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RESEARCH ARTICLE

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Behavioral prediction of environmentally oriented anticonsumption and consumption: A multilevel study of five Eurobarometer surveys

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Abstract

To tackle climate change, greater public engagement is called for in actions that fall under the umbrella of environmentally oriented anticonsumption (EOA), in addition to environmentally oriented consumption (EOC) ones. This study examines potential behavioral effects on EOA and EOC actions in response to climate change, by placing attention on the EOA versus EOC distinction, as well as the behavioral domain and frequency of the selected behavioral outcomes and predictors. Multilevel analysis is conducted on a large-scale, European pooled dataset (N = 137,097 respondents) combined with secondary country data at the societal level (N = 30 countries). The findings provide overall evidence for positive behavioral effects or spillovers on EOA and EOC behaviors in response to climate change, while emphasizing also the need to account for the specificity of different proenvironmental actions. Also, the findings show that positive spillovers are more likely among actions within the same EOA/EOC path of action, pertaining to the same behavioral category (i.e., intra-domain, rather than inter-domain spillovers), and having similar behavioral frequency characteristics (e.g., among non-daily actions). The findings reported here improve understanding of the behavioral mechanisms behind environmental spillovers, for less-researched EOA (and EOC) outcomes, in response to climate change, and cross-nationally.

KEYWORDS
anticonsumption, behavioral effects, climate change, consumption, European Union, multilevel modeling, proenvironmental behavior

1 | INTRODUCTION

There is agreement that, to tackle a complex and challenging environmental problem like climate change, people's behavior must go beyond single, isolated environmental practices such as recycling (Whitmarsh & O'Neill, 2010). What is urgently needed is a shift toward environmental sustainability across a wide array of behaviors (Nash et al., 2017). Particularly, greater public engagement is called for in actions that fall under the umbrella of environmentally oriented anticonsumption (EOA), defined as "here as acts (e.g., individual behaviors) directed against any form of consumption, with the specific aim of protecting the environment (e.g., mitigating climate change)" (García-de-Frutos, Ortega-Egea, & Martínez-del-Río, 2018). Arguably, widespread adoption of EOA actions is a "fast-track" pathway to change the dominant, unsustainable lifestyles in most developed countries (Jackson, 2005; Peattie & Peattie, 2009). Against this backdrop, important questions emerge as to the behavioral mechanisms driving people to adopt (or not) different types of EOA action.

The field of environmental spillovers (Thøgersen, 1999) has offered important insights into people's subsequent environmental behavior(s) as a consequence of an initial environmental action (for reviews, see Nash et al., 2017; Thøgersen, 2012; Truelove, Carrico, Weber, Raimi, & Vandenbergh, 2014). Yet, to date, there is no

consensus on the rationale behind positive (or negative) environmental spillovers (Carrico, Raimi, Truelove, & Eby, 2018; Nash et al., 2017; Truelove et al., 2014). Several studies have suggested the pivotal role of behavioral similarity in people's engagement with different forms of environmental practice (Margetts & Kashima, 2017; Thøgersen, 2012). Hence, environmental behaviors have often been grouped together based on similarity of setting, difficulty, frequency, or domain (Thøgersen, 2012). This study suggests considering an additional way to organize environmental behaviors, that is, attending to their (environmentally oriented) consumption versus anticonsumption characteristics (Black & Cherrier, 2010). EOA comprises acts of reduction, avoidance, or rejection of consumption (Chatzidakis & Lee, 2013), whereas environmentally oriented consumption (EOC from now on) refers to the purchase or consumption of more environmentally friendly products. Green and sustainable consumption are concepts closely related to EOC (Connolly & Prothero, 2008).

People can use both the EOA and EOC paths of action to achieve their environmental goals, but will usually prefer one over the other (Black & Cherrier, 2010). Recent evidence suggests that EOA helps people lower their environmental footprint to a greater extent than other lifestyles (Kropfeld, Nepomuceno, & Dantas, 2018). The prevalence of EOA (over EOC) in terms of environmental impact may be indicative of greater similarity and cohesion among different EOA actions, and thus of potential EOA-EOA spillover or behavioral effects. On the contrary, trade-offs are more likely across EOA and EOC action alternatives—for example, in the energy consumption domain (McCoy & Lyons, 2017).

This study examines potential behavioral effects on EOA and EOC actions in response to climate change, by placing attention placing attention on the EOA versus EOC distinction, as well as the behavioral domain and frequency of the selected behavioral outcomes and predictors. Multilevel analysis is conducted on a large-scale, European pooled dataset (N = 137,097 respondents) combined with secondary country data at the societal level (N = 30 countries). By doing so, the study aims to improve understanding of the behavioral mechanisms behind environmental spillovers, for less-researched EOA (and EOC) outcomes, in response to climate change, and cross-nationally.

2 | BACKGROUND

2.1 | Theoretical accounts of environmental spillovers

Positive (negative) environmental spillovers appear when engaging in one environmental action increases (decreases) the likelihood of performing other environmental actions (Thøgersen, 1999). To date, a handful of theories have been used to explain positive and negative environmental spillovers (Nash et al., 2017).

The most significant theoretical accounts of positive environmental spillovers include consistency theories (i.e., dissonance and self-perception theories), learning theory, and goal theory (Thøgersen, 2012; Truelove et al., 2014). Dissonance theory (Festinger, 1962) conveys the notion that, once an individual engages in environmental action, she or he will tend towards congruence of behavior by further behaving in an environmentally friendly way. According to self-perception theory (Bem, 1972), individuals reflect and make inferences about their own behavior. Individuals who behave in an environmentally friendly way may view themselves as environmentally friendly persons, and thus will more likely behave in such a way in the future (Nash et al., 2017; Van der Werff, Steg, & Keizer, 2014). Learning theory (Bandura, 1977) indicates that engaging in environmental action will provide individuals the necessary knowledge and skills for additional environmental behavior. Such experience will increase self-efficacy evaluations, thus increasing the likelihood of positive environmental spillovers (Thøgersen, 2012). The postulates of goal theory are that individuals pursue broad goals (e.g, fighting against climate change) which tend to vary on perceived relevance (Margetts & Kashima, 2017). Usually, there is not a unique way, but an array of courses of action to accomplish an environmental goal (Lanzini & Thøgersen, 2014). The fact the different actions share the same (broad) goal does not ensure equal evaluation, selection, and performance (Margetts & Kashima, 2017). Individuals will likely think of different environmental actions as separate paths leading to the same goal; thus, engaging in a specific environmental action (or set of actions) may be at the expense of other forms of environmental action (Lanzini & Thøgersen, 2014). Such negative spillover effects would be expected especially when the selected action is viewed as enough to tackle the environmental issue (Margetts & Kashima, 2017).

In respect to negative environmental spillovers, the most significant theories include moral licensing, single action bias, and rebound effects (Truelove et al., 2014). Moral licensing theory suggest that environmental action entitles individuals with moral credits, which may inhibit their need for further environmental action and even excuse other "unsustainable" behavior. Single action bias occurs when individuals perceive that, after engaging in one environmental action, enough has been done to address the environmental problem (e.g., to mitigate climate change). Finally, rebound effects take place when the technical efficiency achieved in some goods, such as eco-efficient innovations, lead to (unintended) greater levels of consumption (Nash et al., 2017).

2.2 | Behavioral classifications and environmental spillovers

The aforementioned theories offer guidance on the "why" of positive and negative environmental spillovers. However, their adequacy in explaining the occurrence (or not) of environmental spillovers will likely be contingent on the characteristics of the specific environmental behaviors under analysis (Nash et al., 2017; Truelove et al., 2014). For instance, recent evidence indicates that positive spillovers are more likely among environmental behaviors that require the same resources—that is, monetary versus nonmonetary (Margetts & Kashima, 2017). Also, evidence from a study on water saving

behavior suggests that people tend to group behaviors first attending to their physical location, followed by the efficiency-investment versus curtailment perspective, and third by the effort required for action (Kneebone, Fielding, & Smith, 2018). The suggested pivotal role of behavioral similarity (or the extent to which different behaviors are perceived as similar) in environmental spillovers has led researchers to consider grouping criteria, such as the setting, cost or difficulty, frequency, and domain of behavior (Margetts & Kashima, 2017; Thøgersen, 2012).

2.3 | Setting

The literature has differentiated between private versus public sphere behavior (Stern, 2000), home versus office behavior (Littleford, Ryley, & Firth, 2014), or home versus holiday behavior (Barr, Shaw, Coles, & Prillwitz, 2010), among other contexts or settings. Some authors suggest that behaving in environmentally friendly way in a specific setting will increase perceived self-efficacy, which, in line with learning theories, would induce further environmental behavior in other settings (Nash et al., 2017). However, the accumulated evidence to date often conflicts with this claim (Lauren, Smith, Louis, & Dean, 2019). Other theories hint that intra-setting environmental behaviors are more likely to be perceived as congruent (Kneebone et al., 2018), thus enhancing the likelihood for positive spillovers. Consistent with this, the perceived congruence of inter-setting environmental behaviors tends to be much lower (Thøgersen, 2012). Yet, the behavioral setting by itself is not enough of an explanation for environmental spillovers; certainly, these depend on other factors such as resources needed for action (Littleford et al., 2014). People's environmental self-identity appears to be major contributor to inter-setting positive spillovers (Lauren et al., 2019), while context-relevant identities of individuals may also come at play (Whitmarsh & O'Neill, 2010).

2.4 | Cost or difficulty

Environmental behaviors can also be classified attending to their level of (perceived) difficulty. Some of the "easiest" or frequent environmental actions (e.g., turning off the tap, recycling) have become normative behaviors for many citizens—that is, regardless of their environmental impact (Lauren et al., 2019). Hence, "more difficult" environmental actions have been suggested as more diagnostic of proenvironmental personalities (Thøgersen, 2012). That is, people who engage in a difficult environmental action are more likely to reflect and make inferences about their own environmentally friendly behavior, which would become a salient feature of their personality and foster future environmental behavior (Truelove et al., 2014; Van der Werff et al., 2014). According to goal theory, people often choose certain environmental actions over others based on cost-benefits analysis—thus preferring smaller/easier (and often lower-impact) environmental actions at the expense of more costly (but often higher-impact) ones (Margetts & Kashima, 2017; Thøgersen & Ölander, 2003).

2.5 | Domain

Other classifications of environmental behaviors have been made attending to the field or domain of action (e.g., energy, transport, purchase, waste). Overall, environmental actions from different domains are more likely to be perceived as different and incongruent, thus suggesting inconsistent inter-domain environmental behavior (Thøgersen, 2012). An individual's environmental self-identity, in fact, may not be enough to predict congruent environmental behavior across domains (Whitmarsh & O'Neill, 2010). Conversely, there is evidence that engagement in a specific environmental action (e.g., organic waste composting) may produce negative intra-domain spillovers (e.g., food waste prevention), but positive inter-domain spillovers (e.g., reducing energy consumption; Sintov, Geislar, & White, 2019).

2.6 | Frequency

Environmental actions practiced on regular, day-to-day basis (e.g., recycling) are likely to become routines that people follow without much thinking of their environmental significance. Such daily, nonreflective environmental behavior has been shown to weakly contribute to people's proenvironmental self-identity (Whitmarsh & O'Neill, 2010). By contrast, infrequent (e.g., one-off) environmental actions have stronger signaling power and, most likely, positive spillover effects on additional environmental behaviors (Thøgersen, 2012). Further, less frequent environmental actions can be expected to "cluster" together in a coherent behavioral pattern (Whitmarsh & O'Neill, 2010). No such evidence exists to suggest a greater likelihood of positive spillovers among regular, day-to-day environmental actions.

2.7 | (Anti)consumption classification of environmental actions

Clearly, there is no consensus on the best behavioral classification account of environmental spillovers (Truelove et al., 2014). In an attempt to reconcile some of the conflicting empirical evidence, this study suggests considering the consumption versus anticonsumption characteristics of environmental actions (Black & Cherrier, 2010). The differentiation between EOC (i.e., purchase or consumption of more environmentally friendly products) and EOA actions (i.e., environmentally oriented reduction, avoidance or rejections of consumption; García-de-Frutos et al., 2018; Ortega-Egea & García-de-Frutos, 2013) is analogous to the well-established categorization of investment/efficiency versus curtailment environmental actions (Stern, 2000). Yet, the latter distinction usually restricts to behaviors from two specific consumption (saving) domains: energy (e.g., McCoy & Lyons, 2017) and water (e.g., Kneebone et al., 2018). By contrast, the EOA versus EOC classification applies across many different domains to cover a broad array of environmental behaviors.

There are good reasons to suggest that the EOA/EOC differentiation adds to current understanding of environmental spillovers. First, two different EOA actions are expected to have more similar resource

requirements, than one EOC and one EOA action. EOA behavior may mainly require nonmonetary resources, such as specific knowledge, time to search for alternatives, ability to control purchase desires, whereas EOC behavior demands substantially more monetary resources. To illustrate, differences were found in a study comparing the antecedents of car use reduction (EOA behavior) and adoption/purchase of a fuel-efficient vehicle (EOC behavior; Jansson, Marell, & Nordlund, 2010): (a) Income and living status (linked to monetary resources) affected the willingness to adopt an energy-efficient car, but not to cut down on driving; (b) ascription of responsibility (nonmonetary resource) had a bearing on car use reduction, but not on adopting an energy-efficient car (Jansson et al., 2010). Second, the separation between EOA and EOC often manifests in (negative) trade-offs between these two types of environmental action (McCoy & Lyons, 2017)—thus reinforcing the notion that EOA and EOC represent two important, but distinct paths of environmental action. Third, the extant literature on anticonsumption lifestyles shows that some people consistently engage in EOA behaviors (Iyer & Muncy, 2009). For such individuals, EOA becomes a key component of their personal identities and roles (Black & Cherrier, 2010), and lead to greater engagement levels in EOA actions across settings or domains (Onel et al., 2018).

In sum, the differentiation between EOA and EOC should improve understanding of environmental spillovers. This work considers the EOA versus EOC distinction, in addition to the better-established classifications of environmental behavior based on domain and frequency, to explain (spillover) behavioral effects on EOA and EOC actions in response to climate change. The following interrelated research questions are proposed:

RQ_1: Are there significant (positive or negative) behavioral effects on EOA and EOC?

RQ2: What is the predictive role of EOA versus EOC actions?

RQ3: Do behavioral frequency and domain account for behavioral effects on EOA and EOC beyond the EOA/EOC distinction?

To explore these research questions, attention is directed towards potential behavioral antecedents of four selected environmental behaviors in response to climate change: Two EOA actions (reduction of car use and avoidance of short-haul flights) and two EOC actions (buying local products and buying a low-energy home). The behavioral predictors and outcomes share the goal of responding to climate change through individual mitigation behavior, thus helping to unravel behavioral (spillover) patterns under the umbrella of a common environmental goal. Behavioral effects will be tested in a disaggregated fashion, that is, separately on each of the selected EOA and EOC outcomes. By doing so, the specificity of each behavioral outcome (i.e., frequency, domain, and EOA/EOC characteristics) are accounted for in the models.

3 | DATA AND METHODS

3.1 | Sample

This study looks at European citizens' self-reported behavioral responses to climate change (i.e., consumption and anticonsumption ones) from 2009 to 2017. The focus on the post-2008 time period (of Eurozone crisis) provides a fertile ground for examining varying individual and country-level effects on the chosen EOA and EOC outcomes. Data are drawn from five Eurobarometer surveys on climate change (i.e., Eurobarometers 72.1, 75.4, 80.3, 83.4, and 87.1), conducted biannually in each of the European Union (EU) member states, and pooled into a single dataset for analysis. Stratified multistage probability sampling was used to guarantee the reliability of national and European estimates. Thus, the pooled sample consists of 137,097 respondents across 30 European countries (see Table 1) and is representative of the European population (aged 15 and above). At each survey wave, roughly 1,000 people per country (with some exceptions) were interviewed face-to-face in their homes, and in the appropriate national language. Access to the Eurobarometer datasets was provided by the GESIS Data Archive for the Social Sciences (Cologne, Germany).

3.2 | Measures

3.2.1 | Behavioral indicators

Behaviors are measured on binary scaled items (1 "yes," 0 "no") indicative of respondents' undertaking (or not) of various consumption and anticonsumption actions aimed at fighting climate change. These activities span household and nonhousehold behavioral domains that entail different requirements and prerequisites for action (Thøgersen & Ölander, 2003); namely: Eco-friendly transportation, waste reduction, eco-shopping, and home energy conservation. In particular, the study focuses on 11 climate change oriented behaviors that have been consistently asked across at least four of the five Eurobarometer surveys pooled here (see Table 2 and Figure 1 for details). There have been slight changes in the wording of the behavioral questions over the different Eurobarometer waves, but such modifications are not likely to affect the aggregate trends and results of this study.

Four of the actions reported in Table 2 were selected as dependent variables based on their relevance as indicators of the climate change oriented consumption and anticonsumption paths of action. To ensure alignment of the selected variables with the anticonsumption field, only actions with the explicit main purpose of "reducing, avoiding, or rejecting consumption" (Chatzidakis & Lee, 2013) were considered EOA. Items (actions) not meeting this criterion, and primarily involving environmentally friendly purchases or consumption, were classified as EOC. The first item, "reduction of car use through alternative modes of transport," is an EOA behavior from the transport field of action that can be performed daily. The second outcome, "avoidance of short-haul flights," is a less frequent (non-daily) transport-related EOA behavior than car use reduction. The third item, "buying local products," is a daily EOC behavior from the eco-shopping field of action. The fourth item, "buying a low-energy home," is a one-off (non-daily) EOC behavior that pertains to the energy conservation domain. Thus, the selected outcome variables cover the consumption and anticonsumption paths of action, daily and non-daily behavior, and three behavioral categories (transport, shopping, and home energy) with substantial impact on climate change.

To test for potential behavioral (spillover) effects, each of the 11 behavioral indicators (Table 2) are considered as individual-level predictors of EOA and EOC in response to climate change—except

TABLE 1 Country descriptive statistics

Country	*n*	Materialism/ postmaterialism value orientation	GDP per capita (2009–2017 average, in current €)	Biocapacity deficit/reserve per person (in gha)	Public support for environmental organizations (2008, in %)	Dependent outcomes: (2009–2017 averages, in %)			
						∇ Car use	∇ Short-haul flights	Buy local products	Buy energy-efficient home
Austria	5,067	Mixed	38,300	−3.13	8.1	34.1	23.6	56.6	2.3
Belgium	5,142	Mixed	35,400	−6.40	8.7	35.4	11.9	45.5	5.5
Bulgaria	5,145	Materialist	6,000	−1.68	1.8	15.2	3.2	39.5	1.3
Croatia	3,053	Mixed	10,900	−0.90	2.8	21.3	5.1	38.7	0.9
Cyprus Republic	2,513	Materialist	22,100	−4.31	2.4	15.1	4.1	31.4	2.3
Czech Republic	5,110	Mixed	17,000	−3.33	5.5	23.2	10.8	30.2	1.3
Denmark	5,058	Postmaterialist	46,100	−2.17	15.5	43.2	13.3	44.5	4.3
Estonia	5,048	Materialist	14,100	3.17	5.2	29.7	7.6	47.1	3.5
Finland	5,003	Postmaterialist	37,300	6.87	6.4	37.8	20.5	40.1	1.5
France	5,121	Mixed	32,100	−2.34	3.9	27.4	6.0	55.3	4.2
Germany (East)	2,663	Postmaterialist	35,200	−3.50	3.8	42.2	19.5	51.1	2.3
Germany (West)	5,108	Postmaterialist	35,200	−3.50	3.8	41.5	23.8	49.2	2.5
Great Britain	5,106	Postmaterialist	32,900	−4.04	6.7	28.5	9.5	36.8	3.0
Greece	5,026	Materialist	17,900	−3.43	2.4	23.3	5.0	37.3	1.0
Hungary	5,120	Materialist	10,800	−0.93	1.4	16.5	6.7	27.3	3.3
Ireland	5,049	Materialist	46,500	−1.33	2.0	20.3	6.5	36.0	3.5
Italy	5,164	Mixed	27,200	−3.94	2.9	18.9	7.8	38.2	3.0
Latvia	5,048	Mixed	11,200	2.77	1.6	35.4	4.9	50.0	1.3
Lithuania	5,077	Materialist	11,600	−0.83	1.3	12.7	3.9	29.4	1.1
Luxembourg	2,530	Postmaterialist	85,400	−13.50	10.8	38.1	21.1	54.8	7.7
Malta	2,500	Mixed	18,900	−4.63	0.5	20.6	4.0	46.1	3.6
Netherlands	5,057	Postmaterialist	39,600	−5.13	38.5	50.2	11.3	37.4	7.8
Northern Ireland	1,550	Postmaterialist	32,900	−4.02	6.7	19.2	7.6	41.8	2.0
Poland	5,013	Materialist	10,300	−2.63	0.8	13.1	3.0	25.3	2.0
Portugal	5,220	Mixed	17,100	−2.77	2.1	14.4	2.9	24.7	1.3
Romania	5,146	Materialist	7,500	−0.34	3.2	18.7	3.4	31.1	1.7
Slovakia	5,080	Materialist	13,800	−1.83	2.1	21.0	5.1	37.2	1.0
Slovenia	5,203	Mixed	18,600	−2.93	5.3	36.1	9.2	49.0	3.4
Spain	5,067	Materialist	23,300	−2.90	1.3	22.7	3.5	27.6	1.8
Sweden	5,110	Postmaterialist	43,000	3.77	8.2	55.1	35.9	53.8	1.5

for the models in which the four indicators listed in the previous paragraph become the dependent variables.

3.2.2 | Control indicators

A set of individual- and country-level control variables are considered in the models.

Individual-level controls

At the individual-level, gender (1 "male," 2 "female"), age (in years), education (measured by age at stopping full-time education), and type of community (1 "rural areas or village," 2 "small/middle town," 3 "large town") are included in the models, given their pervasiveness as demographic factors for proenvironmental behavior. Life dissatisfaction (four-point scale from 1 "very satisfied" to 4 "not at all satisfied")

TABLE 2 Characterization of climate change oriented behaviors

Action	Behavioral domain	Frequency (daily versus non-daily)	EOA versus EOC
(1) Reduce waste (and regularly separate it for recycling)	Waste	Daily	EOA
(2) Purchase a fuel-efficient car	Transport	Non-daily	EOC
(3) Reduce car use (e.g., through alternative modes of transport)	Transport	Daily	EOA
(4) Avoid short-haul flights	Transport	Non-daily	EOA
(5) Buy local products (to avoid products from that come from far away places)	Shopping	Daily	EOC
(6) Cut down on consumption of disposable items	Shopping	Daily	EOA
(7) Installed energy-efficient home appliances	Home energy	Non-daily	EOC
(8) Switch to energy supplier with greater share of renewable sources	Home energy	Non-daily	EOC
(9) Buy low-energy home	Home energy	Non-daily	EOC
(10) Insulate home better	Home energy	Non-daily	EOC
(11) Install home equipment to control and reduce energy consumption (e.g., smart meter)	Home energy	Non-daily	EOC

Notes: Behaviors are ordered first by behavioral domain, second by frequency and third by EOC versus EOA distinction; dependent outcomes included in the main text are highlighted in bold; dependent outcomes included in the appendices are highlighted in italics.
Abbreviations: EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption.

is deemed appropriate to control for people's personal well-being. Ownership of TV, car, and house (binary scaled items: 1 "yes," 0 "no") allow controlling for the amount and important types (media, transport, and housing) of resources owned by respondents. Finally, perceived seriousness of climate change (ten-point scale from 1 "not a serious problem at all" to 10 "an extremely serious problem") accounts for people's concern for the global environmental issue motivating proenvironmental actions.

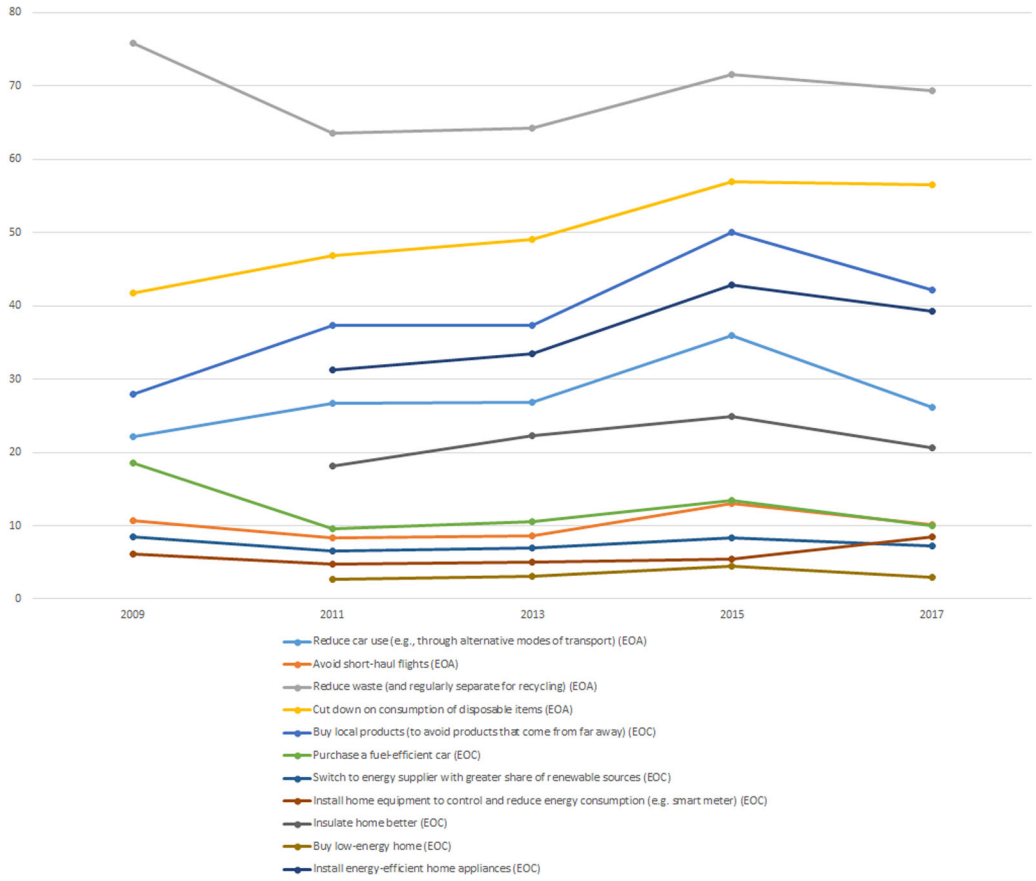

FIGURE 1 Actions in response to climate change over time (2009–2017). EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption [Color figure can be viewed at wileyonlinelibrary.com]

Country-level controls

At the country-level, the models control for a set of cultural, economic, and environmental societal influences. First, Inglehart's (1997) materialism–postmaterialism index, extracted from the integrated dataset of the European values study (https://europeanvaluesstudy.eu/), is used to measure each country's value orientation (1 "materialist values," 2 "mixed values," 3 "postmaterialist values"). Second, gross domestic product (GDP) per capita, by country and year, were extracted from the Eurostat website (https://ec.europa.eu/eurostat/web/main/home). These first two country variables allow to separately control for culturally- and economically-rooted country differences in EOA. Third, biocapacity deficit/reserve per person (in gha), extracted from the website of the ecological footprint network (https://www.footprintnetwork.org/), is included as a measure of the environmental pressure of production and consumption in a given country. Fourth, public support for environmental organizations (in percentage) is again measured using an item from the integrated dataset of the European values study (https://europeanvaluesstudy.eu/), namely the membership rates in conservation, the environment, ecology, and/or animal rights groups in each EU country. These latter two country variables, thus, will allow controlling for potential effects on EOA of each country's specific environmental conditions and activism.

3.2.3 | Analyses

Hierarchical (multilevel) logit modeling (HLM; Raudenbush & Bryk, 2002) is used to assess behavioral (spillover) effects at the individual-level while controlling for individual- and country-level influences on the selected climate change oriented behaviors. Two hierarchically nested levels are specified in the pooled data, which allow individual variables to vary across all 137,097 respondents (Level 1) and country variables to vary across 148 country-years (Level 2). Recall that the dependent variables in the multilevel models are the selected two EOA and two EOC behaviors. The intraclass correlation coefficients for the null models suggested the appropriateness and need of HLM analyses—that is, that sufficient between-group variance exists in outcome means (28.9% for reduction of car use, 44.3% for avoidance of short-haul flights, 26.8% for buying local products, and 28.9% for buying an energy-efficient home; all χ^2 significant at $p < .001$).

Centering is a key step in HLM analyses because the method chosen (i.e., group-mean centering, grand-mean centering, or no centering) has a bearing on the precise results obtained and their interpretation (Kreft, De Leeuw, & Aiken, 1995). In this study, the individual (Level 1) predictors are centered around the group mean (Cronbach, 1976), whereas grand-mean centering is used for the country (Level 2) variables (Enders & Tofighi, 2007).

The individual (Level 1) models examining behavioral effects on EOA and EOC (notation *OUT[A-D]* for each of the four selected outcomes) are formally described in (Equation (1)):

$$\begin{aligned} &\text{Prob}\ (OUT\,[A-D]_{ij}=1|\beta_{[A-D]j})=\phi_{[A-D]ij,}\\ &\log\ [\phi_{[A-D]ij}/(1-\phi_{[A-D]ij})]=\eta_{[A-D]ij},\\ &\eta_{[A-D]ij}=\beta_{[A-D]0j}+\beta_{[A-D][1-10]j}{}^{*}(Individual-level\ controls_{ij})\\ &\qquad\qquad+\beta_{[A-D][11-20]j}{}^{*}(Behavioral\ predictors_{ij}), \end{aligned} \tag{1}$$

where Prob ($OUT[A\text{-}D]_{ij}$) represents the probability of consumer i in country j having taken each of the outcome EOA (A and B) and EOC (C and D) actions; $\beta_{[A\text{-}D]0j}$ stands for the random intercepts; and $\beta_{[A\text{-}D][1\text{–}10]j}$ and $\beta_{[A\text{-}D][11\text{–}20]j}$ denote the regression coefficients.

The country (Level 2) models are summarized in (Equation (2)):

$$\begin{aligned} \beta_{[A-D]0j}&=\gamma_{[A-D]00}+\gamma_{[A-D][01-04]}{}^{*}\,(Country-level\ controls_{j})\\ &\quad+u_{[A-D]0j} \end{aligned} \tag{2}$$

where $\gamma_{[A\text{-}D]00}$ is the country-level intercept; $\gamma_{[A\text{-}D][01\text{–}04]}$ represents the regression coefficients of the country-level controls; and $u_{[A\text{-}D]0j}$ denotes the error terms at the country-level.

4 | RESULTS

4.1 | Over-time shifts in aggregate behavior in response to climate change

Figure 1 compares over time the aggregate EU level undertaking of 11 consumption and anticonsumption actions in response to climate change. Percentages are relatively stable over the considered 2009–2017 period. As expected, reducing waste (and regularly separating it for recycling) is by far the most frequent behavior reported by European respondents (2009–2017 EU average = 68.3%), followed by cutting down on consumption of disposable items (51.1%), buying local products (40.1%), and installing energy-efficient home appliances (36.7%). An increasing trend is observable for these latter three actions in the household domain (see Figure 1). Lower rates are observed for actions, such as reducing car use (28.1%), insulating the home better to reduce energy use (21.7%), purchasing a fuel-efficient car (11.8%), avoiding short-haul flights (10.1%), switching to an energy supplier with greater share of renewable sources (7.4%), install home equipment to control and reduce energy consumption (e.g. smart meter) (5.9%), or buying a low-energy home (3.3%). Overall, although not shown in Figure 1, considerable variation exists across EU-countries in the different climate change oriented behaviors being examined.

4.2 | Behavioral prediction of selected EOA and EOC actions

A set of HLM models was run for each dependent variable. Models with the subscript "a" are the null, intercept-only model plus nine of the individual-level covariates (not focused on climate change): Gender, age, education, type of community, life dissatisfaction, TV ownership, car ownership, house ownership (paid), and house

ownership (still paying). Models with the subscript "b" add perceived seriousness of climate change as an additional individual (Level 1) control. Models with the subscript "c" incorporate ten EOA and EOC behaviors as the main (individual-level) predictors of interest (see Table 3–6). Finally, models with the subscript "d" enter four country (Level 2) control variables: Materialism/postmaterialism value orientation, GDP per capita, biocapacity deficit/reserve per person, and public support for environmental organizations.

Model fit is assessed based on the deviance index which equals (−2 x log-likelihood of a maximum-likelihood estimate; Raudenbush & Bryk, 2002). That is, the deviance value of models with subscripts "a" to "d" is compared with that of the previous nested model by means of χ^2 difference tests. Deviance change (i.e., significant decrease) is an appropriate measure of overall effect size in multilevel models since it accounts for the multilevel nature of errors (Kreft, 2000). Given the tendency of large samples toward statistical significance, the focus here is on the magnitude of predictor-outcome associations (rather than mere significance testing) by reporting and interpreting predictor-specific effect sizes: Standardized parameter estimates and odds ratios. Next, the results of HLM analyses are detailed separately for each of the four dependent variables (see Table 3–6).

4.2.1 | Action 1: Reduction of car use (EOA)

In respect to the individual-level covariates, the analyses highlight the moderate positive effect of (larger) type of community, and the moderate negative effects of car ownership and TV ownership on respondents' reported reduction of car use (e.g., through alternative modes of transport). The addition of ten individual-level controls in models 1a and 1b resulted in a significant change in the variance explained (∇ deviance at $p < .001$). After controlling for individual-level covariates, model 1c shows significant and positive effects of most other climate change oriented actions on reduction of car use. Avoidance of short-haul flights had the greatest (moderate to strong) association with reduction of car use. Both represent EOA actions within the same behavioral domain (transport), but with different frequency levels. In line with the outcome's frequency characteristics, two regular (daily) actions (EOC: "buying local products" and EOA: "cutting down consumption of disposable items") were among the four most influential variables. Interestingly also, two non-daily EOC actions were weak to moderate negative predictors of reduction of car use (i.e., different frequency and EOA/EOC attributes); namely, installing home equipment to control and reduce energy consumption (EOC action from the home energy domain), and interestingly, purchase of a fuel-efficient car (transport-related EOC action). This latter effect goes hand in hand with increased significance (negative effect) of car ownership (Level 1 covariate). The addition of behavioral predictors in model 1c resulted in a significant change in the variance explained (∇ deviance at $p < .001$). Test of country-level influences in model 1d substantiated only the country's (postmaterialist) value orientation as a moderate positive correlate of reduction of car use. There was, however, an additional significant change in explained variance for reduction of car use (∇ deviance at $p < .001$). Notably, the pattern of individual-level behavioral effects remained stable after accounting for the country-level controls (see Table 3).

4.2.2 | Action 2: Avoidance of short-haul flights (EOA)

The analysis of individual-level covariates shows the negative effects of TV ownership (moderate) and gender (weak) on avoidance of short-haul flights. The addition of ten individual-level controls in models 2a and 2b resulted in a significant change in the variance explained (∇ deviance at $p < .001$). The results from model 2c support the idea that engagement in this low-frequency, transport-related EOA action is moderately to strongly, positively influenced by all other climate change oriented actions. After the (strong) effect of buying local (to avoid products that come from far away)—classified here as EOC but that could also be seen as a broad EOA manifestation—the most (strongly) influencing variables are two other EOA actions: reducing car use (i.e., same behavioral domain as the dependent variable: transport) and cutting down on consumption of disposable items. The addition of ten climate change oriented behaviors in model 2c resulted in a significant change in the variance explained (∇ deviance at $p < .001$). Again, the analysis of country (Level 2) variables in model 2d supported only the expected, strong positive influence of the country's (postmaterialist) value orientation on avoidance of short-haul flights. There was further significant change in the amount of explained variance (Δ deviance at $p < .001$), but the pattern of individual (Level 1) behavioral effects on avoidance of short-haul flights remained stable (see Table 4).

4.2.3 | Action 3: Buying local products (EOC)

The analyses show a slightly different pattern of individual-level covariates for buying local products (EOC action), compared with the preceding two EOA outcomes. Gender is identified as a moderate positive correlate, whereas TV ownership is identified as a negative correlate of buying local products (to avoid products that come from far away). The addition of ten individual-level controls in models 3a and 3b significantly changed the amount of variance explained (∇ deviance at $p < .001$). The results from model 3c again show moderate to strong, positive effects of most other behavioral responses to climate change on buying local products, except for the nonsignificant effects of two one-off EOC actions from the home energy domain ("installing home equipment to control and reduce energy consumption (e.g. smart meter)" and "buying a low-energy home"). The four anticonsumption (EOA) behaviors considered as predictors rank among the five most influential variables on buying local products. The addition of ten climate change oriented behaviors in model 3c resulted in a significant change in the variance explained (∇ deviance at $p < .001$). Further, the country's (postmaterialist) value orientation was the only significant country-level variable in model 3d. Despite a significant change in the variance explained in buying

TABLE 3 Prediction of reduction of car use

	Model 1a			Model 1b			Model 1c			Model 1d		
	β	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*
Individual-level controls												
Constant	−1.03***	0.36	−12.31	−1.02***	0.36	−12.36	−1.08***	0.34	−12.34	−1.16***	0.31	−22.44
Gender	0.17***	1.17	5.00	0.14***	1.15	4.69	0.03^{ns}	1.03	1.24	0.04^{ns}	1.04	1.35
Age	−0.01***	0.99	−6.44	−0.01***	0.99	−6.20	−0.01***	0.99	−8.18	−0.01***	0.99	−8.07
Education	0.00***	1.00	4.03	0.00***	1.00	3.90	0.00***	1.00	6.27	0.00***	1.00	6.26
Type of community	0.21***	1.24	8.04	0.21***	1.23	7.95	0.21***	1.24	8.36	0.23***	1.26	8.36
Life dissatisfaction	−0.13***	0.88	−6.44	−0.13***	0.88	−6.47	−0.08***	0.92	−4.02	−0.09***	0.92	−3.85
TV ownership	−0.34***	0.71	−4.06	−0.35***	0.71	−4.08	−0.25**	0.78	−2.99	−0.27**	0.76	−3.11
Car ownership	−0.01^{ns}	0.99	−0.30	−0.02^{ns}	0.98	−0.34	−0.16***	0.85	−3.78	−0.18***	0.84	−3.74
House ownership (paid)	0.06^{ns}	1.06	1.61	0.06^{ns}	1.06	1.52	−0.03^{ns}	0.97	−0.79	−0.03^{ns}	0.97	−0.71
House ownership (still paying)	0.14**	1.15	3.16	0.13**	1.14	2.89	−0.00^{ns}	0.99	−0.17	−0.01^{ns}	0.99	−0.17
Seriousness of climate change				0.07***	1.07	7.65	0.03***	1.03	3.76	0.03***	1.03	3.75
Individual-level predictors												
Avoidance of short-haul flights^{EOA}							0.52***	1.69	12.48	0.58***	1.79	13.51
Reducing waste (and regularly separating it for recycling)^{EOA}							0.24***	1.27	5.78	0.25***	1.29	5.66
Cutting down on consumption of disposable items^{EOA}							0.37***	1.45	10.71	0.39***	1.48	10.75
Buying local products (to avoid "far-away" products)^{EOC}							0.49***	1.64	14.16	0.52***	1.69	14.91
Purchase of a fuel-efficient car^{EOC}							−0.09*	0.91	−2.05	−0.10*	0.90	−2.45
Switching to energy supplier with greater share of renewable sources^{EOC}							0.27***	1.31	6.29	0.30***	1.34	6.89
Installing home equipment to control and reduce energy consumption (e.g., smart meter)^{EOC}							−0.13*	0.88	−2.11	−0.14*	0.87	−2.35
Insulating home better^{EOC}							0.24***	1.27	6.69	0.25***	1.28	6.82
Buying low-energy home^{EOC}							0.29**	1.34	3.10	0.31**	1.37	3.22
Installing energy-efficient home appliances^{EOC}							0.41***	1.50	10.17	0.43***	1.54	10.66
National-level controls												
GDP per capita										0.00**	1.00	2.70
Biocapacity deficit/reserve										0.05**	1.05	2.74
Materialist/postmaterialist value orientation										0.41***	1.50	4.11
Public support for environmental organizations										0.02***	1.02	4.64
Deviance	156110.73			154124.60			150811.41			150744.46		
Number of parameters	11			12			22			26		
∇ Deviance versus previous nested model	50074.23***			1986.13***			3313.18***			66.95***		

Notes: Entries are estimations of standardized fixed effects with robust standard errors.

Abbreviations: EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption; GDP, gross domestic product; ns, not significant.

$^{\dagger}p \leq .10$.

$^{*}p \leq .05$.

$^{**}p \leq .01$.

$^{***}p \leq .001$.

TABLE 4 Prediction of avoidance of short-haul flights

	Model 1a			Model 1b			Model 1c			Model 1d		
	β	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*
Individual-level controls												
Constant	−2.37***	0.09	−18.81	−2.38***	0.09	−19.00	−2.65***	0.07	−19.23	−2.92***	0.05	−35.94
Gender	0.11**	1.12	2.81	0.08*	1.08	7.54	−0.11**	0.90	−3.08	−0.12**	0.90	−3.05
Age	0.00^{ns}	1.00	0.53	0.00^{ns}	1.00	0.83	−0.00^{ns}	1.00	−0.47	−0.00^{ns}	1.00	−0.61
Education	0.00†	1.00	1.83	0.00†	1.00	1.84	0.00***	1.00	3.53	0.00***	1.00	3.27
Type of community	0.08**	1.08	2.65	0.07*	1.07	2.41	0.05†	1.05	1.83	0.06†	1.06	1.82
Life dissatisfaction	−0.15***	0.86	−6.14	−0.15***	0.86	−6.07	−0.06*	0.94	−2.36	−0.07*	0.94	−2.19
TV ownership	−0.62***	0.54	−5.90	−0.62***	0.54	−5.80	−0.45***	0.64	−4.23	−0.49***	0.62	−4.59
Car ownership	0.18***	1.19	3.85	0.18***	1.20	4.04	0.01^{ns}	1.01	0.21	0.01^{ns}	1.01	0.23
House ownership (paid)	0.21***	1.23	4.04	0.20***	1.22	3.94	0.07^{ns}	1.08	1.48	0.08^{ns}	1.08	1.48
House ownership (still paying)	0.29***	1.34	3.67	0.27***	1.31	3.49	0.08^{ns}	1.08	1.06	0.08^{ns}	1.08	1.11
Seriousness of climate change				0.09***	1.09	7.54	0.03**	1.03	2.57	0.03*	1.03	2.54
Individual-level predictors												
Reduction of car use (e.g., through alternative modes of transport)^{EOA}							0.58***	1.78	13.82	0.61***	1.84	14.02
Reducing waste (and regularly separating for it recycling)^{EOA}							0.25***	1.29	6.17	0.27***	1.31	5.34
Cutting down on consumption of disposable items^{EOA}							0.67***	1.88	15.10	0.63***	1.96	13.94
Buying local products (to avoid "far-away" products)^{EOC}							0.90***	2.43	16.58	0.94***	2.57	17.56\
Purchase of a fuel-efficient car^{EOC}							0.19***	1.21	3.56	0.20***	1.23	4.31
Switching to energy supplier with greater share of renewable sources^{EOC}							0.29***	1.34	3.76	0.31***	1.37	5.07
Installing home equipment to control and reduce energy consumption (e.g., smart meter)^{EOC}							0.21*	1.24	2.23	0.24**	1.27	3.03
Insulating home better^{EOC}							0.27***	1.31	5.85	0.29***	1.34	5.95
Buying low-energy home^{EOC}							0.32***	1.38	4.43	0.34***	1.40	4.64
Installing energy-efficient home appliances^{EOC}							0.25***	1.28	5.94	0.26***	1.30	6.07
National-level controls												
GDP per capita										0.00***	1.00	3.77
Biocapacity deficit/reserve										0.07**	1.07	3.03
Materialist/postmaterialist value orientation										0.61***	1.85	4.84
Public support for environmental organizations										−0.01^{ns}	0.99	−1.12
Deviance	126418.72			124811.93			121998.45			121935.47		
Number of parameters	11			12			22			26		
∇ Deviance versus previous nested model	42505.27***			1606.79***			2813.48***			62.98***		

Notes: Entries are estimations of standardized fixed effects with robust standard errors.

Abbreviations: EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption; GDP, gross domestic product; ns, not significant.

$^{\dagger}p \leq .10$.

$^{*}p \leq .05$.

$^{**}p \leq .01$.

$^{***}p \leq .001$.

TABLE 5 Prediction of buying local products

	Model 1a			Model 1b			Model 1c			Model 1d		
	β	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*
Individual-level controls												
Constant	−0.50***	0.60	−8.98	−0.50***	0.61	−8.89	−0.55***	0.58	−8.80	−0.56***	0.57	−10.96
Gender	0.38***	1.46	11.99	0.36***	1.43	11.82	0.27***	1.31	9.86	0.28***	1.32	9.87
Age	0.01***	1.01	6.17	0.01***	1.01	6.71	0.01***	1.01	8.22	0.01***	1.01	8.17
Education	−0.00***	1.00	−3.37	−0.00***	1.00	−3.52	−0.00^{ns}	1.00	−0.98	−0.00^{ns}	1.00	−0.96
Type of community	−0.01^{ns}	0.99	−0.64	−0.02^{ns}	0.98	−1.03	−0.07**	0.93	−2.84	−0.07**	0.93	−2.77
Life dissatisfaction	−0.10***	0.90	−5.90	−0.10***	0.91	−5.72	−0.03^{ns}	0.97	−1.39	−0.03^{ns}	0.97	−1.37
TV ownership	−0.29***	0.75	−4.20	−0.30***	0.74	−4.18	−0.16*	0.85	−2.44	−0.17*	0.85	−2.44
Car ownership	0.28***	1.33	8.95	0.28***	1.32	8.91	0.08**	1.09	3.15	0.09**	1.09	3.10
House ownership (paid)	0.19***	1.21	5.69	0.18***	1.19	5.35	0.07*	1.07	2.01	0.07*	1.07	2.04
House ownership (still paying)	0.25***	1.29	6.71	0.24***	1.27	6.42	0.05^{ns}	1.05	1.47	0.05^{ns}	1.05	1.49
Seriousness of climate change				0.09***	1.09	11.33	0.05***	1.05	6.57	0.05***	1.05	6.50
Individual-level predictors												
Reduction of car use (e.g., through alternative modes of transport)^{EOA}							0.52***	1.68	14.84	0.52***	1.69	15.03
Avoidance of short-haul flights^{EOA}							0.91***	2.48	15.81	0.93***	2.53	16.70
Reducing waste (and regularly separating it for recycling)^{EOA}							0.52***	1.68	15.41	0.53***	1.69	15.13
Cutting down on consumption of disposable items^{EOA}							0.79***	2.20	23.20	0.80***	2.22	23.47
Purchase of a fuel-efficient car^{EOC}							0.19***	1.21	4.41	0.20***	1.22	4.43
Switching to energy supplier with greater share of renewable sources^{EOC}							0.22***	1.25	4.20	0.23***	1.26	4.19
Installing home equipment to control and reduce energy consumption (e.g., smart meter)^{EOC}							0.05^{ns}	1.05	0.79	0.05^{ns}	1.05	0.79
Insulating home better^{EOC}							0.32***	1.38	8.29	0.33***	1.38	8.21
Buying low-energy home^{EOC}							0.06^{ns}	1.06	0.80	0.06^{ns}	1.06	0.80
Installing energy-efficient home appliances^{EOC}							0.62***	1.86	19.15	0.63***	1.88	19.50
National-level controls												
GDP per capita										0.00*	1.00	2.65
Biocapacity deficit/reserve										0.01^{ns}	1.01	0.55
Materialist/postmaterialist value orientation										0.20*	1.22	2.26
Public support for environmental organizations										−0.01*	0.99	−2.16
Deviance	166362.83			163856.70			156402.04			156377.72		
Number of parameters	11			12			22			26		
∇ Deviance versus previous nested model	51865.48***			2506.13***			7454.66***			24.32***		

Notes: Entries are estimations of standardized fixed effects with robust standard errors.

Abbreviations: EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption; GDP, gross domestic product; ns, not significant.

$^{\dagger}p \leq .10$.

$^{*}p \leq .05$.

$^{**}p \leq .01$.

$^{***}p \leq .001$.

TABLE 6 Prediction of buying a low-energy home

	Model 1a			Model 1b			Model 1c			Model 1d		
	β	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*
Individual-level controls												
Constant	−3.61***	0.03	−39.63	−3.60***	0.03	−39.63	−3.71***	0.02	−38.74	−3.76***	0.02	−50.40
Gender	0.03^{ns}	1.03	0.56	0.03^{ns}	1.03	0.66	0.09^{ns}	1.09	1.45	0.08^{ns}	1.08	1.29
Age	−0.01**	0.99	−3.04	−0.01**	0.99	−2.99	−0.01**	0.99	−2.77	−0.01**	0.99	−3.13
Education	−0.01***	0.99	−4.03	−0.01***	0.99	−4.01	−0.01**	0.99	−3.03	−0.01**	0.99	−2.90
Type of community	0.01^{ns}	1.01	0.16	0.01^{ns}	1.01	0.18	0.02^{ns}	1.02	0.68	0.03^{ns}	1.03	0.88
Life dissatisfaction	−0.20***	0.82	−4.95	−0.21***	0.81	−4.94	−0.15***	0.86	−3.42	−0.16***	0.86	−3.49
TV ownership	−0.25^{ns}	0.78	−1.24	−0.25^{ns}	0.78	−1.25	−0.15^{ns}	0.86	−0.77	−0.17^{ns}	0.85	−0.83
Car ownership	0.37***	1.45	5.14	0.36***	1.44	4.94	0.22**	1.25	2.97	0.27***	1.30	3.24
House ownership (paid)	0.50***	1.65	4.71	0.51***	1.67	4.79	0.40***	1.49	3.71	0.37***	1.44	3.31
House ownership (still paying)	1.06***	2.89	7.50	1.07***	2.92	7.66	0.90***	2.47	6.54	0.83***	2.30	6.35
Seriousness of climate change				−0.02^{ns}	0.98	−1.29	−0.03*	0.97	−2.13	−0.04*	0.96	−2.18
Individual-level predictors												
Reduction of car use (e.g., through alternative modes of transport)^{EOA}							0.33***	1.39	3.38	0.32***	1.38	3.26
Avoidance of short-haul flights^{EOA}							0.31***	1.36	3.97	0.28***	1.32	3.81
Reducing waste (and regularly separating it for recycling)^{EOA}							−0.24*	0.79	−2.37	−0.25*	0.78	−2.40
Cutting down on consumption of disposable items^{EOA}							−0.23**	0.79	−3.00	−0.23**	0.79	−2.92
Buying local products (to avoid "far-away" products)^{EOC}							0.05^{ns}	1.05	0.70	0.05^{ns}	1.06	0.75
Purchase of a fuel-efficient car^{EOC}							0.67***	1.95	8.44	0.62***	1.87	8.36
Switching to energy supplier with greater share of renewable sources^{EOC}							0.63***	1.88	6.39	0.56***	1.76	5.80
Installing home equipment to control and reduce energy consumption (e.g. smart meter)^{EOC}							0.82***	2.26	7.18	0.77***	2.17	7.17
Insulating home better^{EOC}							0.41***	1.50	3.77	0.40***	1.50	3.81
Installing energy-efficient home appliances^{EOC}							0.11^{ns}	1.11	1.58	0.12†	1.12	1.68
National-level controls												
GDP per capita										0.00*	1.00	2.55
Biocapacity deficit/reserve										−0.04*	0.96	−1.99
Materialist/postmaterialist value orientation										−0.11^{ns}	0.89	−1.09
Public support for environmental organizations										0.03***	1.03	5.86
Deviance	111901.840380			110473.74			110054.08			110030.56		
Number of parameters	11			12			22			26		
∇ Deviance versus previous nested model	2691.50***			1428.10***			419.66***			23.52***		

Notes: Entries are estimations of standardized fixed effects with robust standard errors.

Abbreviations: EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption; GDP, gross domestic product; ns, not significant.

$^{\dagger}p \leq .10$.

$^{*}p \leq .05$.

$^{**}p \leq .01$.

$^{***}p \leq .001$.

local products (∇ deviance at $p < .001$), the interpretation of individual-level behavioral effects remained unaltered (see Table 5).

4.2.4 | Action 4: Buying a low-energy home (EOC)

The analysis of individual-level covariates highlights house ownership (both paid and paying) and car ownership as strong and moderate positive correlates, respectively, and life dissatisfaction as a weak negative correlate of buying a low-energy home; the least reported climate change oriented behavior by surveyed Europeans. Adding the ten individual-level controls in models 4a and 4b significantly changed the amount of explained variance (∇ deviance at $p < .001$). After controlling for individual-level covariates, model 4c shows moderate to strong positive effects of other low-frequency (one-off) actions within the same EOC field of action (in order: installing home equipment such as smart meters to control and reduce energy consumption, purchasing a fuel-efficient car, switching to energy supplier with greater share of renewable sources, and insulating the home better). Importantly here, weak to moderate negative effects were found for two frequent, EOA actions: Reducing waste (and regularly separating it for recycling), and cutting down on consumption of disposable items—that is, different frequency, behavioral domain, and EOA/EOC characteristics. The addition of ten climate change oriented behaviors in model 4c resulted in a significant change in the variance explained (∇ deviance at $p < .001$). Three of the country-level variables tested in model 4d had significant, but marginal effects on buying a low-energy home (see Table 6).

To provide further insights into behavioral effects on climate change oriented behavior, three alternative models were tested separately for one additional EOA action (cutting down on consumption of disposable items) and two additional EOC actions (purchase of a fuel-efficient car and installing home equipment to control and reduce energy consumption); these results can be found as Appendices.

5 | DISCUSSION

The results of this study provide overall evidence for positive behavioral effects on EOA and EOC behaviors in response to climate change, while emphasizing also the need to account for the specificity of different proenvironmental actions (Nash et al., 2017; Truelove et al., 2014). As for the questions posed in RQ_1, the behavioral effects are mostly moderately-sized, positive, and significant on both EOA and EOC outcomes. As expected (RQ_2), the findings suggest considering the distinction between consumption (EOC) versus anticonsumption (EOA) predictors, in alignment with EOA/EOC characteristics of the outcome variables, in explaining the likelihood of positive behavioral (spillover) effects on climate change oriented behavior. Thus, stronger associations should be expected among actions within the same anticonsumption or consumption path of action. However, positive "crossover" effects (EOA-EOC or EOC-EOA) can be found for predictors/actions having a balanced mix of EOA and EOC characteristics, such as buying local products (to avoid products that come from far away)——classified here as EOC but that could also be seen as a broad EOA manifestation. In this study, buying local products (EOC) was strongly influenced by and predicted other EOA actions. As shown by the results, (significant) negative behavioral effects are unlikely but appear to always occur across the EOA and EOC paths of action. As for RQ_3, the models showed better predictive power of EOA and EOC predictors within the same behavioral domain as the outcomes (i.e., intra-domain effects). Similar frequency characteristics are also likely to reinforce behavioral effects on climate change oriented behavior, especially for non-daily EOC action.

The importance of EOA-EOA links is consistent with the extant view of greater likelihood of environmental spillovers among behaviors with the same required resources (Margetts & Kashima, 2017); that is, nonmonetary resources are required for most EOA actions. Such immaterial resources (e.g., skills and abilities) should develop and grow with EOA action, as proposed by learning theories (Thøgersen, 2012). EOA action also tends to integrate well into individuals' existing personal identities and roles (Black & Cherrier, 2010), thus consistent with self-perception accounts of environmental spillovers (Nash et al., 2017; Van der Werff et al., 2014).

The preponderance of intra-domain (positive) behavioral effects or spillovers (e.g., within the transport and home energy domains) may be indicative of different groups of individuals with varying levels of environmental engagement. There is evidence that, for some people, environmental friendliness stretches across all (or most) facets of behavior, whereas other people restrict their environmental efforts to specific (easier or especially relevant) action domains (Iyer & Muncy, 2009; Onel et al., 2018). In line with self-perception theory, inter-domain spillovers among EOA actions are likely to depend on personal characteristics (e.g., an environmental self-identity) that transcend specific behavioral domains (Lauren et al., 2019)—and that fall beyond the scope of this study. In line with past studies, behavioral frequency helped explain the behavioral associations among climate change oriented actions, particularly among non-daily ones (Whitmarsh & O'Neill, 2010). These findings support the notions that infrequent (e.g., one-off) environmental actions have stronger signaling power and spillover effects on additional environmental behaviors (Thøgersen, 2012; Truelove et al., 2014).

For the most part, this study reports positive behavioral (spillover) effects on EOA and EOC, with few nonsignificant and negative behavioral effects being observed. However, although small, it is worth highlighting the significant negative effect of purchase of a fuel-efficient car (EOC) on reduction of car use (EOA). These two (EOC and EOA) transport-related environmental behaviors are likely to be considered as alternative, rather than complementary, paths toward the same goal (Margetts & Kashima, 2017). Another possible explanation comes from rebound effects, which suggests that the perceived savings from using a fuel-efficient car may encourage consumers to use the car more often (Nash et al., 2017).

The findings were drawn upon multilevel analysis of a large-scale, pooled dataset of 30 countries over a five-year period (2009–2017).

The tested models accounted for a variety of individual and country-level covariates (i.e., environmental and nonenvironmental ones) that provide reasonable evidence for the stability of the results on environmental behavioral effects or spillovers.

6 | LIMITATIONS AND FURTHER RESEARCH

Although rich and relevant to track European citizens' climate change oriented action over time, the behavioral indicators available for analysis in this study were limited by design of the Eurobarometer surveys. For instance, the limitations arising from the datasets did not allow testing the role of additional and well-established behavioral classifications, such as behavioral setting (Kneebone et al., 2018; Littleford et al., 2014) or behavioral difficulty (Van der Werff et al., 2014). Future research should ideally account for a greater variety of environmentally oriented EOA and EOC behaviors and behavioral domains. However, the comprehensive dataset pooled here allows covering a high number of countries in a representative way, while accounting for individual and country-level potential confounds. A second limitation stems from the use of self-reported measures of climate change oriented behavior, which could be subject to subjectivity and social desirability biases. Nevertheless, the use of self-reports of behavior offers important benefits in representing reality, compared to the use of intentional measures. Third, the analysis and interpretation of results would benefit greatly from the availability and use of a more refined measurement of the difficulty of the different individual environmental actions. A fourth and final limitation refers to the use of repeated cross-sectional EU data, where the national samples are not kept constant over time (i.e., across Eurobarometer waves). This restriction inhibits the longitudinal study of (positive and negative) environmental spillovers, which has been identified as an important gap in the literature (Carrico et al., 2018).

The findings of current study warrant further analysis, at the individual and country levels, to improve understanding of individual EOA (and EOC) behavior and of its behavioral, as well as psychographic and sociodemographic correlates. At the individual-level, measures of environmental concern environmental identity can offer important insights into inter-domain environmental spillovers—e.g., by more formally accounting for the theoretical postulates of self-perception theory. At the country-level, the inclusion of alternative cultural variables and frameworks to the considered model of materialist/postmaterialist value orientation (e.g., Schwartz's and Hofstede's cultural values) is called for. A promising extension of the current study—which the available cross-national data would enable—is to test cross-level cultural moderations of environmental behavioral (spillover) effects involving EOA and EOC behaviors.

7 | CONCLUDING REMARKS

This work shed light on the existence of (mostly positive) behavioral effects or spillovers on climate change oriented EOA (and EOC) actions in response to climate change. Overall, the findings suggest that positive spillovers are more likely among actions within the same EOA/EOC path of action, pertaining to the same behavioral category (i.e., intra-domain, rather than inter-domain spillovers), and having similar behavioral frequency characteristics (e.g., among non-daily actions). Considering the positive country-level influence of the country's materialist/postmaterialist value orientation on most EOA outcomes, there is room to further investigate if and how such cultural values, shared at the societal level, can color environmental spillovers.

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APPENDIX A

TABLE A1 Prediction of purchase of a fuel-efficient car

	Model 1a			Model 1b			Model 1c			Model 1d		
	β	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*
Individual-level controls												
Constant	−2.42***	0.09	−23.74	−2.41***	0.09	−23.81	−2.47***	0.06	−23.51	−2.70***	0.07	−46.87
Gender	−0.20***	0.82	−6.03	−0.21***	0.81	−6.38	−0.26***	0.77	−7.87	−0.27***	0.76	−7.59
Age	−0.01***	1.00	−4.51	−0.00***	1.00	−4.17	−0.01***	0.99	−5.13	−0.01***	0.99	−5.06
Education	−0.01***	0.99	−10.10	−0.01***	0.99	−9.99	−0.01***	0.99	−7.47	−0.01***	0.99	−6.90
Type of community	−0.02^{ns}	0.98	−0.92	−0.02^{ns}	0.98	−1.15	−0.00^{ns}	1.00	−0.21	−0.00^{ns}	1.00	−0.03
Life dissatisfaction	−0.23***	0.79	−9.00	−0.23***	0.79	−8.84	−0.19***	0.82	−7.30	−0.20***	0.82	−6.72
TV ownership	−0.13^{ns}	0.88	−0.92	−0.12^{ns}	0.89	−0.79	−0.06^{ns}	0.94	−0.41	−0.07^{ns}	0.94	−0.46
Car ownership	1.98***	7.25	28.98	1.98***	7.23	28.37	1.86***	6.40	25.74	1.99***	7.35	20.82
House ownership (paid)	0.18***	1.20	3.50	0.17***	1.19	3.38	0.06^{ns}	1.06	1.10	0.05^{ns}	1.05	0.92
House ownership (still paying)	0.32***	1.38	6.12	0.31***	1.37	5.98	0.12*	1.13	2.08	0.11*	1.12	1.99
Seriousness of climate change				0.04***	1.04	4.85	0.02**	1.02	2.61	0.02**	1.02	2.59
Individual-level predictors												
Reduction of car use (e.g., through alternative modes of transport)^{EOA}							−0.06^{ns}	0.94	−1.37	−0.06^{ns}	0.94	−1.42
Avoidance of short-haul flights^{EOA}							0.17**	1.19	3.10	0.18***	1.20	3.73
Reducing waste (and regularly separating it for recycling)^{EOA}							−0.04^{ns}	0.96	−1.50	−0.05^{ns}	0.96	−1.37
Cutting down on consumption of disposable items^{EOA}							0.09*	1.09	2.46	0.09*	1.09	2.37
Buying local products (to avoid "far-away" products)^{EOC}							0.20***	1.22	4.18	0.21***	1.23	4.66
Switching to energy supplier with greater share of renewable sources^{EOC}							0.25***	1.29	3.90	0.26***	1.30	4.63
Installing home equipment to control and reduce energy consumption (e.g., smart meter)^{EOC}							0.19**	1.22	2.92	0.20***	1.22	3.50
Insulating home better^{EOC}							0.39***	1.48	8.27	0.42***	1.53	8.46
Buying low-energy home^{EOC}							0.57***	1.76	7.31	0.61***	1.85	8.03
Installing energy-efficient home appliances^{EOC}							0.50***	1.65	17.73	0.53***	1.71	15.51
National-level controls												
GDP per capita										0.00***	1.00	6.85
Biocapacity deficit/reserve										0.02^{ns}	1.02	1.29
Materialist/postmaterialist value orientation										0.29**	1.34	3.24
Public support for environmental organizations										0.01^{ns}	1.01	0.87
Deviance	129094.51			127564.68			126632.77			126561.28		
Number of parameters	11			12			22			26		
∇ Deviance versus nested model	49069.09***			1529.83***			931.92***			71.49***		

Note: Entries are estimations of standardized fixed effects with robust standard errors.

Abbreviations: EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption; GDP, gross domestic product; ns, not significant.

$^{\dagger}p \leq .10$.

$^{*}p \leq .05$.

$^{**}p \leq .01$.

$^{***}p \leq .001$.

APPENDIX B

TABLE B1 Prediction of cutting down on consumption of disposable items

	Model 1a			Model 1b			Model 1c			Model 1d		
	β	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*
Individual-level controls												
Constant	−0.07^{ns}	0.93	−1.00	−0.06^{ns}	0.94	−0.83	−0.07^{ns}	0.93	−0.88	−0.04^{ns}	0.96	−0.79
Gender	0.38***	1.46	14.27	0.36***	1.43	14.00	0.24***	1.27	11.24	0.26***	1.29	11.52
Age	0.00†	1.00	1.64	0.00*	1.00	2.24	0.00^{ns}	1.00	1.27	0.00^{ns}	1.00	1.33
Education	−0.00^{ns}	1.00	−0.75	−0.00^{ns}	1.00	−0.74	0.00^{ns}	1.00	1.03	0.00^{ns}	1.00	1.07
Type of community	0.07***	1.07	3.43	0.06**	1.06	3.07	0.04*	1.04	2.02	0.04*	1.05	2.17
Life dissatisfaction	−0.09***	0.92	−5.38	−0.09***	0.92	−5.47	−0.03†	0.97	−1.65	−0.03†	0.97	−1.74
TV ownership	−0.18*	0.83	−2.45	−0.19**	0.83	−2.56	−0.08^{ns}	0.92	−1.14	−0.09^{ns}	0.92	−1.20
Car ownership	0.25***	1.28	8.27	0.25***	1.28	8.13	0.08***	1.09	3.43	0.09***	1.09	3.50
House ownership (paid)	0.13***	1.14	4.29	0.12***	1.13	4.13	0.02^{ns}	1.02	0.55	0.02^{ns}	1.02	0.64
House ownership (still paying)	0.20***	1.22	5.71	0.18***	1.20	5.27	0.03^{ns}	1.03	0.79	0.03^{ns}	1.03	0.89
Seriousness of climate change				0.10***	1.11	11.34	0.06***	1.06	7.10	0.06***	1.06	7.17
Individual-level predictors												
Reduction of car use (e.g., through alternative modes of transport)^{EOA}							0.38***	1.46	11.07	0.39***	1.48	11.20
Avoidance of short-haul flights^{EOA}							0.59***	1.81	14.80	0.68***	1.97	14.61
Reducing waste (and regularly separating it for recycling)^{EOA}							1.25***	3.49	28.42	1.25***	3.50	28.95
Buying local products (to avoid "far-away" products)^{EOC}							0.77***	2.16	22.41	0.80***	2.22	23.71
Purchase of a fuel-efficient car^{EOC}							0.08*	1.08	2.17	0.08*	1.09	2.20
Switching to energy supplier with greater share of renewable sources^{EOC}							0.14**	1.15	3.05	0.16***	1.18	3.18
Installing home equipment to control and reduce energy consumption (e.g., smart meter)^{EOC}							−0.08*	0.92	−2.11	−0.08*	0.92	−2.04
Insulating home better^{EOC}							0.05^{ns}	1.05	1.32	0.05^{ns}	1.05	1.34
Buying low-energy home^{EOC}							−0.20**	0.82	−2.91	−0.21**	0.81	−2.94
Installing energy-efficient home appliances^{EOC}							0.38***	1.47	12.76	0.40***	1.49	12.75
National-level controls												
GDP per capita										0.00***	1.00	4.37
Biocapacity deficit/reserve										−0.00^{ns}	1.00	−0.01
Materialist/postmaterialist value orientation										0.20†	1.23	1.90
Public support for environmental organizations										−0.00^{ns}	1.00	−0.04
Deviance	168248.61			165466.69			156949.80			156905.11		
Number of parameters	11			12			22			26		
Δ Deviance versus nested model	54738.65***			2781.92***			8516.89***			44.69***		

Notes: Entries are estimations of standardized fixed effects with robust standard error.

Abbreviations: EOA, environmentally oriented anticonsumption; EOC, environmentally oriented consumption; GDP, gross domestic product; ns, not significant.

$^{\dagger}p \leq .10$.

$^{*}p \leq .05$.

$^{**}p \leq .01$.

$^{***}p \leq .001$.

APPENDIX C

TABLE C1 Prediction of installing home equipment to control and reduce energy consumption

	Model 1a			Model 1b			Model 1c			Model 1d		
	β	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*	*β*	Odds ratio	*t*
Individual-level controls												
Constant	−3.10***	0.05	−32.17	−3.09***	0.05	−32.37	−3.20***	0.04	−32.00	−3.35***	0.03	−41.87
Gender	−0.19***	0.82	−4.87	−0.21***	0.81	−5.18	−0.20***	0.82	−5.06	−0.20***	0.82	−4.92
Age	−0.00*	1.00	−2.53	−0.00*	1.00	−2.38	−0.00**	1.00	−2.62	−0.01**	0.99	−2.64
Education	−0.00***	1.00	−4.51	−0.00***	1.00	−4.46	−0.00†	1.00	−1.79	−0.00†	1.00	−1.65
Type of community	−0.30***	0.74	−7.92	−0.30***	0.74	−8.06	−0.28***	0.76	−8.02	−0.29***	0.75	−7.71
Life dissatisfaction	−0.28***	0.75	−9.01	−0.28***	0.75	−8.83	−0.24***	0.79	−7.52	−0.25***	0.78	−6.81
TV ownership	−0.23ns	0.80	−1.41	−0.24ns	0.78	−1.48	−0.17ns	0.84	−1.03	−0.17ns	0.84	−1.07
Car ownership	0.54***	1.72	8.88	0.72***	1.72	8.77	0.38***	1.46	6.22	0.40***	1.49	5.40
House ownership (paid)	0.75***	2.12	9.59	0.75***	2.12	9.61	0.62***	1.85	8.52	0.62***	1.86	8.21
House ownership (still paying)	0.76***	2.15	7.92	0.76***	2.13	7.82	0.54***	1.72	5.77	0.54***	1.71	5.95
Seriousness of climate change				0.03**	1.03	3.13	0.02†	1.02	1.69	0.02†	1.02	1.64
Individual-level predictors												
Reduction of car use through alternative modes of transport[EOA]							−0.09ns	0.92	−1.61	−0.08ns	0.92	−1.64
Avoidance of short-haul flights[EOA]							0.24**	1.27	2.88	0.24***	1.27	3.36
Reducing waste and regularly separating for recycling[EOA]							−0.16***	0.85	−3.68	−0.16***	0.85	−3.33
Cutting down on consumption of disposable items[EOA]							−0.08*	0.92	−2.08	−0.09*	0.92	−2.04
Buying local products (to avoid "far-away" products)[EOC]							0.06ns	1.06	0.98	0.06ns	1.06	0.97
Purchase of a fuel-efficient car[EOC]							0.22***	1.24	3.45	0.21***	1.24	3.94
Switching to energy supplier with greater share of renewable sources[EOC]							0.47***	1.60	5.66	0.47***	1.60	6.72
Insulating home better[EOC]							0.72***	2.05	14.15	0.73***	2.08	14.87
Buying low-energy home[EOC]							0.73***	2.08	6.38	0.74***	2.10	6.74
Installing energy-efficient home appliances[EOC]							0.28***	1.32	4.48	0.29***	1.33	4.46
National-level controls												
GDP per capita										0.00***	1.00	4.41
Biocapacity deficit/reserve										0.04ns	1.04	1.19
Materialist/postmaterialist value orientation										0.12ns	1.12	0.91
Public support for environmental organizations										0.01ns	1.01	0.84
Deviance	117415.56			115973.68			115343.60			115299.61		
Number of parameters	11			12			22			26		
∇ Deviance versus nested model	39749.22			1441.88***			630.09***			43.99***		

Notes: Entries are estimations of standardized fixed effects with robust standard errors.

†$p \leq .10$.

*$p \leq .05$.

**$p \leq .01$.

***$p \leq .001$.