Additionally, several other factors could be considered, such as the rise of environmentalist parties (Inglehart, 1995), recent political history, former communist vs. western societies (Kemmelmeier et al., 2002), the number of (non-)governmental organizations, or the level of democracy (Hadler & Haller, 2011).

Our last study, reported in Chapter 4, is the first to study the heterogeneity in the effect of attitude-behavior-context theory systematically. Thus, further studies need to verify it. Considering the attitude-behavior relationships, other environmental behavior theories may be applied to study this topic further, and heterogeneity in theories may be examined in more detail using a hybrid multilevel casual model (Lamberti et al., 2017; 2021).

SUPPLEMENTARY APPENDIX

Table 1. Descriptive statistics for the individual-level environmental factors.

Item	Mean	SD	Skewness	Kurtosis
QD5.1 As an individual, you can play a role in protecting the environment in (country).	3.32	0.74	-0.97	0.68
QD5.2 The big polluters should be mainly responsible for making good the environmental damage they cause.	3.65	0.57	-1.59	2.62
QD5.3 Environmental issues have a direct effect on your daily life	3.25	0.79	-88	0.28
QD5.4 You are worried about the impact on your health of everyday products made of plastic.	3.13	0.86	-0.74	-0.17
QD5.5 You are worried about the impact on the environment of everyday products made of plastic	3.38	0.72	-1.07	0.95
QD5.6 You are worried about the impact on your health of chemicals present in everyday products.	3.34	0.77	-1.07	0.71
QD5.7 You are worried about the impact on the environment of chemicals present in everyday products	3.43	0.7	-1.15	1.16
QD9.1 EU environmental legislation is necessary to protect the environment in (country).	3.28	0.77	-0.97	0.67
QD9.2 The EU should be able to check that EU environmental laws are being applied correctly in (country).	3.29	0.77	-1.02	0.78
QD9.3 The EU should assist non-EU countries to improve their environmental standards.	3.29	0.77	-1.02	0.84
QD15.1 Local authorities should provide more and better collection facilities for plastic waste	3.5	0.65	-1.22	1.45
QD15.2 People should be educated on how to reduce their plastic waste	3.5	0.67	-1.31	1.57
QD15.4 Industry and retailers should make an effort to reduce plastic packaging	3.6	0.6	-1.47	2.21
QD15.5 Products should be designed in a way that facilitates the recycling of plastic	3.64	0.58	-1.54	2.44

Mean inter-item correlation=0.305, Cronbach's α=0.859.

Results of the common variance method tests

a) Harman's single factor test with no rotation

Eco-friendly purchasing: 1st factor explains 29% of variance

Public transport use: 1st factor explains 30% of variance

Reduced resource consumption: 1st factor explains 30% of variance

b) Cross-loading examinations

Table 2. Exploratory factor analysis for the main constructs of the responsible environmental behavior (REB) model plus environmental behaviors with varimax rotation (extraction method: principal component analysis).

Items	Factor loadings				
Environmental factors and eco-friendly purchase behavior items	**Factor (1)**	**Factor (2)**	**Factor (3)**	**Factor (4)**	**Factor (5)**
QD5.4. You are worried about the impact on your health of everyday products made of plastic.	.81				
QD5.6. You are worried about the impact on your health of chemicals present in everyday products.	.83				
QD5.7. You are worried about the impact on the environment of chemicals present in everyday products.	.80				
QD5.3. Environmental issues have a direct effect on your daily life.	.74				
QD5.5. You are worried about the impact on the environment of everyday products made of plastic.	.76				
QD15.1. Local authorities should provide more and better collection facilities for plastic waste.		.70			
QD15.2. People should be educated on how to reduce their plastic waste.		.69			
QD15.5. Products should be designed in a way that facilitates the recycling of plastic.		.79			
QD15.4. Industry and retailers should make an effort to reduce plastic packaging.		.77			
QD9.2. The EU should be able to check that EU environmental laws are being applied correctly in (country).			.84		

QD9.1. EU environmental legislation is necessary to protect the environment in (country).			.84		
QD9.3. The EU should assist non-EU countries to improve their environmental standards.			.69		
QD5.2. The big polluters should be mainly responsible for making good the environmental damage they cause.					
QD5.1. As an individual, you can play a role in protecting the environment in (country).	.46				
QD4.2. Avoided buying overpackaged products				.54	
QD4.3. Avoiding single-use plastic goods other than plastic bags or bought reusable plastic products				.76	
QD4.8. Buying local products					.81
QD4.7. Buying products marked with an environmental label					.54
Environmental factors and public transport behavior items	**Factor (1)**	**Factor (2)**	**Factor (3)**	**Factor (4)**	**Factor (5)**
QD5.4. You are worried about the impact on your health of everyday products made of plastic.	.83				
QD5.6. You are worried about the impact on your health of chemicals present in everyday products.	.83				
QD5.7. You are worried about the impact on the environment of chemicals present in everyday products.	.77				
QD5.3. Environmental issues have a direct effect on your daily life.	.75				
QD5.5. You are worried about the impact on the environment of everyday products made of plastic.	.73				
QD15.1. Local authorities should provide more and better collection facilities for plastic waste.		.77			
QD15.2. People should be educated on how to reduce their plastic waste.		.75			
QD15.5. Products should be designed in a way that facilitates the recycling of plastic.		.70			
QD15.4. Industry and retailers should make an effort to reduce plastic packaging.		.68			
QD9.2. The EU should be able to check that EU environmental laws are being applied correctly in (country).			.84		
QD9.1. EU environmental legislation is necessary to protect the environment in (country).			.84		
QD9.3. The EU should assist non-EU countries to improve their environmental standards.			.70		
QD5.2. The big polluters should be mainly responsible for making good the environmental damage they cause.				.75	
QD5.1. As an individual, you can play a role in protecting the environment in (country).				.48	
QD19.3. Frequently using public transport or biking or walking instead of using a car					.79
QD4.1. Choosing more environmentally friendly travel (walking, biking, public transport)					.77
QD4.9. Using your car less by avoiding unnecessary trips					.63
Environmental factors and reduction of resources behavior items	**Factor (1)**	**Factor (2)**	**Factor (3)**	**Factor (4)**	**Factor (5)**
QD5.4. You are worried about the impact on your health of everyday products made of plastic.	.80				
QD5.6. You are worried about the impact on your health of chemicals present in everyday products.	.83				
QD5.7. You are worried about the impact on the environment of chemicals present in everyday products.	.81				
QD5.3. Environmental issues have a direct effect on your daily life.	.74				
QD5.5. You are worried about the impact on the environment of everyday products made of plastic.	.74				
QD15.1. Local authorities should provide more and better collection facilities for plastic waste.		.69			
QD15.2. People should be educated on how to reduce their plastic waste.		.69			
QD15.5. Products should be designed in a way that facilitates the recycling of plastic.		.80			
QD15.4. Industry and retailers should make an effort to reduce plastic packaging.		.78			
QD9.2. The EU should be able to check that EU environmental laws are being applied correctly in (country).			.84		
QD9.1. EU environmental legislation is necessary to protect the environment in (country).			.84		
QD9.3. The EU should assist non-EU countries to improve their environmental standards.			.69		
QD5.2. The big polluters should be mainly responsible for making good the environmental damage they cause.	.47				

QD5.1. As an individual, you can play a role in protecting the environment in (country).	.47				
QD4.5. Cutting down on water consumption					.90
QD4.6. Cutting down on energy consumption (turning down air conditioning or heating, not leaving appliances on stand-by, buying energy-efficient appliances)				.62	
QD19.2. Replacing older energy-intensive equipment (hotwater boiler, oven, dishwasher, etc) with more energy efficient equipment (e.g., labelled A+++)				.82	
Note: Items with factor loading lower than .04 are not shown.					

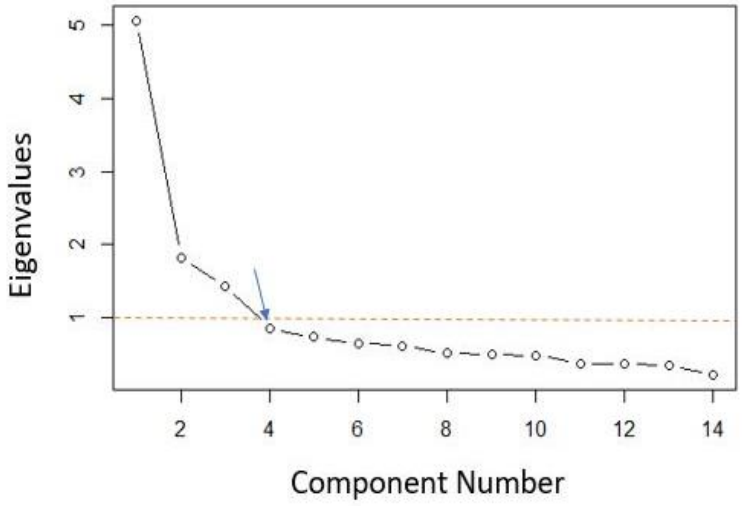

Figure 1. Scree test for 14 individual-level environmental factors.

Table 3. Pro-environmental behaviors.

Dependent variables	Items
Pro-environmental behaviors	QD4.1. Choosing more environmentally friendly travel (walking, biking, public transport) QD4.2. Avoiding buying overpackaged products QD4.3. Avoiding single-use plastic goods other than plastic bags or bought reusable plastic products QD4.4. Separating most waste for recycling QD4.5. Cutting down on water consumption QD4.6. Cutting down on energy consumption (turning down air conditioning or heating, not leaving appliances on stand-by, buying energy-efficient appliances) QD4.7. Buying products marked with an environmental label QD4.8. Buying local products QD4.9. Using your car less by avoiding unnecessary trips QD19.1. Changing home heating system from a higher-emission (coal, oil or wood) to lower-emission (natural gas, pellet, electricity, solar, etc.) system QD19.2. Replacing older energy-intensive equipment (hotwater boiler, oven, dishwasher, etc.) with more energy efficient equipment (e.g., labelled A+++) QD19.3. Frequently using public transport or bike or walking instead of using a car QD19.4. Buying an electric vehicle (car, motorbike, bike) QD19.5. Buying a low-emission vehicle (e.g., hybrid car) QD19.6. Buying low-emission products to fuel open fire or barbecue (e.g., briquettes instead of coal)

Table 4. Mean environmental behavioral score of 28 European Union countries.

Country EU-28 country	Environmental behavior score μ=3.869
Austria	4.407
Belgium	4.932
Bulgaria	2.749
Cyprus	3.179
Croatia	2.661
Czech Republic	3.713
Denmark	5.089
Estonia	3.703
Finland	4.941
France	4.686
Germany	4.580
Greece	3.287
Hungary	3.693
Ireland	4.252
Italy	3.614
Latvia	4.209
Lithuania	3.113
Luxembourg	5.165
Malta	4.796
Netherlands	5.371
Poland	3.094
Portugal	2.609
Romania	3.079
Slovakia	3.559
Slovenia	4.679
Spain	3.494
Sweden	6.256
United Kingdom	4.107

Table 5. Individual-level independent variables.

Theoretical constructs	Items selected as indicators
Perceived behavioral control	QD5.1. As an individual, you can play a role in protecting the environment in (country). QD5.2. The big polluters should be mainly responsible for making good the environmental damage they cause.
Environmental attitudes	QD5.3. Environmental issues have a direct effect on your daily life. QD5.4. You are worried about the impact on your health of everyday products made of plastic. QD5.5. You are worried about the impact on the environment of everyday products made of plastic. QD5.6. You are worried about the impact on your health of chemicals present in everyday products. QD5.7. You are worried about the impact on the environment of chemicals present in everyday products.
Attitudes toward environmental behaviors	QD9.1. EU environmental legislation is necessary to protect the environment in (our country). QD9.2. The EU should be able to check that EU environmental laws are being applied correctly in (country). QD9.3. The EU should assist non-EU countries to improve their environmental standards.
Subjective environmental norms	QD15.1. Local authorities should provide more and better collection facilities for plastic waste. QD15.2. People should be educated on how to reduce their plastic waste. QD15.4. Industry and retailers should make an effort to reduce plastic packaging. QD15.5. Products should be designed in a way that facilities the recycling of plastic.

Environmental knowledge	QD3.1. National newspapers QD3.2. Regional or local newspapers QD3.3. Magazines QD3.4. Television news QD3.5. The radio QD3.6. Films and documentaries on television QD3.7. Family, friends, neighbors or colleagues QD3.8. Books or scientific publications QD3.9. Brochures or information materials QD3.10. Events (conferences, fairs, exhibitions, festivals, etc.) QD3.11. Museums, national parks or regional parks QD3.12. Online social networks QD3.13. The Internet (other websites, blogs, forums, etc.)

Table 6. Exploratory factor analysis for individual-level independent variables with varimax rotation (extraction method: principal component analysis).

Items	Factor loadings			
	(1) Environmental attitudes	**(2) Subjective environmental norms**	**(3) Attitudes toward environmental behaviors**	**(4) Perceived behavioral control**
QD5.4. You are worried about the impact on your health of everyday products made of plastic.	.83			
QD5.6. You are worried about the impact on your health of chemicals present in everyday products.	.82			
QD5.7. You are worried about the impact on the environment of chemicals present in everyday products.	.75			
QD5.3. Environmental issues have a direct effect on your daily life.	.74			
QD5.5. You are worried about the impact on the environment of everyday products made of plastic.	.71			
QD15.1. Local authorities should provide more and better collection facilities for plastic waste.		.77		
QD15.2. People should be educated on how to reduce their plastic waste.		.74		
QD15.5. Products should be designed in a way that facilitates the recycling of plastic.		.70		
QD15.4. Industry and retailers should make an effort to reduce plastic packaging.		.68		
QD9.2. The EU should be able to check that EU environmental laws are being applied correctly in (country).			.84	
QD9.1. EU environmental legislation is necessary to protect the environment in (country).			.84	
QD9.3. The EU should assist non-EU countries to improve their environmental standards.			.70	
QD5.2. The big polluters should be mainly responsible for making good the environmental damage they cause.				.72
QD5.1. As an individual, you can play a role in protecting the environment in (country).				.59

Table 7. Social factors at the individual level.

Social indicators	Characteristics	N (Overall=27881)	Percentage (%)
Age	15-24 years	2347	8.4
	25-39 years	5791	20.8
	40-54 years	6719	24.1
	55 years and older	13024	46.7
	N-miss	-	-
Gender	Man	12495	44.8
	Woman	15386	55.2
	N-miss	-	-
Education level	Mean (SD)	19.639 (5.295)	
	Range	2-71	
	N-miss	728	
Income: Difficulties to pay bills	Most of the time	2618	9.6
	From time to time	6983	25.5
	Never	17770	64.9
	N-miss	510	

Table 8. Country level drivers.

EU27+UK country	GDP per capita (PPP $)	Gini Index	Educational Index	Environmental Performance Index	Hofstede's individualism score
Austria	54637	27.9	0.871	87.22	55
Belgium	50772	26.1	0.893	80.15	75
Bulgaria	21182	40.2	0.805	83.39	30
Croatia	26700	29.9	0.796	86.98	33
Cyprus	33628	30.8	0.811	80.24	NA*
Czech Republic	38489	24.5	0.892	84.67	58
Denmark	55065	27.6	0.920	89.21	74
Estonia	33821	31.6	0.881	88.59	60
Finland	47470	25.3	0.915	90.68	63
France	44783	28.8	0.811	88.19	71
Germany	53012	29.1	0.946	84.26	67
Greece	29089	33.4	0.833	85.81	35
Hungary	29529	28.1	0.816	84.59	80
Ireland	78128	30.6	0.918	86.59	70
Italy	41785	32.7	0.793	84.48	76
Latvia	28489	34.5	0.871	85.71	70
Lithuania	33821	37.6	0.890	85.49	60
Luxembourg	112823	30.9	0.802	86.58	60
Malta	41786	28.2	0.818	88.48	59
Netherlands	55348	27,1	0.906	82.03	80
Poland	30143	29.2	0.866	81.26	60
Portugal	33086	33.5	0.759	88.63	27
Romania	27298	33.1	0.762	83.24	30
Slovakia	30906	23.2	0.824	85.42	52
Slovenia	36651	23.7	0.893	88.98	28
Spain	39575	34.1	0.824	88.91	51
Sweden	52693	28.0	0.914	90.51	71
United Kingdom	45975	33.1	0.916	87.38	89

* NA: Data not available.

BIBLIOGRAPHY

Abrahamse, W., & Steg, L. (2009). How do socio-demographic and psychological factors relate to households' direct and indirect energy use and savings?. Journal of economic psychology, 30(5), 711-720.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), Action Control: From Cognition to Behavior (pp. 11–39). Springer. doi: 10.1007/978-3-642-69746-3_2.

Ajzen, I. (2005). Attitudes, personality, and behavior. (2nd ed.). Open University Press.

Ajzen, I.& Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. Psychol. Bull, 84, 888–918.

Aldrich, G. A., Grimsrud, K. M., Thacher, J. A., & Kotchen, M. J. (2007). Relating environmental attitudes and contingent values: How robust are methods for identifying preference heterogeneity? Environmental and Resource Economics, 37(4), 757–775. https://doi.org/10.1007/s10640-006-9054-7

Ali, A. & Shahzad, W. (2011). Determinants of Pakistani consumers' green purchase behavior: Some insights from a developing country. Int. J. Bus. Manag. Soc. Res. 2 (10).

Alisat, S. & Riemer, M. (2015). The environmental action scale: Development and psychometric evaluation. J. Environ. Psychol, 43, 13–23.

Aoyagi-Usui, M., Vinken, H., & Kuribayashi, A. (2003). Pro-environmental attitudes and behaviors: An international comparison. Human Ecology Review, 10(1), 23–31. http://www.jstor.org/stable/24707084

Aral, Ö. H., & López-Sintas, J. (2020). A Comprehensive Model to Explain Europeans' Environmental Behaviors. Sustainability, 12(10), 4307. https://doi.org/10.3390/su12104307

Arcury, T.A., & Christianson, E.H. (1990). Environmental worldview in response to environmental problems: Kentucky 1984 and 1988 compared. Environ. Behav, 22, 387–407.

Arcury, T.A.; Scollay, S.J. & Johnson, T.P. (1987). Sex differences in environmental concern and knowledge: The Case of acid rain. Sex Roles, 16, 463–472.

Balderjahn, I. (1988). Personality variables and environmental attitudes as predictors of ecologically responsible consumption patterns. Journal of Business Research, 17(1), 51–56. https://doi.org/10.1016/0148-2963(88)90022-7

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. Journal of Environmental Psychology, 27(1), 14–25. https://doi.org/10.1016/j.jenvp.2006.12.002

Barr, S. (2003). Strategies for sustainability: citizens and responsible environmental behaviour. Area, 35(3), 227-240.

Barro, R. J. (2000). Inequality and Growth in a Panel of Countries. Journal of economic growth, 5(1), 5-32.

Bates, D. M. (2010). lme4: Mixed-effects modeling with R. New York: Springer. http://lme4.r-forge.r-project.org/book/

Beaton, C., Perera, O., Arden-Clarke, C., Farah, A. Z., & Polsterer, N. (2012). Global Outlook on Sustainable Consumption and Production (SCP) Policies: Taking Action Together. Executive Summary (Report 2012: 1). United Nations Environment Program (UNEP).

Berenguer, J., Corraliza, J. A., & Martín, R. (2005). Rural-urban differences in environmental concern, attitudes, and actions. European Journal of Psychological Assessment, 21(2), 128–138. https://doi.org/10.1027/1015-5759.21.2.128

Bicchieri, C. (2005). The Grammar of Society: The Nature and Dynamics of Social Norms. Cambridge University Press. https://doi.org/10.1017/CBO9780511616037

Bijmolt, T. H. A., Paas, L. J., & Vermunt, J. K. (2004). Country and consumer segmentation: Multi-level latent class analysis of financial product ownership. International Journal of Research in Marketing, 21(4), 323–340. https://doi.org/10.1016/j.ijresmar.2004.06.002

Bilan, Y., Mishchuk, H., Samoliuk, N., & Yurchyk, H. (2020). Impact of Income Distribution on Social and Economic Well-Being of the State. Sustainability, 12(1), 429. https://doi.org/10.3390/su12010429

BIO Intelligence Service (2012), Policies to encourage sustainable consumption, Final report prepared for. European Commission (DG ENV)

Black, J. S., Stern, P. C., & Elworth, J. T. (1985). Personal and contextual influences on household energy adaptations. Journal of Applied Psychology, 70(1), 3–21. https://doi.org/10.1037/0021-9010.70.1.3

Bodur, M., & Sarigöllü, E. (2005). Environmental Sensitivity in a Developing Country: Consumer Classification and Implications. Environment and Behavior, 37(4), 487–510. https://doi.org/10.1177/0013916504269666

Bohr, J., & Dunlap, R. E. (2017). Key Topics in environmental sociology, 1990–2014: Results from a computational text analysis. Environmental Sociology, 4(2), 181–195. https://doi.org/10.1080/23251042.2017.1393863

Bonnes, M., & Bonaiuto, M. (2002). Environmental psychology: From spatial-physical environment to sustainable development. In Handbook of environmental psychology (pp. 28–54). John Wiley & Sons, Inc.

Bornstein, M. H., Giusti, Z., Leach, D. B., & Venuti, P. (2005). Maternal reports of adaptive behaviours in young children: Urban–rural and gender comparisons in Italy and United States. Infant and Child Development, 14(4), 403–424. https://doi.org/10.1002/icd.414

Bourdieu, P. (1979). La distinction-critique sociale due jugement. Editions de Minuit.

Bourdieu, P. (1989). Outline of a Theory of Practice (5th. repr). Cambridge University Press.

Boyce, J. K. (2007). Is inequality bad for the environment? In R. C. Wilkinson & W. R. Freudenburg (Eds.), Equity and the Environment (Vol. 15, pp. 267–288). Emerald Group Publishing Limited. https://doi.org/10.1016/S0196-1152(07)15008-0

Bozonnet, J. P. (2017). Explaining environmental activism by national cultures: The hypothesis of hysteresis. In A. Telesiene & M. Gross (Eds.), Green European: Environmental Behaviour and Attitudes in Europe in a Historical and Cross-Cultural Comparative Perspective (1st ed., pp. 119-138). Routledge. https://doi.org/10.4324/9781315648491

Bruno, B., Faggini, M., & Parziale, A. (2017). Motivation, incentives and performance: An interdisciplinary review. International Journal of Business and Management, 12(12), 29-52. https://doi.org/10.5539/ijbm.v12n12p29

Bryer, J.M. (2014). A National Study Comparing Charter and Traditional Public Schools Using Propensity Score Analysis. Ph.D. Thesis, State University of New York at Albany, Albany, NY, USA.

Butkeviciene, E., & Morkevicius, V. (2017). Explaining membership in pro-environmental groups: A comparative European perspective. In A. Telesiene & M. Gross (Eds.), Green European: Environmental Behaviour and Attitudes in Europe in a Historical and Cross-Cultural Comparative Perspective (1st ed., pp. 139-160). Routledge. https://doi.org/10.4324/9781315648491

Callen, T. (2020). Finance & Development. Finance & Development | F&D. https://www.imf.org/external/pubs/ft/fandd/basics/gdp.htm

Carmichael, R. (2019). Behaviour change, public engagement and Net Zero, a report for the Committee on Climate Change.

Chekima, B., Chekima, S., Syed Khalid Wafa, S. A. W., Igau, O. A., & Sondoh Jr, S. L. (2016). Sustainable consumption: the effects of knowledge, cultural values, environmental advertising, and demographics. International Journal of Sustainable Development & World Ecology, 23(2), 210-220. https://doi.org/10.1080/13504509.2015.1114043

Chen, M.-F., & Tung, P.J. (2010). The Moderating Effect of Perceived Lack of Facilities on Consumers' Recycling Intentions. Environment and Behavior, 42(6), 824–844. https://doi.org/10.1177/0013916509352833

Clark, W. C. (2001). A transition toward sustainability. Ecology Law Quarterly, 1021-1075. https://www.jstor.org/stable/24114051

Clayton, S., Devine-Wright, P., Swim, J., Bonnes, M., Steg, L., Whitmarsh, L., & Carrico, A. (2016). Expanding the role for psychology in addressing environmental challenges. American Psychologist, 71(3), 199.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. Journal of applied psychology, 78(1), 98. https://doi.org/10.1037/0021-9010.78.1.98

Cottrell, S. P. (2003). Influence of Sociodemographics and Environmental Attitudes on General Responsible Environmental Behavior among Recreational Boaters. Environment and Behavior. https://doi.org/10.1177/0013916503035003003

Cottrell, S. P., & Graefe, A. R. (1997). Testing a conceptual framework of responsible environmental behavior. The Journal of Environmental Education, 29(1), 17-27.

Curtin, D., & Jia, F. (2020). Cooperation and competition impact environmental action: An experimental study in social dilemmas. Sustainability, 12(3), 1249. https://doi.org/10.3390/su12031249

Dagher, G., Itani, O., & Kassar, A. N. (2015). The Impact of Environment Concern and Attitude on Green Purchasing Behavior: Gender as The Moderator. Contemporary Management Research, 11(2). https://doi.org/10.7903/cmr.13625

Dalton, R. J. (2005). The Greening of the Globe? Cross-national Levels of Environmental Group Membership. Environmental Politics, 14(4), 441–459. https://doi.org/10.1080/09644010500175783

Davies, J., Foxall, G. R., & Pallister, J. (2002). Beyond the intention–behaviour mythology: an integrated model of recycling. Marketing theory, 2(1), 29-113. https://doi.org/10.1177/1470593102002001645

De Maya, S. R., López-López, I., & Munuera, J. L. (2011). Organic food consumption in Europe: International segmentation based on value system differences. Ecological Economics, 70(10), 1767-1775. https://doi.org/10.1016/j.ecolecon.2011.04.019

Desa, U. N. (2016). Transforming our world: The 2030 agenda for sustainable development.

Dhir, A., Sadiq, M., Talwar, S., Sakashita, M., & Kaur, P. (2021). Why do retail consumers buy green apparel? A knowledge-attitude-behaviour-context perspective. Journal of Retailing and Consumer Services, 59, 102398. https://doi.org/10.1016/j.jretconser.2020.102398

Diamantopoulos, A., Schlegelmilch, B. B., Sinkovics, R. R., & Bohlen, G. M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. Journal of Business Research, 56(6), 465–480. https://doi.org/10.1016/S0148-2963(01)00241-7

Diekmann, A., & Franzen, A. (1999). The Wealth of Nations and Environmental Concern. Environment and Behavior, 31(4), 540–549. https://doi.org/10.1177/00139169921972227

Diekmann, A., & Preisendörfer, P. (1998). Environmental behavior: Discrepancies between aspirations and reality. Rationality and society, 10(1), 79-102. https://doi.org/10.1177/104346398010001004

Dietz, T., Stern, P. C., & Guagnano, G. A. (1998). Social structural and social psychological bases of environmental concern. Environment and behavior, 30(4), 450-471. https://doi.org/10.1177/001391659803000402

do Paço, A., & Raposo, M. (2009). "Green" segmentation: An application to the Portuguese consumer market. Marketing Intelligence & Planning, 27(3), 364–379. https://doi.org/10.1108/02634500910955245

Dolnicar, S., & Grün, B. (2009). Environmentally friendly behavior: Can heterogeneity among individuals and contexts/environments be harvested for improved sustainable Management? Environment and Behavior, 41(5), 693–714. https://doi.org/10.1177/0013916508319448

Duncan, C., Jones, K., & Moon, G. (1998). Context, composition and heterogeneity: Using multilevel models in health research. Social Science & Medicine, 46(1), 97–117. https://doi.org/10.1016/s0277-9536(97)00148-2

Dunlap, R. E., & Liere, K. D. V. (1978). The "New Environmental Paradigm." The Journal of Environmental Education, 9(4), 10–19. https://doi.org/10.1080/00958964.1978.10801875

Dunlap, R. E., & Mertig, A. G. (1995). Global Concern for the Environment: Is Affluence a Prerequisite? Journal of Social Issues, 51(4), 121–137. https://doi.org/10.1111/j.1540-4560.1995.tb01351.x

Dunlap, R. E., & Mertig, A. G. (1997). Global Environmental Concern: An Anomaly for Postmaterialism. Social Science Quarterly, 78(1), 24–29.

Duroy, Q. M. H. (2008). Testing the affluence hypothesis: A cross-cultural analysis of the determinants of environmental action. The Social Science Journal, 45(3), 419–439. https://doi.org/10.1016/j.soscij.2008.07.001

Ertz, M., Karakas, F., & Sarigöllü, E. (2016). Exploring pro-environmental behaviors of consumers: An analysis of contextual factors, attitude, and behaviors. Journal of Business Research, 69(10), 3971–3980. https://doi.org/10.1016/j.jbusres.2016.06.010

Escobar, A. (2006). An ecology of difference: Equality and conflict in a glocalized world. Focaal, 2006(47), 120–137. https://doi.org/10.3167/092012906780646415

European Commission and European Parliament, Brussels (2018): Eurobarometer 88.1 (2017). TNS opinion, Brussels [producer]. GESIS Data Archive, Cologne. ZA6925 Data file Version 1.0.0, https://doi.org/10.4232/1.12959

Eurostat. (2020). Gini coefficient of equivalised disposable income - EU-SILC survey, Eurostat [ilc_di12]. Retrieved July 10, 2021, from https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di12&lang=en

Fairbrother, M. (2013). Rich People, Poor People, and Environmental Concern: Evidence across Nations and Time. European Sociological Review, 29(5), 910–922. https://doi.org/10.1093/esr/jcs068

Faria, S., & Gonçalves, F. (2013). Financial data modeling by Poisson mixture regression. Journal of Applied Statistics, 40(10), 2150–2162. https://doi.org/10.1080/02664763.2013.807332

Farizo, B. A., Joyce, J., & Soliño, M. (2014). Dealing with Heterogeneous Preferences Using Multilevel Mixed Models. Land Economics, 90(1), 181–198. https://doi.org/10.3368/le.90.1.181

Fetting, C. (2020). “The European Green Deal”, ESDN Report, December 2020, ESDN Office, Vienna.

Finch, W. H., Bolin, J. E., & Kelley, K. (2019). Multilevel Modeling Using R. CRC Press.

Finisterra do Paço, A. M., Barata Raposo, M. L., & Filho, W. L. (2009). Identifying the green consumer: A segmentation study. Journal of Targeting, Measurement and Analysis for Marketing, 17(1), 17–25. https://doi.org/10.1057/jt.2008.28

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Addison-Wesley.

Franzen, A. (2003). Environmental Attitudes in International Comparison: An Analysis of the ISSP Surveys 1993 and 2000*. Social Science Quarterly, 84(2), 297–308. https://doi.org/10.1111/1540-6237.8402005

Franzen, A., & Meyer, R. (2010). Environmental Attitudes in Cross-National Perspective: A Multilevel Analysis of the ISSP 1993 and 2000. European Sociological Review, 26(2), 219–234. https://doi.org/10.1093/esr/jcp018

Frey, B. S. (1997). On the relationship between intrinsic and extrinsic work motivation. International Journal of Industrial Organization, 4(15), 427-439.

Freymeyer, R. H., & Johnson, B. E. (2010). A Cross-Cultural Investigation of Factors Influencing Environmental Actions. Sociological Spectrum, 30(2), 184–195. https://doi.org/10.1080/02732170903496075

Gatersleben, B., Steg, L., & Vlek, C. (2002). Measurement and determinants of environmentally significant consumer behavior. Environment and behavior, 34(3), 335-362. https://doi.org/10.1177/0013916502034003004

Geiger, J. L., Steg, L., van der Werff, E., & Ünal, A. B. (2019). A meta-analysis of factors related to recycling. Journal of Environmental Psychology, 64, 78–97. https://doi.org/10.1016/j.jenvp.2019.05.004

Gelissen, J. (2007). Explaining Popular Support for Environmental Protection: A Multilevel Analysis of 50 Nations. Environment and Behavior, 39(3), 392–415. https://doi.org/10.1177/0013916506292014

Gelman, A., & Hill, J. (2006). Data Analysis Using Regression and Multilevel/Hierarchical Models (Analytical Methods for Social Research). Cambridge University Press.

Gendall, P., Smith, T. W., & Russell, D. (1995). Knowledge of scientific and environmental facts: a comparison of six countries. Marketing bulletin, 6, 65-74.

Giddens, A. (1984). The constitution of society: Outline of the theory of structuration. University of California Press.

Giddens, A. (1986). The Constitution of Society: Outline of the Theory of Structuration. Polity Press.

Gifford, R., & Sussman, R. (2012). Environmental Attitudes. In S. D. Clayton (Ed.), The Oxford Handbook of Environmental and Conservation Psychology (pp. 65-80). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199733026.013.0004

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. International journal of psychology, 49(3), 141-157. https://doi.org/10.1002/ijop.12034

Gilg, A., Barr, S., & Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. Futures, 37(6), 481-504. https://doi.org/10.1016/j.futures.2004.10.016

Givens, J. E., & Jorgenson, A. K. (2011). The Effects of Affluence, Economic Development, and Environmental Degradation on Environmental Concern: A Multilevel Analysis. Organization & Environment, 24(1), 74–91. https://doi.org/10.1177/1086026611406030

Gkargkavouzi, A., Halkos, G., & Matsiori, S. (2019). Environmental behavior in a private-sphere context: Integrating theories of planned behavior and value belief norm, self-identity and habit. Resources, Conservation and Recycling, 148, 145-156.

Golob, U., & Kronegger, L. (2019). Environmental consciousness of European consumers: A segmentation-based study. Journal of Cleaner Production, 221, 1–9. https://doi.org/10.1016/j.jclepro.2019.02.197

Gooch, G. D. (1995). Environmental beliefs and attitudes in Sweden and the Baltic states. Environment and behavior, 27(4), 513-539.

Gouveia, V. V. (2002). Self, Culture, and Sustainable Development. In P. Schmuck & W. P. Schultz (Eds.), Psychology of Sustainable Development (pp. 151–174). Springer US. https://doi.org/10.1007/978-1-4615-0995-0_8

Greenland, S., & Morgenstern, H. (1989). Ecological bias, confounding, and effect modification. International Journal of Epidemiology. https://doi.org/10.1093/IJE/18.1.269

Gross, M., & Telesiene, A. (2017). Introduction. How Green are Green Europeans? In Green European: Environmental Behaviour and Attitudes in Europe in a Historical and Cross-Cultural Comparative Perspective (1st ed.). Routledge.

Guagnano, G. A., Stern, P. C., & Dietz, T. (1995). Influences on attitude-behavior relationships: A natural experiment with curbside recycling. Environment and Behavior, 27(5), 699–718. https://doi.org/10.1177/0013916595275005

Guerin, D., Crete, J., & Mercier, J. (2001). A Multilevel Analysis of the Determinants of Recycling Behavior in the European Countries. Social Science Research, 30(2), 195–218. https://doi.org/10.1006/ssre.2000.0694

Gupta, S., & Ogden, D. (2006). The attitude-behavior gap in environmental consumerism. APUBEF Proceedings, 3(1), 199–206.

Gupta, S., & Ogden, D. T. (2009). To buy or not to buy? A social dilemma perspective on green buying. Journal of Consumer Marketing, 26(6), 376–391. https://doi.org/10.1108/07363760910988201

Hadler, M., & Haller, M. (2011). Global activism and nationally driven recycling: The influence of world society and national contexts on public and private environmental behavior. International Sociology, 26(3), 315–345. https://doi.org/10.1177/0268580910392258

Hadler, M., & Haller, M. (2013). A shift from public to private environmental behavior: Findings from Hadler and Haller (2011) revisited and extended. International Sociology, 28(4), 484–489. https://doi.org/10.1177/0268580913494661

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (1998). Multivariate data analysis. Volume 5. Uppersaddle River.

Hammer, T. H., & Landau, J. C. (1981). Methodological issues in the use of absence data. Journal of Applied Psychology, 66(5), 574. doi:https://doi.org/10.1037/0021-9010.66.5.574.

Hannibal, B., Liu, X., & Vedlitz, A. (2016). Personal characteristics, local environmental conditions, and individual environmental concern: A multilevel analysis. Environmental Sociology, 2(3), 286–297. https://doi.org/10.1080/23251042.2016.1197355

Hayward, K. (1990). Responsible environmental behaviour: A test of the Hines model [Masters' Thesis, Wilfrid Laurier University]. Scholars Commons @ Laurier. https://scholars.wlu.ca/etd/588/?utm_source=scholars.wlu.ca%2Fetd%2F588&utm_medium=PDF&utm_campaign=PDFCoverPages

He, Q., Duan, Y., Wang, R., & Fu, Z. (2019). Factors affecting consumers' purchase intention of eco-friendly food in China: The evidence from respondents in Beijing. International Journal of Consumer Studies, 43(5), 457–470. https://doi.org/10.1111/ijcs.12525

Heath, Y., & Gifford, R. (2002). Extending the theory of planned behavior: Predicting the use of public transportation 1. Journal of Applied Social Psychology, 32(10), 2154–2189. https://doi.org/10.1111/j.1559-1816.2002.tb02068.x

Hertwich, E. G., & Peters, G. P. (2009). Carbon footprint of nations: a global, trade-linked analysis. Environmental science & technology, 43(16), 6414-6420.

Heyman, J., & Ariely, D. (2004). Effort for payment: A tale of two markets. Psychological science, 15(11), 787-793. https://doi.org/10.1111/j.0956-7976.2004.00757.x

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis. The Journal of Environmental Education, 18(2), 1–8. https://doi.org/10.1080/00958964.1987.9943482

Hofstede, G. (2001). Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations. SAGE Publications.

Hofstede, G. (2020, February 20). Dimension data matrix. https://geerthofstede.com/research-and-vsm/dimension-data-matrix/

Finch, W. H., Bolin, J. E., & Kelley, K. (2019). Multilevel modeling using R. Crc Press.

Hsu, A., D., Esty, M., Levy, A., & de Sherbinin. (2016). The 2016 environmental performance index report. Yale Center for Environmental Law and Policy (YCELP) and Center for International Earth Science Information Network (CIESIN), Columbia University. http://dx.doi.org/10.13140/RG.2.2.19868.90249

Hsu, S. J., & Roth, R. E. (1998). An assessment of environmental literacy and analysis of predictors of responsible environmental behaviour held by secondary teachers in the Hualien area of Taiwan. Environmental education research, 4(3), 229-249.

Huebner, R. B., & Lipsey, M. W. (1981). The relationship of three measures of locus of control to environment activism. Basic and Applied Social Psychology, 2(1), 45-58. https://doi.org/10.1207/s15324834basp0201_4

Hui-Chun, P., & Wen-Jing, L. (2020). Crowding-out (-in) effects of subsidy schemes on individual donations: An experimental study. Judgment and Decision Making, 15(3), 346-352.

Hungerford, H. R., & Volk, T. L. (1990). Changing Learner Behavior Through Environmental Education. The Journal of Environmental Education, 21(3), 8–21. https://doi.org/10.1080/00958964.1990.10753743

Hunter, L. M., Hatch, A., & Johnson, A. (2004). Cross-National Gender Variation in Environmental Behaviors*. Social Science Quarterly, 85(3), 677–694. https://doi.org/10.1111/j.0038-4941.2004.00239.x

Husted, B. W. (2005). Culture and Ecology: A Cross-National Study of the Determinants of Environmental Sustainability. MIR: Management International Review, 45(3), 349–371.

Inglehart, R. (1995). Public Support for Environmental Protection: Objective Problems and Subjective Values in 43 Societies. PS: Political Science and Politics, 28(1), 57–72. https://doi.org/10.2307/420583

Inglehart, R., & Baker, W. E. (2000). Modernization, Cultural Change, and the Persistence of Traditional Values. American Sociological Review, 65(1), 19–51. https://doi.org/10.2307/2657288

IPCC (2014). Climate Change (2014). Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

IPCC, (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.

Israel, D., & Levinson, A. (2004). Willingness to Pay for Environmental Quality: Testable Empirical Implications of the Growth and Environment Literature. Contributions in Economic Analysis & Policy, 3(1). https://doi.org/10.2202/1538-0645.1254

Jänicke, M. (Ed.). (2007). Environmental governance in global perspective: New approaches to ecological modernisation (2. ed). Freie Univ., Environmental Policy Research Centre.

Jensen, B. B. (2002). Knowledge, action and pro-environmental behaviour. Environmental education research, 8(3), 325-334. https://doi.org/10.1080/13504620220145474

Jiménez Sánchez, M., & Lafuente, R. (2010). Defining and measuring environmental consciousness. Revista Internacional de Sociología, 68(3), 731–755. https://doi.org/10.3989/ris.2008.11.03

Kaiser, F. G., Hübner, G., & Bogner, F. X. (2005). Contrasting the Theory of Planned Behavior With the Value-Belief-Norm Model in Explaining Conservation Behavior1. Journal of Applied Social Psychology, 35(10), 2150–2170. https://doi.org/10.1111/j.1559-1816.2005.tb02213.x

Kaiser, F. G., & Fuhrer, U. (2003). Ecological behavior's dependency on different forms of knowledge. Applied psychology, 52(4), 598-613.

Kaplan, R., & Kaplan, S. (2002). Adolescents and the natural environment: A time out. In Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations, edited by P. H., Kahn Jr., and S. R. Kellert, 227–257. Cambridge, MA: MIT Press.

Katz-Gerro, T., Greenspan, I., Handy, F., & Vered, Y. (2020). Environmental behavior in three countries: The role of intergenerational transmission and domains of socialization. Journal of Environmental Psychology, 71, 101343. https://doi.org/10.1016/j.jenvp.2019.101343

Kemmelmeier, M., Król, G., & Kim, Y. H. (2002). Values, Economics, and Proenvironmental Attitudes in 22 Societies: Cross-Cultural Research. https://doi.org/10.1177/10697102036003004

Kim, H. Y. (2013). Statistical Notes for Clinical Researchers: Assessing Normal Distribution (2) Using Skewness and Kurtosis. Restorative Dentistry & Endodontics, 38(1), 52–54. doi:https://doi.org/10.5395/rde.2013.38.1.52.

Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—A meta-analysis. Global Environmental Change, 23(5), 1028–1038. https://doi.org/10.1016/j.gloenvcha.2013.05.014

Knight, K. W. (2016). Public awareness and perception of climate change: A quantitative cross-national study. Environmental Sociology, 2(1), 101–113. https://doi.org/10.1080/23251042.2015.1128055

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8(3), 239–260. https://doi.org/10.1080/13504620220145401

Kostadinova, E. (2016). Sustainable consumer behavior: Literature overview. Economic Alternatives, 2, 224–234.

Kotchen, M. J., Boyle, K. J., & Leiserowitz, A. A. (2013). Willingness-to-pay and policy-instrument choice for climate-change policy in the United States. Energy Policy, 55, 617-625. https://doi.org/10.1016/j.enpol.2012.12.058

Krajhanzl, J. (2010). Environmental and proenvironmental behavior. School and Health, 21(1), 251-274.

Krettenauer, T., Wang, W., Jia, F., & Yao, Y. (2020). Connectedness with nature and the decline of pro-environmental behavior in adolescence: A comparison of Canada and China. Journal of Environmental Psychology, 71, 101348. https://doi.org/10.1016/j.jenvp.2019.101348

Kurisu, K. (2015). Pro-environmental behaviors (1st ed.). Springer Japan. https://www.springer.com/gp/book/9784431558323

Lamberti, G., Aluja, T. B., & Sanchez, G. (2017). The Pathmox approach for PLS path modeling: Discovering which constructs differentiate segments. 33(6), 674–689. https://doi.org/10.1002/asmb.2270

Lamberti, G., Lopez-Sintas, J., & Sukphan, J. (2021). The social process of internet appropriation: Living in a digitally advanced country benefits less well-educated Europeans. Telecommunications Policy, 45(1), 102055. https://doi.org/10.1016/j.telpol.2020.102055

Lee, H., Kurisu, K., & Hanaki, K. (2013). Influential factors on pro-environmental behaviors—A case study in Tokyo and Seoul. 4(3). 104-116. doi: 10.4236/lce.2013.43011.

Li, D., Zhao, L., Ma, S., Shao, S., & Zhang, L. (2019). What influences an individual's pro-environmental behavior? A literature review. Resources, Conservation and Recycling, 146, 28-34.

Liere, K. D. V., & Dunlap, R. E. (1980). The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence. Public opinion quarterly, 44(2), 181-197.

Liobikienė, G., Mandravickaitė, J., & Bernatonienė, J. (2016). Theory of planned behavior approach to understand the green purchasing behavior in the EU: A cross-cultural study. Ecological Economics, 125, 38–46. https://doi.org/10.1016/j.ecolecon.2016.02.008

Liu, J. H., & Sibley, C. G. (2012). Hope for the Future? Understanding Self-Sacrifice Among Young Citizens of the World in the Face of Global Warming. Analyses of Social Issues and Public Policy, 12(1), 190–203. https://doi.org/10.1111/j.1530-2415.2011.01275.x

López-Mosquera, N., Lera-López, F., & Sánchez, M. (2015). Key factors to explain recycling, car use and environmentally responsible purchase behaviors: a comparative perspective. Resources, Conservation and Recycling, 99, 29-39.

Magnani, E. (2000). The Environmental Kuznets Curve, environmental protection policy and income distribution. Ecological Economics, 32(3), 431–443. https://doi.org/10.1016/S0921-8009(99)00115-9

Mainieri, T., Barnett, E. G., Valdero, T. R., Unipan, J. B., & Oskamp, S. (1997). Green buying: The influence of environmental concern on consumer behavior. The Journal of social psychology, 137(2), 189-204.

Makowski, D. (2018). The psycho Package: An Efficient and Publishing-Oriented Workflow for Psychological Science. Journal of Open Source Software, 3(22), 470. https://doi.org/10.21105/joss.00470

Marquart-Pyatt, S. T. (2012). Explaining Environmental Activism Across Countries. Society & Natural Resources, 25(7), 683–699. https://doi.org/10.1080/08941920.2011.625073

McCann, G., & McCloskey, S. (Eds.). (2003). From the local to the global: Key issues in development studies. Pluto Press.

McKenzie-Mohr, D., Nemiroff, L. S., Beers, L., & Desmarais, S. (1995). Determinants of Responsible Environmental Behavior. Journal of Social Issues, 51(4), 139–156. https://doi.org/10.1111/j.1540-4560.1995.tb01352.x

McNeish, D., & Wolf, M. G. (2020). Thinking twice about sum scores. 52(2287–2305). https://doi.org/10.3758/s13428-020-01398-0

Milfont, T. L. (2012). Cultural differences in environmental engagement. In S. D. Clayton (Ed.), The Oxford handbook of environmental and conservation psychology (pp. 181–200). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199733026.013.0011

Miller, K. D. (1993). Industry and country effects on managers' perceptions of environmental uncertainties. Journal of International Business Studies, 24(4), 693-714.

Minton, A. P., & Rose, R. L. (1997). The Effects of Environmental Concern on Environmentally Friendly Consumer Behavior: An Exploratory Study. Journal of Business Research, 40(1), 37–48. https://doi.org/10.1016/S0148-2963(96)00209-3

Mohai, P. (1992). Men, women, and the environment: An examination of the gender gap in environmental concern and activism. Society & Natural Resources, 5(1), 1-19.

Mol, A. P. J. (2002). Ecological Modernization and the Global Economy. Global Environmental Politics, 2(2), 92–115. https://doi.org/10.1162/15263800260047844

Morgenstern, H., & Thomas, D. (1993). Principles of study design in environmental epidemiology. Environmental Health Perspectives, 101 Suppl 4, 23–38. https://doi.org/10.1289/ehp.93101s423

Morren, M., & Grinstein, A. (2016). Explaining environmental behavior across borders: A meta-analysis. Journal of Environmental Psychology, 47, 91–106. https://doi.org/10.1016/j.jenvp.2016.05.003

Morris, M. W., Hong, Y., Chiu, C., & Liu, Z. (2015). Normology: Integrating insights about social norms to understand cultural dynamics. Organizational Behavior and Human Decision Processes, 129, 1–13. https://doi.org/10.1016/j.obhdp.2015.03.001

Mostafa, M. M. (2007). Gender differences in Egyptian consumers' green purchase behaviour: The effects of environmental knowledge, concern and attitude. International Journal of Consumer Studies, 31(3), 220–229. https://doi.org/10.1111/j.1470-6431.2006.00523.x

Mostafa, M. M. (2012). Does globalisation affect consumers' pro-environmental intentions? A multilevel analysis across 25 countries. International Journal of Sustainable Development & World Ecology, 19(3), 229–237. https://doi.org/10.1080/13504509.2011.614289

Mufidah, I., Jiang, B. C., Lin, S.-C., Chin, J., Rachmaniati, Y. P., & Persada, S. F. (2018). Understanding the Consumers' Behavior Intention in Using Green Ecolabel Product through Pro-Environmental Planned Behavior Model in Developing and Developed Regions: Lessons Learned from Taiwan and Indonesia. Sustainability, 10(5), 1423. https://doi.org/10.3390/su10051423

Muralidharan, S., Rejón-Guardia, F., & Xue, F. (2016). Understanding the green buying behavior of younger Millennials from India and the United States: A structural equation modeling approach. Journal of International Consumer Marketing, 28(1), 54–72. https://doi.org/10.1080/08961530.2015.1056328

Neuvonen, A., Kaskinen, T., Leppänen, J., Lähteenoja, S., Mokka, R., & Ritola, M. (2014). Low-carbon futures and sustainable lifestyles: A backcasting scenario approach. Futures, 58, 66–76. https://doi.org/10.1016/j.futures.2014.01.004

Nový, M., Smith, M. L., & Katrňák, T. (2017). Inglehart's scarcity hypothesis revisited: Is postmaterialism a macro- or micro-level phenomenon around the world? International Sociology, 32(6), 683–706. https://doi.org/10.1177/0268580917722892

OECD. (2019). OECD Work on Environment. https://www.oecd.org/environment/brochure-oecd-work-on-environment-2019-2020.pdf

Olli, E., Grendstad, G., & Wollebaek, D. (2001). Correlates of Environmental Behaviors: Bringing Back Social Context. Environment and Behavior, 33(2), 181–208. https://doi.org/10.1177/0013916501332002

Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally: Values, the theory of planned behavior, and value-belief-norm theory. Environment and Behavior, 38(4), 462–483. https://doi.org/10.1177/0013916505286012

Ortega-Egea, J. M., García-de-Frutos, N., & Antolín-López, R. (2014). Why do some people do "more" to mitigate climate change than others? Exploring heterogeneity in psycho-social associations. PLoS ONE, 9(9), e106645. https://doi.org/10.1371/journal.pone.0106645

Oskamp, S., Harrington, M. J., Edwards, T. C., Sherwood, D. L., Okuda, S. M., & Swanson, D. C. (1991). Factors influencing household recycling behavior. Environment and Behavior, 23(4), 494–519. https://doi.org/10.1177/0013916591234005

Ostman, R. E., & Parker, J. L. (1987). A Public's Environmental Information Sources and Evaluations of Mass Media. The Journal of Environmental Education, 18(2), 9–17. https://doi.org/10.1080/00958964.1987.9943483

Ozturk, I. (2008). The Role of Education in Economic Development: A Theoretical Perspective (SSRN Scholarly Paper ID 1137541). Social Science Research Network. https://doi.org/10.2139/ssrn.1137541

Paço, A. do, Alves, H., Shiel, C., & Filho, W. L. (2013). Development of a green consumer behaviour model. International Journal of Consumer Studies, 37(4), 414–421. https://doi.org/10.1111/ijcs.12009

Park, H., Russell, C., & Lee, J. (2007). National culture and environmental sustainability: A cross-national analysis. Journal of Economics and Finance, 31(1), 104–121. https://doi.org/10.1007/BF02751516

Pirani, E., & Secondi, L. (2011). Eco-friendly Attitudes: What European Citizens Say and What They Do. International Journal of Environmental Research 5(1), 67–84.

Pisano, I., & Hidalgo, M.-C. (2013). Environmental concern in Andalusia, Spain: What, how much, who and why? PsyEcology, 4(3), 287–310. https://doi.org/10.1174/217119713807749841

Pisano, I., & Lubell, M. (2017). Environmental Behavior in Cross-National Perspective: A Multilevel Analysis of 30 Countries. Environment and Behavior, 49(1), 31–58. https://doi.org/10.1177/0013916515600494

Plant, R. E. (2012). Spatial data analysis in ecology and agriculture using R (1st Edition). CRC Press. https://doi.org/10.1201/b11769

Poortinga, W., Steg, L., & Vlek, C. (2004). Values, Environmental Concern, and Environmental Behavior: A Study into Household Energy Use. Environment and Behavior, 36(1), 70–93. https://doi.org/10.1177/0013916503251466

Punzo, G., Panarello, D., Pagliuca, M. M., Castellano, R., & Aprile, M. C. (2019). Assessing the role of perceived values and felt responsibility on pro-environmental behaviours: A comparison across four EU countries. Environmental Science & Policy, 101, 311-322.

R Core Team. (2020). R: A language and environment for statistical computing. https://www.R-project.org/

Reisch, L.A. & Thøgersen, J. (2015). Handbook of Research on Sustainable Consumption; Edward Elgar Publishing: Cheltenham, UK.

Roberts, J. K. (2000). Examining mutable reform options for urban schools with multilevel analysis in the National Educational Longitudinal Study:88. http://adsabs.harvard.edu/abs/2000PhDT.....122R

Rommel, J., Buttmann, V., Liebig, G., Schönwetter, S., & Svart-Gröger, V. (2015). Motivation crowding theory and pro-environmental behavior: Experimental evidence. Economics Letters, 129, 42-44. https://doi.org/10.1016/j.econlet.2015.01.025

Røpke, I. (2005). Trends in the development of ecological economics from the late 1980s to the early 2000s. Ecological Economics, 55(2), 262–290. https://doi.org/10.1016/j.ecolecon.2004.10.010

Rowlands, I. H., Scott, D., & Parker, P. (2003). Consumers and green electricity: Profiling potential purchasers. Business Strategy and the Environment, 12(1), 36–48. https://doi.org/10.1002/bse.346

Ruiz de Maya, S., López-López, I., & Munuera, J. L. (2011). Organic food consumption in Europe: International segmentation based on value system differences. Ecological Economics, 70(10), 1767–1775. https://doi.org/10.1016/j.ecolecon.2011.04.019

Samdahl, D. M., & Robertson, R. (1989). Social determinants of environmental concern: Specification and test of the model. Environment and behavior, 21(1), 57-81.

Sarigöllü, E. (2009). A Cross-Country Exploration of Environmental Attitudes. Environment and Behavior, 41(3), 365–386. https://doi.org/10.1177/0013916507313920

Schaffrin, A., & Schmidt-Catran, A. (2017). Changing concern about environmental threats and risks – a longitudinal and multilevel perspective on the relationship between values and interests. In A. Telesiene & M. Gross (Eds.), Green European: Environmental Behaviour and Attitudes in Europe in a Historical and Cross-Cultural Comparative Perspective (1st ed., pp. 84-116). Routledge. https://doi.org/10.4324/9781315648491

Schahn, J., & Holzer, E. (1990). Studies of individual environmental concern: The role of knowledge, gender, and background variables. Environment and behavior, 22(6), 767-786.

Schultz, P. W. (2002). Environmental attitudes and behaviors across cultures. Online readings in psychology and culture, 8(1), 2307-0919.

Schwartz, S. H. (1970). Elicitation of moral obligation and self-sacrificing behavior: An experimental study of volunteering to be a bone marrow donor. Journal of Personality and Social Psychology, 15(4), 283–293. https://doi.org/10.1037/h0029614

Schwartz, S. H. (1977). Normative influences on altruism. In Advances in experimental social psychology edited by L. Berkowitz (Vol. 10, pp. 221-279). Academic Press. doi:https://doi.org/10.1016/S0065-2601(08)60358-5.

Scott, D. & Willits, F.K. (1991). Environmental concern of Pennsylvania citizens: Data from a statewide survey. In Technical Report A.E. and R.S. 219, University Park; Pennsylvania State University: State College, PA, USA.

SDSN, & IEEP. (2020). The 2020 Europe Sustainable Development Report: Meeting the Sustainable Development Goals in the face of the COVID-19 pandemic. Sustainable Development Solutions Network and Institute for European Environmental Policy: https://www.sustainabledevelopment.report

Soyez, K. (2012). How national cultural values affect pro-environmental consumer behavior. International Marketing Review, 29(6), 623–646. https://doi.org/10.1108/02651331211277973

Spaargaren, G., & Mol, A. P. J. (1992). Sociology, environment, and modernity: Ecological modernization as a theory of social change. Society & Natural Resources, 5(4), 323–344. https://doi.org/10.1080/08941929209380797

Stanley, B. J., Stern P. C., & Elworth, J. T. (1985). Personal and Contextual Influences on Household Energy Adaptations. Journal of Applied Psychology 70(1), 3–21. doi:https://doi.org/10.1037/0021-9010.70.1.3.

Steg, L., & De Groot, J. I. (2012). Environmental values. In The Oxford handbook of environmental and conservation psychology.

Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. Journal of social issues, 56(3), 407-424.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. Human Ecology Review, 6(2), 81–97. https://www.jstor.org/stable/24707060

Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. Environment and behavior, 25(5), 322-348.

Stern, P. C., & Oskamp, S. (1987). Managing scarce environmental resources. In D. Stokols & I. Altman (Eds.), Handbook of environmental psychology (pp. 1043–1088). New York: Wiley.

Stiglitz, J. (2009). Progress, what progress? - OECD Observer. https://oecdobserver.org/news/archivestory.php/aid/2793/Progress,_what_progress_.html

Streiner, D. L. (2003). Starting at the beginning: an introduction to coefficient alpha and internal consistency. Journal of personality assessment, 80(1), 99-103.

Sun, Y., Liu, N., & Zhao, M. (2019). Factors and mechanisms affecting green consumption in China: A multilevel analysis. Journal of Cleaner Production, 209, 481–493. https://doi.org/10.1016/j.jclepro.2018.10.241

Swim, J. K., Clayton, S., & Howard, G. S. (2011). Human behavioral contributions to climate change: Psychological and contextual drivers. American Psychologist, 66(4), 251–264. https://doi.org/10.1037/a0023472

Tabaschnick, B. G., & Fidell, L. S. (2013). Using multivariate statistics (6th Edit.).Pearson. London, UK.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International journal of medical education, 2, 53.

Tehseen, S., Ramayah, T., & Sajilan, S. (2017). Testing and controlling for common method variance: A review of available methods. Journal of Management Sciences, 4(2), 142-168.

Telesiene, A., & Gross, M. (2017). Green European: Environmental Behaviour and Attitudes in Europe in a Historical and Cross-Cultural Comparative Perspective (1st ed.). Routledge. https://doi.org/10.4324/9781315648491

The Associated Press. (2021, August 20). French Riviera wildfire not spreading but still uncontrolled. ABC News. https://abcnews.go.com/International/wireStory/french-riviera-wildfire-spreading-uncontrolled-79557584

Thielking, M., & Moore, S. (2001). Young people and the environment: Predicting ecological behaviour. Australian Journal of Environmental Education, 17, 63-70.

Thøgersen, J. (2005). How May Consumer Policy Empower Consumers for Sustainable Lifestyles? Journal of Consumer Policy, 28(2), 143–177. https://doi.org/10.1007/s10603-005-2982-8

Thøgersen, J. (2010). Country Differences in Sustainable Consumption: The Case of Organic Food. Journal of Macromarketing, 30(2), 171–185. https://doi.org/10.1177/0276146710361926

Tonglet, M., Phillips, P. S., & Read, A. D. (2004). Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: a case study from Brixworth, UK. Resources, conservation and recycling, 41(3), 191-214.

Turaga, R. M. R., Howarth, R. B., & Borsuk, M. E. (2010). Pro-environmental behavior. Annals of the New York Academy of Sciences, 1185(1), 211–224. https://doi.org/10.1111/j.1749-6632.2009.05163.x

UN Environment. (2019). Global Environment Outlook – GEO-6: Summary for Policymakers. Nairobi. https://doi.org/10.1017/9781108639217

United Nations Development Programme, Human Development Report. (2020, July 21). Education index. http://hdr.undp.org/en/indicators/103706

United Nations. (2021). Secretary-General Calls Latest IPCC Climate Report ‘Code Red for Humanity’, Stressing ‘Irrefutable’ Evidence of Human Influence [Press release]. Retrieved from https://www.un.org/press/en/2021/sgsm20847.doc.htm.

Vermunt, J. K. (2003). Multilevel latent class models. Sociological Methodology, 33(1), 213–239. https://doi.org/10.1111/j.0081-1750.2003.t01-1-00131.x

Vermunt, J. K., & Magidson, J. (2005). Technical guide for Latent GOLD 4.0: Basic and advanced. Belmont, MA: Statistical Innovations Inc.

Vig, N. J., & Kraft, M. E. (2012). Environmental Policy: New Directions for the Twenty-First Century 8th Edition. Sage.

Wackernagel, M., Schulz, N. B., Deumling, D., Linares, A. C., Jenkins, M., Kapos, V., ... & Randers, J. (2002). Tracking the ecological overshoot of the human economy. Proceedings of the national Academy of Sciences, 99(14), 9266-9271. https://doi.org/10.1073/pnas.142033699

Wang, T., Shen, B., Han Springer, C., & Hou, J. (2021). What prevents us from taking low-carbon actions? A comprehensive review of influencing factors affecting low-carbon behaviors. Energy Research & Social Science, 71, 101844. https://doi.org/10.1016/j.erss.2020.101844

Wang, Y. (2017). Promoting sustainable consumption behaviors: The impacts of environmental attitudes and governance in a cross-national context. Environment and Behavior, 49(10), 1128–1155. https://doi.org/10.1177/0013916516680264

Weber, E. (2015). Climate Change Demands Behavioral Change: What Are the Challenges? Social Research, 82(3), 561–580.

Wedel, M., & Kamakura, W. A. (2012). Market Segmentation: Conceptual and Methodological Foundations. Springer Science & Business Media.

Weigel, R. H., Vernon, D. T. A., & Tognacci, L. N. (1974). Specificity of the attitude as a determinant of attitude-behavior congruence. Journal of Personality and Social Psychology, 30(6), 724–728. https://doi.org/10.1037/h0037540

Welch, D., & Southerton, D. (2019). After Paris: Transitions for sustainable consumption. Sustainability: Science, Practice and Policy, 15(1), 31–44. https://doi.org/10.1080/15487733.2018.1560861

Wiederhold, M., & Martinez, L. F. (2018). Ethical consumer behaviour in Germany: The attitude-behaviour gap in the green apparel industry. International Journal of Consumer Studies, 42(4), 419–429. https://doi.org/10.1111/ijcs.12435

Wiernik, B. M., Ones, D. S., & Dilchert, S. (2013). Age and environmental sustainability: a meta-analysis. Journal of Managerial Psychology, 28(7): 826–856. doi:https://doi.org/10.1108/JMP-07-2013-0221.

Williams, B., Onsman, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. Australasian Journal of Paramedicine, 8(3). https://doi.org/10.33151/ajp.8.3.93

Williamson, K., Satre-Meloy, A., Velasco, K., & Green, K. (2018). Climate Change Needs Behavior Change: Making the Case For Behavioral Solutions to Reduce Global Warming. Arlington, VA: Rare.

Wood, N. D., Gnonhosou, D. C. A., & Bowling, J. W. (2015). Combining Parallel and Exploratory Factor Analysis in Identifying Relationship Scales in Secondary Data. Marriage & Family Review, 51(5), 385–395. https://doi.org/10.1080/01494929.2015.1059785

World Bank. (n.d.). GDP per capita, PPP (constant 2017 international $). https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD

WWF. (2014). Living Planet Report 2014: Species and spaces, people and places. [McLellan, R., Iyengar, L., Jeffries, B. and N. Oerlemans (Eds)]. WWF, Gland, Switzerland.

Xu, X., Maki, A., Chen, C., Dong, B., & Day, J. K. (2017). Investigating willingness to save energy and communication about energy use in the American workplace with the attitude-behavior-context model. Energy Research & Social Science, 32, 13–22. https://doi.org/10.1016/j.erss.2017.02.011

Young, H. P. (2015). The Evolution of Social Norms. Annual Review of Economics, 7(1), 359–387. https://doi.org/10.1146/annurev-economics-080614-115322

Zelezny, L. C., Chua, P. P., & Aldrich, C. (2000). New Ways of Thinking about Environmentalism: Elaborating on Gender Differences in Environmentalism. Journal of Social Issues, 56(3), 443–457. https://doi.org/10.1111/0022-4537.00177

Zsóka, Á., Szerényi, Z. M., Széchy, A., & Kocsis, T. (2013). Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students. Journal of Cleaner Production, 48, 126-138. https://doi.org/10.1016/j.jclepro.2012.11.030