

INTERNATIONAL ASSESSMENT OF ENVIRONMENTALLY MOTIVATED ANTI-CONSUMPTION: MAIN, MODERATING, AND DISAGGREGATED EFFECTS

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ABSTRACT

Faced with the threat of climate change, there is a challenge to promote more environmentally friendly consumption patterns. This work aims to provide a better understanding of environmentally motivated anti-consumption (ie, consumption reduction) aimed at fighting climate change. A 'core' model hypothesizing three psychographics (environmental knowledge, motivations, and attitudes) as antecedents of consumption reduction was tested. Two alternative models assessed disaggregated motivational and knowledge effects on anti-consumption behavior. These three alternative models were well supported by the findings; jointly, environmental knowledge, motivations, and attitudes were moderately predictive of climate change-oriented anti-consumption. Finally, five additional influences (perceived environmental threat, gender, age, education and country value orientation) were examined as potential moderators of the hypothesized relationships in the 'core' model. All the analyzed moderators exerted significant influences on (at least) one structural relationship; 'attitude-behavior' was the most stable linkage, while information/knowledge effects varied much more across moderators.

Keywords:

Anti-consumption, climate change, environmental psychographics, socio-demographics, moderators, SEM, multi-group analysis.

1. Introduction

Economic growth and technology development have typically led to high (and increasing) rates of consumption in modern societies (Jackson, 2005; Varey, 2010). However, excessive consumption contributes to depletion of natural resources and generates huge quantities of waste (Thøgersen & Grunert-Beckmann, 1997); thus, unsustainable consumption patterns can be related to both local and global environmental problems, such as climate change and global warming (European Commission, 2010). The European Union (EU) is responsible for as much as 12% of the world's greenhouse emissions (European Commission, 2010). Moreover, 20% of CO₂ emissions in EU-27 countries are attributable to household consumption (Junta de Andalucía, 2010). Such data suggest that, despite continued efforts to promote more environmentally-friendly citizen and consumer behavior, there is still much room for improvement within most EU countries (European Environment Agency, 2010).

Recycling is a major solution to solid waste problems caused by consumption (Ebreo, Hershey, & Vining, 1999; Thøgersen & Grunert-Beckmann, 1997). Even so, recycling efforts appear to be insufficient, owing to non-recyclable materials and less-than-desirable recycling rates (Ebreo et al., 1999; European Commission, 2008). In addition, recycling is a resource-intensive process that demands significant amounts of energy (European Commission, 2010). Another pathway towards sustainability is based upon the development of ecologically efficient new products and product substitutions; however, such incremental eco-efficiency improvements have been largely offset by substantial growth in global consumption (Peattie & Peattie, 2009). Faced with this situation, some authors argue that more effective solutions to environmental degradation lie in changing the dominant lifestyles and reducing current consumption levels (Jackson, 2005; Peattie & Peattie, 2009).

Hence, this paper provides a thorough assessment of factors leading European citizens to reduce their consumption levels for environmental reasons (ie, fighting climate change). (1) First, the authors examine the role of three psychographics (environmental knowledge, motivations, and attitudes) in European citizens' environmentally motivated anti-consumption (ie, consumption reduction behavior). Based on expectancy-value models (eg, Ajzen, 1991), a 'core' research model posits that environmental attitudes are important predictors of anti-consumption; respondents' ecological motivations and level of knowledge about climate change are, respectively, modeled as internal and external factors jointly influencing environmental attitudes. (2) Two alternative models examine in more detail the role of specific, disaggregated ecological motivations (ie, altruistic and egoistic motivations) and environmental knowledge (ie, about the causes, consequences, and ways of fighting climate change) in consumption reduction. (3) Finally, five additional influences (perceived threat of climate change, gender, age, education, and country value orientation) are examined as potential moderators of the relationships (in the 'core' model) between psychographics and environmentally motivated consumption reduction.

2. Environmentally motivated anti-consumption

The recent publication of special issues devoted to 'sustainability' and 'anti-consumption', in leading business and marketing journals such as *Journal of Business Research* (2009), *International Journal of Consumer Studies* (2009), *Journal of Consumer Behavior* (2010), or *Journal of Macromarketing* (2010), exemplifies the importance of discovering and investigating alternative forms of environmentally sustainable consumption.

Sustainable consumption is a broad term referring to the various ways to reduce the ecological footprint of consumption (Black & Cherrier, 2010). There is evidence of two (basic) consumption strategies for environmental sustainability. A rather 'liberal' view of sustainable consumerism revolves around the purchase of 'greener' products and reducing (to a certain level) current consumption levels; thus, consumers' current consumption habits need not be excessively modified (Moisander, 2007). In contrast, 'radical' green consumers would reduce their consumption to the 'strictly necessary' (Moisander, 2007); radical green consumerism

involves a broad rethinking of society and prevailing unsustainable lifestyles (Black & Cherrier, 2010). Hence, despite the common belief that consumers construct and express their ‘self’ (eg, self-image and personality) through the purchase and use of brands and products –particularly in developed countries (Rucker & Galinsky, 2008; Varey, 2010), anti-consumption practices increasingly help to achieve self-construction goals as part of living more sustainable lifestyles (Black & Cherrier, 2010).

The differentiation of two consumption domains based on location (ie, home routines vs. purchasing decisions) has proven useful in anti-consumption research (Barr & Gilg, 2006; De Young, Duncan, Frank et al., 1993). Anti-consumption decisions in household and shopping domains differ not only in terms of behavior frequency, with home activities being more habitual than purchasing ones, but also in the moment of decision-making or choice (Ebreo et al., 1999), and an individual’s ability and options for action (De Young et al., 1993). In the developing literature on environmentally motivated anti-consumption –ie, consumption reduction (see Barr, 2007; Fujii, 2006), most studies have focused on specific kinds of household behavior.

Given the wide range of anti-consumption manifestations, research in this field may benefit from the prediction of consumption reduction behaviors at ‘aggregate’ or more general levels. Such analyses will likely lead to the identification of factors predicting anti-consumption in a wide array of domains. The present study examines both domestic and ‘out-of-home’ types of environmentally motivated consumption reductions. For that purpose, two items measure respondents’ reduction of energy and water consumption at home; the other two behavioral items are self-reported measures of anti-shopping actions (ie, consuming less disposable items, such as plastic bags and packaging, and avoiding products that come from far away-places). Thus, the dependent construct in the analysis (ie, consumption reduction behavior) is expected to be either uni- or bi-dimensional in structure.

3. Theory and hypotheses

Two theoretical frameworks are prevalent in pro-environmental behavior models. Ajzen’s theory of planned behavior (TPB) is often used to explain pro-environmental actions from a ‘self-interest’ perspective –ie, ecological action results from a rational evaluation of its costs and benefits (eg, time, money, effort, and social approval) (Abrahamse & Steg, 2009). Conversely, Schwartz’s, norm-activation model (NAM) draws on ‘altruism’ (ie, trading off personal benefit for environmental conservation) to account for environmentally significant behavior (Bamberg & Möser, 2007). Several studies have modified, combined, and extended TPB and NAM (ie, Bamberg & Möser, 2007; Abrahamse & Steg, 2009), particularly to account for psychological influences on environmentally responsible behavior (Stern, 2000). However, pro-environmental behavior, such as environmentally motivated consumption reduction, may be influenced by many other factors, such as contextual forces, habits, or personal capabilities (Stern, 2000).

3.1. ‘Core’ research model

Based on expectancy-value theory (Ajzen, 1991), the ‘core’ research model posits that environmental attitudes (towards climate change) are important predictors of environmentally motivated anti-consumption. The environmental literature identifies attitude as a major construct influencing pro-environmental intention and behavior (Bamberg & Möser, 2007; Kaiser, Wölfling, & Fuhrer, 1999). Hence, individuals with positive attitudes towards the environment should be more likely to engage in consumption reduction behaviors; likewise, negative environmental attitudes should be negatively related to environmentally motivated anti-consumption (Bamberg & Möser, 2007; Kollmuss & Agyeman, 2002). Considering the ‘value/belief’ nature of ecological motivations (Grunert & Juhl, 1995), attitudes toward climate change will mediate the effect of (altruistic and egoistic) motivations on consumption reduction (see Barr, 2007). Moreover, knowledge of environmental issues is also considered to be a necessary, but insufficient, antecedent condition for pro-environmental behavior (Bamberg & Möser, 2007; Kaiser et al., 1999; Kollmuss & Agyeman, 2002). Knowledge about climate

change is posited to influence consumption reduction behavior indirectly, through respondents' environmental attitudes (Abrahamse et al., 2005; Barr, 2007; De Young et al., 1993). Also, environmental knowledge will exert a significant influence on (altruistic and egoistic) motivations for environmentally motivated anti-consumption (Thøgersen, 1994).

H1a. *Positive environmental attitudes will have a positive effect on consumption reduction.*

H1b. *Negative environmental attitudes will have a negative effect on consumption reduction.*

H2. *Ecological motivations will have a positive effect on (positive and negative) environmental attitudes.*

H3a. *Environmental knowledge will have a positive effect on (pos. / neg.) environmental attitudes.*

H3b. *Environmental knowledge will have a positive effect on ecological motivations.*

3.2. Disaggregated motivational effects

Motivations are made up of different value orientations held in various proportions (Stern et al., 1993; Kollmuss & Agyeman, 2002). Environmental studies have explored the main values underlying people's motivation for environmentally responsible behavior (Schultz & Zelezny, 1999). Following Schwartz's NAM (Schwartz, 1977), most authors have distinguished between self-transcendent (altruistic) and self-enhancement (egoistic) values. People with predominant self-transcendent values have been found to be more engaged in different types of pro-environmental behaviors (Stern et al., 1993; Gagnon Thompson & Barton, 1994), including consumption reduction ones (Barr, 2007; Barr & Gilg, 2006). However, changes toward more sustainable lifestyles (eg, consuming less or downshifting) can also be the consequence of desires to improve quality of life or to reinforce personal identity –ie, selfish motivations (Huneke, 2005; Black & Cherrier, 2010). Hence, different motivational mechanisms are likely to be operative in a person's environmentally responsible decision-making (Schultz & Zelezny, 1999). The available empirical evidence also suggests that both egoistic and altruistic values can result in pro-environmental behavior (Stern et al., 1993), particularly when different types of ecological values come into play in a coherent manner (De Young et al., 1993). Consistent with the previous arguments concerning the role of ecological motivations, the following two hypotheses are proposed:

H4a. *Self-transcendent (altruistic) ecological motivations will exert a greater effect on environmental attitudes, compared to self-enhancement (egoistic) ones.*

H4b. *The joint effects of altruistic and egoistic ecological motivations (in the 'core model') will be greater than the separate effects of either altruistic or egoistic types of motivations (in the model of disaggregated motivational effects).*

3.3. Disaggregated information level / knowledge effects

General environmental information / knowledge effects have been widely examined in environmental literature on environmentally responsible behaviour (Bamberg & Möser, 2007; Kollmuss & Agyeman, 2002). Still, relatively few studies have examined the effects of more than two types of environmental information or knowledge on pro-environmental attitudes and behavior (Frik, Kaiser, & Wilson, 2004). Environmental information can be divided in 'system information', concerning the existence and nature of environmental problems, 'action-related information', concerning ecological action strategies, and 'effectiveness information', concerning the consequences of engaging (or not) in pro-environmental actions (Frik et al., 2004). System and action-related environmental knowledge have been particularly associated with pro-environmental behavior (Kaiser & Fuhrer, 2003), with action-related knowledge showing the strongest effects (Abrahamse et al., 2005; Barr, 2007; Frik et al., 2004). The role of effectiveness environmental knowledge is somewhat controversial; some authors argue that effectiveness information may elicit feelings of frustration, owing to people's increased awareness of the limited impact of their actions on environmental protection (Kollmuss & Agyeman, 2002); yet, empirical findings show that effectiveness knowledge benefits

individuals' pro-environmental performance (Frik et al., 2004). In any case, different types of environmental information / knowledge must interact in a convergent way if they are to effectively foster ecological behaviors (Kaiser & Fuhrer, 2003), such as environmentally motivated anti-consumption.

H5a. *Action-related environmental knowledge (of ways to fight climate change) will exert greater effects on pro-environmental attitudes and ecological motivations, compared to system and effectiveness environmental knowledge.*

H5b. *The joint effects of system, action-related, and effectiveness environmental knowledge (in the 'core model') will be greater than the separate effects of each of these three types of environmental knowledge (in the model of disaggregated knowledge effects).*

3.4. Moderation effects

The importance of analyzing moderation effects has been acknowledged in environmental research (Kaiser et al., 1999). In particular, moderation analyses help to clarify the questions of 'when' and 'for whom' a given variable is significantly or more strongly predictive of an outcome variable (Frazier et al., 2004). Regardless of the assumed importance of psychographics for pro-environmental behaviors (Bamberg & Möser, 2007), the consistency of 'attitudes-behavior', 'motivation-attitudes', 'knowledge-attitudes', and 'knowledge-motivation' linkages (in the 'core' model of environmentally motivated anti-consumption) is likely to be contingent on a variety of internal and exogenous influences (Diamantopoulos et al., 2003; Kaiser et al., 1999; O'Connor et al., 1999).

Perceived threat (seriousness) of climate change. People with higher perceptions of environmental threat are more likely to engage in information-seeking (Kahlor et al., 2006; Whitmarsh, 2008). However, from a particular threshold upwards, increasing levels of information may lead to more stable attitudes towards specific environmental problems—eg, climate change (Kahlor et al., 2006). Thus, people with high threat perceptions will rely less on external, environmental information (Whitmarsh, 2008), and be guided more by their internal reasons internal reasons for environmentally motivated anti-consumption (Schultz et al., 1995). Consistent with this, (positive and negative) environmental attitudes will have greater effects on consumption reduction behavior for individuals rating climate change as a more serious problem—i.e., high threat perceptions (Poss, 2001).

H6a. *For respondents with 'high' perceived threat of climate change, the effect of (positive and negative) attitudes toward climate change on consumption reduction will be 'intensified'.*

H6b. *For respondents with 'high' perceived threat of climate change, the effect of environmental information level on ecological motivations will be 'attenuated'.*

H6c. *For respondents with 'high' perceived threat of climate change, the effect of environmental information level on (pos. / neg.) environmental attitudes will be 'attenuated'.*

H6d. *For respondents with 'high' perceived threat of climate change, the effect of ecological motivations on (pos. / neg.) environmental attitudes will be 'intensified'.*

Gender. The traditional gender division of housework has been used to explain women's greater environmental performance in 'private-sphere' behaviors (Barr, 2007; Hunter, Hatch, & Johnson, 2004). Women may perceive fewer barriers than men to environmentally motivated consumption reduction 'at home'—e.g., to reducing household water and energy consumption (Hunter et al., 2004); hence, female gender should intensify the relationships between environmental attitudes and anti-consumption behavior. In addition, women have often reported lower levels of environmental knowledge than men (Diamantopoulos et al., 2003; Kollmuss & Agyeman, 2002; Olli et al., 2001). Nonetheless, women tend to be more attentive than men to general environmental information (Kahlor et al., 2006; von Borgstede & Anderson, 2010), and more responsive to 'green' advertising (Haytko & Matulich, 2010). Hence, the paths from environmental information/knowledge—to environmental attitudes and ecological motivations—should be intensified for female respondents.

H7a. *For female respondents, the effects of (positive and negative) environmental attitudes on consumption reduction will be ‘intensified’.*

H7b. *For female respondents, the effect of environmental information level on ecological motivations will be ‘intensified’.*

H7c. *For female respondents, the effect of environmental information level on (pos. / neg.) environmental attitudes will be ‘intensified’.*

Age. The interplay of ‘cohort’ and ‘life-cycle’ age effects suggests that middle-aged individuals are more likely to engage in environmentally significant behavior (Franzen & Meyer, 2010). Conversely, the ‘attitude–behavior’ linkage may be attenuated for younger people, due to lack of necessary resources for pro-environmental actions (Diamantopoulos et al., 2003); likewise, older people’s environmental engagement may be hindered by previous habits and routines (Thøgersen, 1994). Regarding environmental knowledge, it is not possible to find clear age patterns (Diamantopoulos et al., 2003). However, older people’s attitudes will be more stable, due to greater commitment to the established paradigm (Diamantopoulos et al., 2003). Based on constrained capabilities for pro-environmental action (Stern, 2000), attenuated information/knowledge effects are expected for younger respondents.

H8a. *For middle-aged respondents, the effect of (positive and negative) environmental attitudes on consumption reduction will be ‘intensified’.*

H8b. *For middle-aged respondents, the effect of environmental information level on ecological motivations will be ‘intensified’.*

H8c. *For middle-aged respondents, the effect of environmental information level on (pos. / neg.) environmental attitudes will be ‘intensified’.*

Education. More educated individuals tend to be more knowledgeable about environmental issues (Kollmuss & Agyeman, 2002). People with more years of formal education have access to more sources and types of information (Vining & Ebreo, 1990). In addition, education helps people understand the complex relationships between environmental problems, their consequences, and mitigation strategies (O’Connor et al., 1999; Diamantopoulos et al., 2003; Xiao et al., 2007). Greater capabilities to overcome knowledge barriers suggest that the ‘attitude–behavior’ will be intensified for better-educated individuals. However, higher levels of environmental information do not necessarily lead to stronger information / knowledge effects; on the contrary, people with extensive knowledge about environmental hazards may become rather insensitive to external cues (von Borgstede & Anderson, 2010).

H9a. *For respondents with more years of education, the effect of (positive and negative) environmental attitudes on consumption reduction will be ‘intensified’.*

H9b. *For respondents with more years of education, the effect of environmental information level on ecological motivations will be ‘attenuated’.*

H9c. *For respondents with more years of education, the effect of environmental information level on (pos. / neg.) environmental attitudes will be ‘attenuated’.*

Country value orientation. It is widely believed that differences in environmental concern and behavior are a consequence of shared values within a culture (Schultz & Zelezny, 1999). Inglehart’s theory of post-materialism provides a prevalent approach to examining country differences in pro-environmental behavior (Franzen & Meyer, 2010). According to post-materialist theory, lower levels of pro-environmental commitment in ‘materialist’ countries can be accounted for by structural barriers to ecological action; thus, ‘environmental attitudes–consumption reduction’ linkages should be attenuated for the materialist country group. As noted previously, environmental information effects are particularly strong when information aligns with individual interests (von Borgstede & Anderson, 2010); environmental protection arouses significant public interest in countries with predominant post-materialist values. Consequently, the paths from environmental information level to attitudes and motivations will be stronger for post-materialist countries.

H10a. For ‘post-materialist’ countries, the effect of (positive and negative) environmental attitudes on consumption reduction will be ‘intensified’.

H10b. For ‘post-materialist’ countries, the effect of environmental information level on ecological motivations will be ‘intensified’.

H10c. For ‘post-materialist’ countries, the effect of environmental information level on (pos. / neg.) environmental attitudes will be ‘intensified’.

4. Methodology

4.1. Sample

The empirical analyses are based on the cross-national dataset ‘Eurobarometer 69.2—Europeans’ attitudes towards climate change’. Data were collected between March and May 2008 in all EU-27 member states, plus three candidate countries (Croatia, Turkey, and the Former Yugoslav Republic of Macedonia) and the Turkish Cypriot Community. A stratified, multistage probability sampling design was used to guarantee the reliability of national and European results. 30,170 individuals participated in the survey (with few exceptions, approximately 1000 per country). The survey addressed two types of environmentally motivated anti-consumption: domestic (ie, reducing household water and energy consumption) and ‘out-of-home’ behaviors (ie, anti-shopping actions); other measures include EU citizens’ attitudes, motivations, and level of knowledge about climate change, post-materialism values, perceived threat of climate change, and socio-demographics.

4.2. Statistical methodology

‘Core’ model tests. First, exploratory factor analysis (EFA) is used to check the dimensional structure of the ‘core’ research model. Next, confirmatory factor analysis (CFA) and structural equation modeling (SEM), using the EQS v6.1 statistical software, are respectively applied to examine the psychometric properties of the scales and test the hypotheses in the ‘core’ model. Statistical tests and criteria, such as Cronbach’s alpha values, composite reliabilities, the average variance extracted (AVE), and chi-square difference tests, are used to assess measurement reliability and convergent and discriminant validity.

Moderation analyses. Two common methods for testing moderating effects have been described: multiple regression and multi-group analysis (multi-group SEM). Owing to the characteristics of the ‘core’ model and moderator variables (ie, perceived threat of climate change, gender, age, education, and country value orientation), multi-group SEM is used in this work; the relationships in the ‘core’ model were compared between two groups of threat perceptions of climate change (*high* vs. *low* threat)—median split defined groups; two gender categories (*men* vs. *women*); three age groups split into terciles (*15–38 years*, *39–56 years*, and *more than 57 years old*); and three country groups based on post-materialism (*materialist* countries, *countries with mixed values*, and *post-materialist* countries).

5. Results

From the initial sample of 30,170 cases, the authors selected those respondents who ‘agreed’ or ‘tended to agree’ with the statement ‘*You personally have taken actions aimed at helping to fight climate change*’, with the aim of testing the hypotheses of the study. In the year 2008, EU citizens undertaking some form pro-environmental activity accounted for 51.7% of the sample ($n=17,233$); only these individuals were included in subsequent analyses.

5.1. Psychometric properties of scales

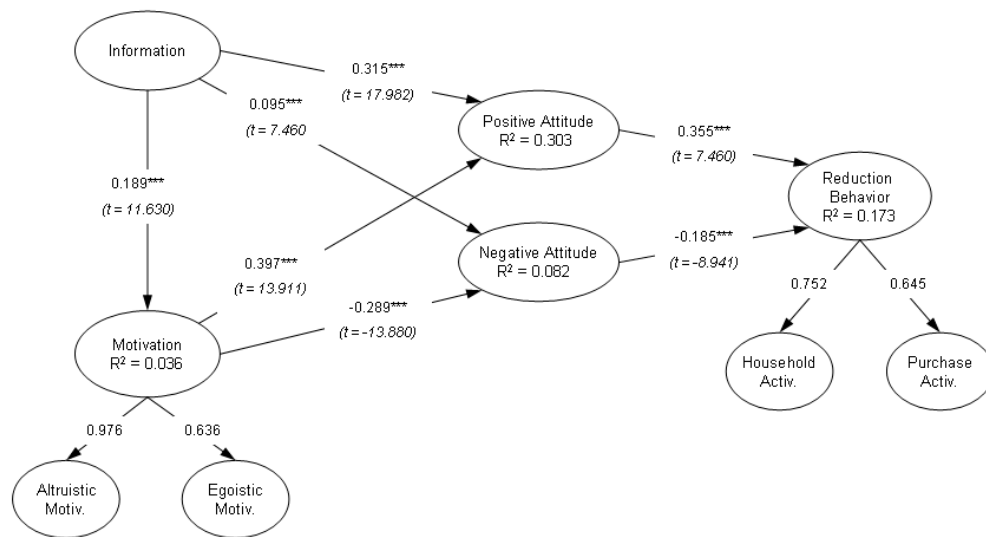
As expected, both exploratory and confirmatory factor analyses suggested the distinction between two subtypes of consumption reduction behavior, which comprise the dependent factor in the research model (see Fig. 1). The first factor (two items) covers respondents’ self-reported reduction of energy and water consumption at home; the second factor comprises ‘anti-shopping’ actions. The internal consistency of the second-order anti-consumption scale was

satisfactory, according to the common threshold of 0.7 (Hair, Anderson, Tatham, et al., 1998). Moreover, the analyses revealed the consistency of both positive ($\alpha=0.47$; $\rho=0.65$) and negative ($\alpha=0.65$; $\rho=0.66$) attitude factors. Consistent with previous literature (eg, Thøgersen & Grunert-Beckmann, 1997), the analyses supported both a second-order factor of ecological motivations ($\alpha=0.56$; $\rho=0.61$), as well as separate factors of egoistic ($\alpha=0.487$; $\rho=0.64$) and altruistic motivations ($\alpha=0.431$; $\rho=0.62$). In the knowledge factor, internal consistency coefficients were well above the recommended level of 0.8 (Straub, 1989). For both (positive and negative) attitudes and motivation, Cronbach's alphas were around 0.5, but all Raykov's rho coefficients exceeded the more lenient cut-off of 0.6 (Hair et al., 1998). These results were expected, owing to the use of Eurobarometer data with 'predefined' indicators. Thus, the internal consistency of the constructs may be acceptable in this study (Hair et al., 1998). All confidence interval and chi-square tests were indicative of discriminant validity between all analyzed pairs of factors.

5.2. Explaining environmentally motivated consumption reduction

'Core' model. The results provided support for all the hypothesized relationships in the 'core' research model (see Fig. 1). Positive and negative environmental attitudes (towards climate change) accounted for 17.35% of the variance in environmentally motivated consumption reduction. Positive attitudes had a strong, positive influence (std. $\beta=0.355$; $p<0.01$), whereas negative attitudes were negatively (and weakly) related to anti-consumption (std. $\beta=-0.185$; $p<0.01$) –thus supporting H1a and H1b.

FIGURE 1
Assessment of the 'core' model: standardized solution



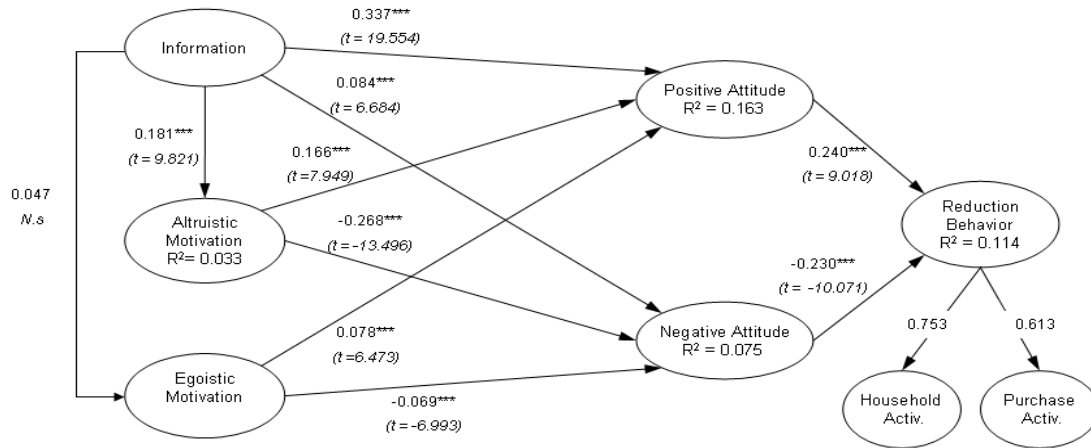
***Significant for $p<0.01$; T values in brackets

The analysis also supported the hypothesized direct paths from ecological motivations and environmental knowledge to respondents' environmental attitudes (support for H2 and H3a); these influences were stronger on positive attitudes than on negative attitudes (30.3% vs. 8.2% of variances explained). Ecological motivations exerted a negative influence on negative environmental attitudes (std. $\beta=-0.289$; $p<0.01$); surprisingly, the link between respondents' level of environmental knowledge on negative environmental attitudes was positive, although weak (std. $\beta=0.095$; $p<0.01$). Consistent with H3b, environmental knowledge had a modest, positive influence on ecological motivations (std. $\beta=0.189$; $p<0.01$). This model provided a very good fit to the data. The assessment of absolute fit showed that the scaled chi-square (S-B χ^2) was significant at $p<0.01$, an expected result given the large sample size. RMSEA (0.029) fell below the recommended level of 0.08. Incremental fit measures also indicated a good model fit,

with all values (NNFI, NFI, CFI, IFI, and MFI) exceeding the rigorous threshold of 0.95 (Schumacker & Lomax, 2004).

Disaggregated motivational effects. In this alternative model, almost all the ‘core’ hypothesized relationships were supported, with the exception of the path from environmental information level to ‘egoistic’ ecological motivations (see Fig. 2); these findings provide only partial support for H3b.

FIGURE 2
Assessment of the model with ‘disaggregated motivational effects’: standardized solution



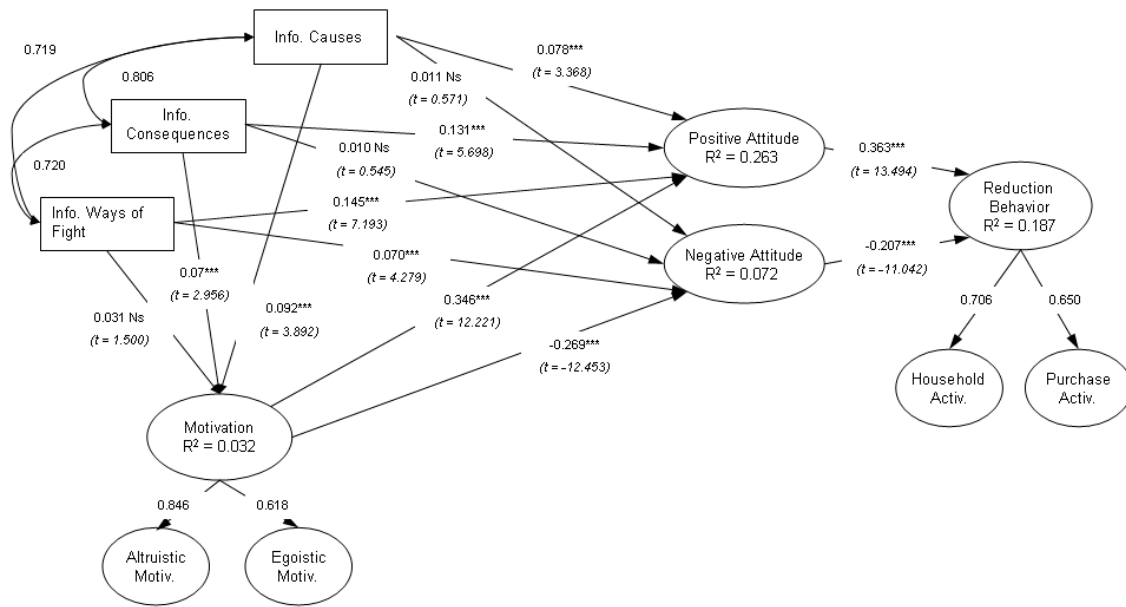
***Significant for $p < 0.01$; T values in brackets

Consistent with previous literature, altruistic motivations had greater influence on positive environmental attitudes, compared to egoistic motivations (std. $\beta = 0.166$; $p < 0.01$ vs. std. $\beta = 0.078$; $p < 0.01$)—support for H4a. Consistent with H4b, the separate effects of both altruistic and egoistic motivations were somewhat weaker than the joint motivational effects in the ‘core’ research model. Due to the attenuation of motivational influences, environmental information level showed the strongest effect on positive attitudes (std. $\beta = 0.337$; $p < 0.01$) in the second model. Interestingly, altruistic ecological motivations were most strongly (and negatively) related to negative attitudes (std. $\beta = -0.268$; $p < 0.01$). The effect of egoistic motivations on negative environmental attitudes was also negative, though weak (std. $\beta = -0.069$; $p < 0.01$). The explained variance in anti-consumption is lower (11.6%) in this alternative model, compared to the ‘core’ model (17.3%). This holds true also for the variance explained in positive (16.3% vs. 30.3%) and negative attitudes (7.5% vs. 8.2%). Concerning model fit, the scaled chi-square (S-B χ^2) was again significant at $p < 0.01$. However, incremental fit values were satisfactory, with RMSEA (0.04) within the recommended interval, and NNFI, NFI, CFI, IFI, and MFI indexes between 0.928 and 0.942. As expected, the ‘core’ model provided slightly better fit to the data.

Disaggregated information level / knowledge effects. Tests of the third model specification showed the differentiated effects of each type of environmental information / knowledge (ie, about the causes, consequences, and ways to fight climate change) both on ecological motivations and (positive and negative) environmental attitudes. Most relationships proposed in the ‘core’ model continue to be supported, except for some of the disaggregated knowledge influences (see Fig. 3).

FIGURE 3

Assessment of the model with ‘disaggregated knowledge effects’: standardized solution



***Significant for $p<0.01$; T values in brackets

Despite positive environmental attitudes (significantly) being influenced by all three types of environmental information / knowledge, their specific effects differed slightly. The strongest effect was found for ‘action-related information’—ie, about ways to fight climate change (std. $\beta=0.145$; $p<0.01$); the weakest influence was observed for ‘system information’—ie, about the causes of climate change (std. $\beta=0.078$; $p<0.01$). Surprisingly, knowledge of climate change action strategies is also positively (though weakly) linked to negative environmental attitudes predictor (std. $\beta =0.070$; $p<0.01$). A different pattern emerges for ‘knowledge–motivation’ linkages, with knowledge of the causes of climate change (system / procedural information) as the most influential predictor of ecological motivations (std. $\beta =0.092$; $p<0.01$); no significant effect was observed for action-information. These results provide only partial support for H5a. In line with H5b, the separate effects of knowledge about the causes, ways to fight, and consequences of climate change were attenuated, compared to the joint effects of environmental information level / knowledge in the ‘core’ research model. This model accounts for a slightly higher percentage of the variance in anti-consumption (18.7%), compared to the previous two models. Conversely, it explains less variance in both positive (26.3% vs. 30.3%), and negative attitudes (7.2% vs. 8.2%), compared to the ‘core’ model. Model fit was again satisfactory, but not as good as in the ‘core’ research model: RMSEA=0.036; NNFI, NFI, CFI, IFI, and MFI were between 0.934 and 0.947.

Taken together, these findings indicate that, despite the importance of analyzing in detail the role of specific, disaggregated ecological motivations and environmental knowledge, the ‘core’ research model offers a more robust and parsimonious characterization of environmentally motivated anti-consumption (ie, consumption reduction). Thus, moderation performed on the structural relationships of the final ‘core’ model, as depicted in Fig. 1.

5.3. Moderation results

All the potential moderators (ie, perceived environmental threat, gender, age, education, and country value orientation) significantly intensified or attenuated at least one structural relationship in the 'core' model (see Table 1). Overall, the linkage 'positive attitudes–consumption reduction behavior' was highly stable across moderating variables; on the other end, the path 'information level–positive attitudes' varied much more across moderator levels.

People rating environmental hazards (ie, climate change) as more threatening were influenced, to a greater extent, by negative environmental attitudes in their consumption reduction behavior. Moreover, no significant influences of environmental information level / knowledge were found for the 'higher threat perception' subgroup; these results yield only partial support for H6c and H6a, and no support for H6b and H6d. Women's positive environmental attitudes appear to be more strongly determined by the level of environmental information, compared to men; hence, partial support is obtained for H7c, and no support for H7a and H7b. As hypothesized in H8b, for middle-aged respondents the effect of environmental information level on ecological motivations was slightly intensified; moderating differences were for other structural paths from environmental knowledge, but not fully supportive of H8c. No significant differences were observed in the links from positive and negative attitudes to anti-consumption (rejection of H8a). Consumption reduction behavior of better-educated respondents seems to be guided more by positive environmental attitudes, but less by negative attitudes (partial support for H9a). Contrary to H9c, environmental information level exerted a stronger effect on positive environmental attitudes for better-educated individuals; no intensification of the 'information level–negative attitudes' was observed. No age differences were found in the 'information level–ecological motivations' linkage (no support for H9b). As for country value orientation, respondents' level of environmental information had greater effect on positive environmental attitudes, but no significant effect on negative attitudes (partial support for H10c). For the country subgroup with 'mixed values', the paths from environmental knowledge to ecological motivations and negative environmental attitudes were significantly intensified. Finally, no significant differences between country groups, defined by value orientation, were observed in the relationships from (positive and negative) environmental attitudes to anti-consumption behaviour; these findings do not lend support for either H10a or H10b.

6. Discussion

This work has shed light on European citizens' environmentally motivated anti-consumption (i.e., consumption reduction) by assessing: (1) the main effects three environmental psychographics (knowledge, motivations, and attitudes towards climate change); (2) disaggregated motivational and knowledge influences; and (3) moderating influences of internal (perceived environmental threat) and exogenous factors (gender, age, education, and country value orientation). The amount of variance in anti-consumption was below 20% across tested models; this finding can be considered as evidence of unmodeled factors, most notably behavioral intentions and situational constraints to anti-consumption actions.

Tests of the 'core' research model provided evidence of the interplay between environmental information level / knowledge, motivations, and attitudes, as antecedent factors of consumption reduction behavior. Alternative structural models confirmed the differentiated role of specific, disaggregated types of ecological motivations and environmental information in environmentally motivated anti-consumption. Based on the distinction between altruistic and egoistic motivations, the findings indicate that altruistic motivations are more effective in shaping environmental attitudes (ie, developing positive attitudes and reducing negative ones), which is in line with previous environmental literature (Barr, 2007). Recent studies on consumption reduction and sustainability suggest that selfish (egoistic) motivations would lead more effectively to anti-consumption, when questionnaire items address issues of self-identity and personal wellbeing (Black & Cherrier, 2010), instead saving money and personally suffering the consequences of climate change.

In line with previous literature (Frik et al., 2004; Barr, 2007), in the model of disaggregated information types, knowledge about ways to fight climate change (ie, action-related information / knowledge) showed the strongest influence on environmental attitude influence on attitudes. However, action-related knowledge also had a weak positive effect on negative attitudes; this undesirable effect may be a consequence of constraints, such as lack of interest or ability to commit to known courses of action to fight climate change. Interestingly, weaker effects were observed for disaggregated ecological motivations and environmental information, compared to

the joint effects tested in the ‘core’ model. Hence, (altruistic and egoistic) ecological motivations, and (system, action-related, and effectiveness) environmental information must converge and work together if they are to efficiently foster environmentally motivated consumption reduction (De Young et al., 1993; Kaiser & Fuhrer, 2003).

TABLE 1
Multi-group results

Moderating variables/ Subgroups	Information level → Ecological motivations		Information level → Positive attitudes		Information level → Negative attitudes		Positive Attitude → Consumption reduction		Negative Attitude → Consumption reduction		Motivation → Positive attitudes		Motivation → Negative attitudes	
	Std. β	t-value	Std. β	t-value	Std. β	t-value	Std. β	t-value	Std. β	t-value	Std. β	t-value	Std. β	t-value
Perceived threat of climate change														
High	0.162	10.970***	0.300	18.354***	<i>0.001</i>	<i>0.077 n.s</i>	0.238	8.195***	<i>-0.248</i>	<i>-8.077***</i>	0.230	8.604***	-0.272	-11.022***
Low	0.197	10.970***	0.311	18.354***	<i>0.155</i>	<i>8.762***</i>	0.205	8.195***	<i>-0.126</i>	<i>-4.799***</i>	0.196	8.604***	-0.197	-11.022***
Gender														
Male	0.189	11.913***	<i>0.300</i>	<i>11.973***</i>	0.083	6.793***	0.245	9.858***	-0.225	-9.802***				
Female	0.192	11.913***	<i>0.328</i>	<i>16.140***</i>	0.085	6.793***	0.297	9.858***	-0.209	-9.802***				
Age														
15-38 years	<i>0.140</i>	<i>5.252***</i>	<i>0.314</i>	<i>14.801***</i>	<i>0.036</i>	<i>1.710 n.s</i>	0.251	9.621***	-0.234	-10.100***				
39-56 years	<i>0.230</i>	<i>11.687***</i>	<i>0.292</i>	<i>14.801***</i>	<i>0.115</i>	<i>7.545***</i>	0.244	9.621***	-0.214	-10.100***				
+57 years	<i>0.211</i>	<i>11.687***</i>	<i>0.332</i>	<i>12.902***</i>	<i>0.118</i>	<i>7.545***</i>	0.295	9.621***	-0.236	-10.100***				
Country Value Orientation														
Post-materialist	<i>0.179</i>	<i>4.904**</i>	<i>0.505</i>	<i>6.439***</i>	<i>-0.061</i>	<i>-1.897 n.s</i>	0.087	10.744***	-0.189	-10.856***				
Materialist	<i>0.130</i>	<i>5.165***</i>	<i>0.329</i>	<i>14.119***</i>	<i>0.082</i>	<i>4.012***</i>	0.645	10.744***	-0.479	-10.856***				
Mixed	<i>0.181</i>	<i>6.632***</i>	<i>0.249</i>	<i>8.158***</i>	<i>0.106</i>	<i>6.069***</i>	0.178	10.744***	-0.190	-10.856***				
Age when stopped full-time education														
Less than 15	0.171	10.786***	<i>0.264</i>	<i>16.295***</i>	<i>0.196</i>	<i>7.368***</i>	<i>0.118</i>	<i>2.966***</i>	<i>-0.233</i>	<i>-8.646***</i>				
From 16 to 19	0.165	10.786***	<i>0.315</i>	<i>16.295***</i>	<i>0.074</i>	<i>4.362***</i>	<i>0.199</i>	<i>5.861***</i>	<i>-0.203</i>	<i>-8.646***</i>				
More than 20	0.165	10.786***	<i>0.220</i>	<i>5.268***</i>	<i>0.011</i>	<i>0.511 n.s</i>	<i>0.556</i>	<i>7.639***</i>	<i>-0.069</i>	<i>-2.435***</i>				
Still Studying	0.185	10.786***	<i>0.475</i>	<i>16.295***</i>	<i>0.074</i>	<i>4.362***</i>	<i>0.430</i>	<i>5.022***</i>	<i>-0.071</i>	<i>-2.435***</i>				

Note: ***Significant for $p < 0.01$. Significant moderating effects are highlighted in italics and bold

The analysis of moderating effects of internal and exogenous factors on environmentally motivated consumption reduction behavior also extends the available evidence in anti-consumption research. Particularly, these findings highlight the importance of socio-demographics beyond direct predictors of pro-environmental behaviors. As mentioned above, the links from environmental information level / knowledge to positive environmental attitudes varied most across moderator levels; thus, environmental information and messages, aimed at reducing current consumption levels, should be carefully designed to account for socio-demographic and psychological influences. On the contrary, 'positive attitudes–consumption behavior' patterns were quite uniform across moderator levels; these findings are somewhat in line with those of Diamantopoulos et al. (2003).

Negative environmental attitudes may detract to a higher extent from environmentally-motivated anti-consumption, among people perceiving climate change as a more threatening problem (Poss, 2001). As hypothesized, the findings provided some evidence that people with higher levels of perceived environmental threat tend to be guided more by internal motivations (reasons) for consumption reduction (Whitmarsh, 2008; Schultz et al., 1995). Gender was a significant moderator of only one structural relationship (information level–positive attitudes), suggesting that women may be more sensitive to external cues to anti-consumption, such as 'green' information (Kahlor et al., 2006; von Borgstede & Anderson, 2010) and communication (Haytko & Matulich, 2010); the similar response profiles of male and female participants may be the consequence of 'diluting' gender roles in both private and public spheres. The interplay of 'cohort' and 'life-cycle' age effects are most likely to underlie the significant, heterogeneous age patterns observed in the influence paths from environmental knowledge (Franzen & Meyer, 2010). For the middle-aged and oldest age groups, the findings warn of unintended effects of environmental information (and messages), potentially eliciting negative environmental attitudes. A positive finding refers to the moderating effect of education on 'attitude–behavior' linkages: for better-educated individuals, positive environmental attitudes (but not negative ones) positively lead to environmentally motivated anti-consumption. In the least-educated group, environmental information level showed a comparatively stronger, positive influence on negative environmental attitudes; thus, the complexity of climate change can lead to confusion and frustration of less-educated individuals (Kollmuss & Agyeman, 2002). Overall, education effects were consistent with previous studies relating education level to pro-environmental behavior (Olli et al., 2001).

For country value orientation, an interesting result concerns the positive contribution of environmental information level to positive, but not to negative environmental attitudes (towards climate change) in the 'post-materialist' country group. Undesirable positive effects of environmental knowledge on negative attitudes are more likely in countries with 'mixed *materialism* / *post-materialism* values'. These findings suggest that the effectiveness of environmental messages (and information) is dependent on its alignment with the predominant values, interests, and goals pursued in each cultural country group (von Borgstede & Anderson, 2010).

7. Limitations and future research

This study suffers from two main limitations. The first is common to most environmental research relying on self-reported measures of pro-environmental behavior: a social desirability effect. Hence, respondents might have exaggerated their responses to project a better social image of themselves. The second and most important limitation concerns the use of 'Eurobarometer' data. Despite its benefits, such as providing a rich, cross-national source of information, using this type of data had restrictive effects on research design. Thus, the authors could not participate in the development of questionnaire items. In addition, the use of Eurobarometer data precluded the inclusion of other relevant factors.

Further research should try to assess the importance of alternative antecedents of environmentally motivated anti-consumption. Among others, potentially relevant factors include behavioral intentions, subjective norm, frugality, perceived behavioral control, or

citizen's perceptions of self-relevance. Moreover, the examined moderating influences call for additional studies replicating and extending the present study's findings. Other socio-demographics like income or household size have been predictive of some consumption reduction behaviors in past literature (Abrahamse et al., 2005; Abrahamse & Steg, 2009).

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