Behavioral spillovers from green purchases: comparing impacts on consumption and policy support

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Green labels and green advertising aim to promote products associated with less energy demands and lower carbon emissions. However, there are indications that purchasing green products may trigger negative spillover effects to subsequent pro-environmental behaviors. One policy-relevant question is whether spillovers from green purchases vary between different types of pro-environmental behaviors, notably consumption vs. policy support, and what determines any differences. Another important question is whether the price of green products affects the magnitude and direction of such spillover effects. Using an experiment among US citizens ($N = 1,985$), we show that spillovers from green purchases differ significantly between pro-environmental behaviors. In particular we find that spillovers are positive for green consumption and negative for climate policy support. Regarding price effects, we do not find robust evidence on their moderating role but only a tendency for cheap prices to exacerbate the direction of the spillover: negative for policy support and positive for green consumption. Finally, pro-environmental identity, previously suggested in the literature as a central moderator of spillover effects from green purchases, appears to be less determinant.

KEYWORDS

spillovers, pro-environmental behaviors, consumption, climate policy support, experiment, green purchases

1 Introduction

There is an on-going debate on the overall effectiveness of "low-cost" pro-environmental behaviors in the context of carbon emission reduction in view of potential negative spillovers they may trigger on more relevant behaviors (Lacasse, 2015; Sparkman et al., 2021; Lacroix et al., 2022). Some scholars argue that household behaviors such as green consumption can rapidly reduce carbon emissions at comparatively low cost (Gifford et al., 2011). Moreover, they may encourage pro-environmental actions by signaling a path through which citizens can contribute toward reducing emissions, and thus foster a sense of environmental responsibility (Vandenbergh et al., 2008; Dietz et al., 2009). In contrast, others argue that focusing on individual pro-environmental behaviors such as green purchases may lead to overly optimistic perceptions of their effectiveness (Maniates, 2001; Santa and Drews, 2023). In turn, this may lower feelings of environmental responsibility (Thøgersen, 2004) and justify limiting further environmental action (Diekmann and Preisendörfer, 2003).

For example, after purchasing a green product, consumers may see themselves as pro-environmental citizens and consider that their environmental goal (e.g., reducing personal emissions) has been fulfilled. This may then translate into them giving less attention to environmental or climate policy, which is arguably more effective at mitigating climate change than individual behavior (Stavins, 2008). Given evidence that the performance of a pro-environmental behavior can lead to both positive and negative spillovers (Truelove et al., 2014), it is relevant to compare the behavioral effects of green purchases on conceptually different behaviors such as policy support and consumption behavior (Lacroix et al., 2022). From a policy perspective, this will allow deciding under what circumstances and conditions promoting voluntary purchase of green products is worthwhile.

An important variable that may moderate potential spillovers arising from green consumption is the price of a product. Reducing the carbon footprint of a product involves changes in production costs, which typically make green alternatives more expensive (Bertini et al., 2022). A higher price of green products will also affect demand: consumers highly concerned about the environment may increase demand, while those less concerned—and more sensitive to prices—may reduce it (Aschemann-Witzel and Niebuhr Aagaard, 2014). Research shows that, even though consumers report increasing environmental concern, behavior is still strongly driven by price and convenience rather than by environmental motivations (Terlau and Hirsch, 2015). A high price of a green product may not only co-determine purchase decisions but also serve as a way for people to maintain their pro-environmental identity or signal their pro-environmental motivation (Gneezy et al., 2012). On the other hand, a low price could trigger further green purchases because individuals want to be consistent with their choices, or crowd out environmental motivations, notably when the purchase is strongly motivated by price (Frey and Oberholzer-Gee, 1997). The questions of whether price has a moderating role in spillover effects on pro-environmental behaviors following green purchases, and what is the relationship with pro-environmental identity, remain unanswered.

The purpose of this article is threefold. First, we want to explore whether spillovers from green purchases differ across relevant but conceptually different pro-environmental behaviors, namely consumption choices and climate policy support. Second, we investigate whether the price of green products affects the likelihood of observing positive or negative spillover effects. Third, we explore the psychological mechanisms of potential spillovers by examining the relationship between green purchases and self-concepts, notably participants' pro-environmental identity and perceptions of doing enough for the environment, which the literature suggest to be moderators of spillovers.

To this end, we undertook an online experiment with 1,985 participants from the United States, using two different artificial shops (green and conventional) for an initial shopping decision, followed by a pro-environmental decision. To test for price effects, we evaluated price signals as moderators of spillover effects by performing two additional treatments where the price of the green products was varied relative to the conventional ones. The overall results contribute to the ongoing debate about the effectiveness of encouraging green purchases as a strategy for climate change mitigation.

The paper is organized as follows. Section 2 presents a review of the literature. In Section 3, we describe the hypotheses we set out to test. Section 4 explains in detail the experimental design and procedures. Results are reported and discussed in Section 5 and Section 6, respectively, which are then followed by conclusions in Section 7.

2 Literature review

2.1 Spillovers between pro-environmental behaviors

The notion of behavioral spillovers refers to the *causal* effects of one behavior on another (Nash et al., 2017). In the environmental domain, spillovers are positive whenever the probability of subsequently behaving pro-environmentally is increased after performing a prior pro-environmental behavior, such as purchasing a green product. These positive spillovers may include not only purchasing decisions but also support for climate policy. Positive spillovers are sometimes referred to as "behavioral consistency," especially when the two behaviors belong to the same category (Thøgersen and Ölander, 2003). Although what is defined as a common behavioral category can be open to interpretation (i.e., pro-environmental behaviors), it typically refers to very closely related behaviors, such as recycling paper and recycling plastic.

Spillovers are negative when the probability of subsequently behaving pro-environmentally is reduced after engaging in a prior pro-environmental behavior. The most common interpretation of such effects in the literature is moral licensing (e.g., a pro-environmental action gives a moral license for subsequent anti-environmental actions). Some authors also refer to this effect as a single action bias or compensatory green beliefs (Kaklamanou et al., 2015; Capstick et al., 2019) where, after performing a pro-environmental action, people perceive they have already "done enough" to protect the environment, which allows them to disregard the environmental dimensions of later actions (Nilsson et al., 2017). Here, we will more generally refer to the effect of one behavior on another as a spillover effect, and refer to more specific mechanisms causing the spillover if there is evidence for it.

A recent meta-analysis of 22 experimental and quasi-experimental studies (Maki et al., 2019) showed that spillovers between pro-environmental behaviors are positive when the second "behavior" refers to an *intention* to perform a pro-environmental behavior. In contrast, a negative spillover effect is more likely when the subsequent phase is an *actual behavior*. In both cases, the average size of the effect was small, but even more so in the latter case. Independent of the intention vs. behavior distinction, the direction and size of spillovers strongly depend on the particular behaviors involved (Truelove et al., 2014).

To unequivocally identify a causal effect, participants must be randomly assigned to the initial pro-environmental behavior. This ensures that self-selection bias is not an issue. Moreover, the study should also include a baseline condition with a neutral initial behavior (Mullen and Monin, 2016). Spillovers will take place if there is a difference in the subsequent behavior between those randomly assigned to the neutral or pro-environmental behavior. These considerations are relevant as much of the evidence found

in the literature to date for behavioral spillovers are correlational studies that lack a baseline condition (Galizzi and Whitmarsh, 2019).

For example, to test for spillovers associated with green purchases, many studies use questionnaire-based surveys that relate past green consumption to pro-environmental intentions (see Burger et al., 2022). They find that compared to consumers not purchasing green products, those that report purchasing green-labeled products in the past show higher future purchase intentions for organic products (Dean et al., 2012; Juhl et al., 2017), increased acceptance for wind power energy (Thøgersen and Noblet, 2012), or reduced likelihood of using public transport (Thøgersen and Ölander, 2003). Nonetheless, as this evidence is based on surveys where participants "self-select" to the initial behavior, they cannot be used as strong evidence for spillovers. A reduced likelihood of using public transport (i.e., subsequent behavior) might not necessarily be the result of having previously bought green products (initial behavior). Instead, the probability of engaging with both behaviors may depend on a common third factor (e.g., pro-environmental values) (Thøgersen and Ölander, 2006). Controlled experiments with a baseline treatment can address this issue as subjects do not self-select to the initial behavior but rather are randomly assigned to perform it.

In the following sub-sections, we review experimental or quasi-experimental studies, i.e., studies that include a baseline treatment. We summarize evidence on whether green purchases lead to positive, negative, or no spillovers. Given that results are mixed, we identify important moderators of spillovers. We further discuss mediating factors or mechanisms that may be able to explain positive and negative spillovers.

2.2 Experimental evidence on behavioral spillovers from green purchases

We identified five experimental studies of spillovers including a baseline condition. Lanzini and Thøgersen (2014) performed a study consisting of two waves of online surveys on pro-environmental behaviors. In-between the surveys, they performed an experimental intervention with verbal and monetary incentives to induce green purchasing behavior. Compared to baseline, both interventions revealed exclusively positive spillovers from green purchases to other low-cost pro-environmental behaviors. Bauer and Menrad (2020) showed that priming participants with an "organic offer" (vs. a non-organic offer) increased the probability of pro-environmental donations. This positive spillover, however, was only significant among individuals with highly pro-environmental values and a rule-based mindset. Garvey and Bolton (2017) presented participants with imaginary shopping scenarios describing a purchase of a low-carbon product or a conventional (control) product. Subsequently, participants were presented with another imaginary shopping scenario where they had to choose between products that varied in carbon intensiveness. Results showed that initial green purchases led to fewer green purchases, i.e., negative spillovers, but only for participants with low environmental consciousness. Similarly, Meijers et al. (2019) induced participants to imagine purchasing a product presented in a green (vs. conventional) advertisement and then asked

them to state their behavioral intentions regarding several pro-environmental actions. They found a negative spillover effect on pro-environmental intentions but only for participants with a low environmental identity. Finally, Margetts and Kashima (2017) randomly assigned participants to make purchases in either a green or a conventional store and subsequently presented them with a real-life donation decision to an environmental organization. The amount donated did not differ across conditions, even after statistically assessing its interaction with individuals' environmental identity.

These various results indicate that green purchases can lead to either positive, negative, or no spillover effects. If one looks more closely at the results, however, a pattern emerges. In the three out of the four studies reporting significant effects (Garvey and Bolton, 2017; Meijers et al., 2019; Bauer and Menrad, 2020), spillovers only emerged after introducing environmental identity or related variables as a moderator.

2.3 Moderators

Psychological research on spillover effects has focused on the context and particularities under which spillovers between pro-environmental behaviors occur (for a review see Truelove et al., 2014). The examination of variables moderating spillover effects is fundamental here as it can explain the mixed evidence for negative vs. positive spillover effects (Mullen and Monin, 2016).

Take as an example a study by Mazar and Zhong (2010) that undertakes an experiment in which participants are randomly assigned to purchasing products from a green or conventional store. This is then followed by various moral tasks involving the possibility of lying or stealing to earn more money in the experiment. The results show that green purchases lead to more "immoral behaviors." Susewind and Hoelzl (2014) replicate this experiment but change the framing of the goal achieved through green purchases. The obtained results show frames do change the direction of the spillovers from green purchases on moral behavior; i.e., depending on the frame employed, they find evidence for positive or negative spillovers from green purchases on moral behaviors. This underpins the importance of taking into account moderating variables into the analysis of spillovers effects.

The literature has identified three groups of moderators as the most crucial. Probably the most often cited moderator is pro-environmental identity (Whitmarsh and O'Neill, 2010). Spillovers between pro-environmental behaviors tend to be positive for individuals with a high pro-environmental identity and negative for those with a low pro-environmental identity. Similar results have shown environmental attitudes to be moderators of spillover effects: people with a high level of environmental awareness will likely be consistent across pro-environmental behaviors (Hahnel et al., 2015; Garvey and Bolton, 2017). Along the same line, Maki et al. (2019) showed that positive spillovers were more likely when interventions targeted intrinsic, pro-environmental motivations. For example, assigning the label "environmentally friendly" to people after they purchase a green product motivates them to make further green purchasing choices (Cornelissen et al., 2007). Together, these results suggest that individuals who perceive green

purchasing as a part of their identity lean toward behavioral consistency (Young et al., 2010).

The second important moderator is the similarity between behaviors (Truelove et al., 2014; Margetts and Kashima, 2017). Research has shown that consistency between behaviors depends on how closely the behaviors are associated in the person's mind (Thøgersen, 1999; Cornelissen et al., 2008). If individuals see that two behaviors are linked to a common goal (e.g., environmental protection), they might consistently perform both or experience cognitive dissonance when performing one and not the other (Thøgersen, 2004). However, the behaviors must be similar in terms of the time and place of their performance as well as the money or effort employed. This has also been referred to as the "behavioral category" (Ajzen and Fishbein, 2005).

Finally, a third important moderator is the cost of behaviors. Gneezy et al. (2012) showed that adding a cost to the initial moral behavior (donation) triggered consistency in subsequent moral behaviors (altruism). The interpretation of the authors is that cost acts as a signal of an individual's pro-social identity. In the environmental domain, costs relate to the expenditure (money), time, inconveniences, or effort that a pro-environmental behavior invokes. Environmentally concerned people may easily engage in behaviors they perceive as low-cost (e.g., recycling) but their willingness to engage decreases for behaviors they perceive as costly (e.g., reducing flying) (Diekmann and Preisendörfer, 2003). According to recent studies (Tobler et al., 2012; Truelove and Gillis, 2018), purchasing green products (i.e., purchasing seasonal food or energy-efficient appliances) is perceived as low-cost while changes to car use or flights as well as support for serious climate policies (i.e., taxes on heating oil or gasoline) are perceived as high-cost. This categorization is relevant since spillover effects associated with pro-environmental behaviors may also vary between costly and non-costly actions.

2.4 Moral licensing

The most common interpretation of negative spillover effects is in terms of moral licensing (Merritt et al., 2010; Miller and Effron, 2010; Gholamzadehmir et al., 2019). The idea here is that individuals accumulate credits in a metaphorical moral bank account and later use them to buy out positive behavior or offset negative behavior, retaining an overall positive self-image (Nisan and Horenczyk, 1990; Jordan et al., 2011). Therefore, moral licensing predicts that after engaging in a first pro-environmental behavior, the individual has an inflated self-image, a primed pro-environmental identity, or a boosted perception that she has done enough for the environment, which gives license to subsequent immoral behaviors (Kouchaki, 2011; Cornelissen et al., 2013). Other notions, closely related to that of self-concept, explain (lack of) engagement in sequential pro-environmental behaviors; examples are "self-efficacy" (Lauren et al., 2016) and "guilt" (Truelove et al., 2021). An earlier study by Truelove et al. (2016) found that an initial pro-environmental behavior (recycling) triggered a *primed* self-image, which in turn was correlated with the probability of engaging in behavior two (policy support). In such cases, identity acts as a mediator of spillover effects.

Although these interpretations underlie many studies that report spillover effects, the psychological processes causing such licensing are not yet fully understood and only a few studies have actually measured these variables (Mullen and Monin, 2016; Nilsson et al., 2017). Furthermore, even in the case that they are explicitly elicited, a measure of *change* of these variables is warranted to establish their role as mediators. For example, to test the potential role of pro-environmental identity as a mediator, the difference between baseline and primed identity should be associated with behavior two. If identity is primed by behavior one, then we should observe a change between baseline and primed identity. If this *change* is predictive of a negative spillover to a second behavior, we can then refer to it as moral licensing. In contrast, to test the potential role of identity as a moderator, one needs to establish an association between a baseline measure of identity (not affected by the initial behavior) and behavior two.

3 Experimental procedure

We employ an experiment to test (1) whether spillovers of green purchases vary between conceptually different behaviors, namely green consumption and climate policy support, and (2) whether changing the cost of green products, i.e., making green purchases more expensive or cheaper relative to conventional ones, moderates potential spillover effects of green purchases on subsequent pro-environmental behaviors. In addition, we measure individuals' pro-environmental identity and perceptions of "doing enough" for the environment that may moderate or rather mediate spillover effects (details on the experimental design are provided on Section 5).

In the experiment participants ($N = 1,985$) from the United States were recruited in December 2021 through Amazon Mechanical Turk to participate in a so-called "spending task." The experiment was not pre-registered. The size of the sample per treatment was set at 300 for green consumption and 200 for policy support, well above that of studies with similar designs. A bigger sample size for shopping decisions was based on the fact that spillovers for this behavior are not only significantly less explored but also with smaller effect sizes while the literature clearly identifies significant negative spillovers from pro-environmental behaviors to climate policy support [see the meta-analysis by Maki et al. (2019)].

Once participants entered the task, we asked for their consent to participate. They were able to exit the task immediately or do so at any later moment considered opportune. The compensation was set at $1 for a 7 min task. Participants first engaged in behavior 1 (purchases in conventional, green, expensive green, or cheap green shops). Directly after, subjects were randomly assigned to behavior 2, which was either another purchase decision or stating their support for climate policies. Then, after a short attention check (SM1), participants completed a brief questionnaire measuring central variables such as pro-environmental identity and self-perceptions of "doing enough" for the environment to test for potential mechanisms underlying spillover effects. Finally, participants answered socio-demographic questions. Two months later, participants were recontacted, and their pro-environmental identity and "doing enough" variables were elicited with the goal of having a baseline measure,

FIGURE 1
Experimental sequence.
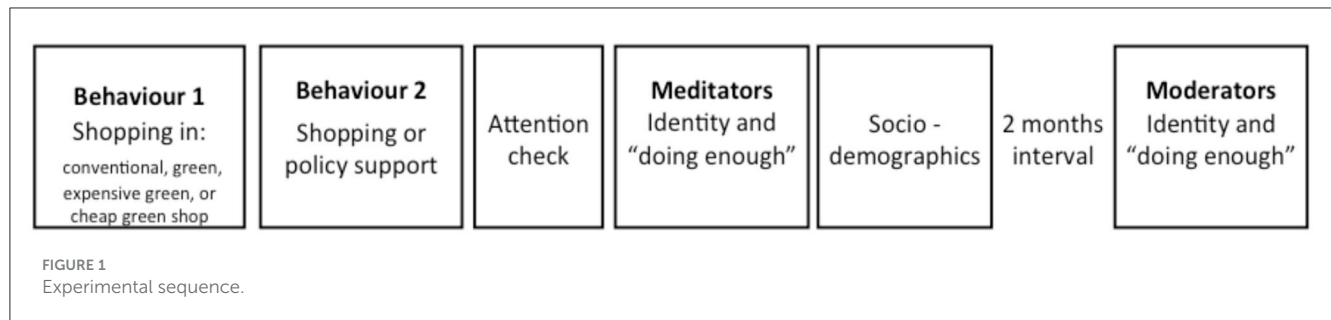
unaffected by experimental procedures. Figure 1 depicts the experimental sequence.

4 Hypotheses

The hypotheses we aim to test with the experiment are:

H1: Spillovers from green purchases differ between distinct types of pro-environmental behaviors.

We expect the size and direction of spillover effects to vary depending on the type of pro-environmental behavior following green purchases. According to the hypothesis of behavioral similarity (Thøgersen, 2004), we expect negative spillovers when the first and second behavior are conceptually different, as is the case for policy support, and expect less negative effects if they are similar, as in the case of green choices.

H2: The price of green products moderates the strength of the spillover.

In the case of green purchases, the cost of the behavior is essentially the price of green products. We anticipate that this cost will moderate the size of the spillover. In particular, we expect negative spillovers to be strong for those assigned to the cheap green shop, and mild for those assigned to the expensive one. This is motivated by previous studies that found that the costlier the initial moral behavior, the higher consistency in behavior (the lower the probability of a negative spillover) (Gneezy et al., 2012). The underlying reason is that a costly behavior is perceived as identity-relevant while non-costly behavior is not.

H3: Negative spillovers are more likely to occur among individuals with a low pro-environmental identity.

We expect pro-environmental identity to strongly moderate spillover effects (Meijers et al., 2019) and, in particular, the negative effect to be restricted to individuals with a low pro-environmental identity. For those with a high pro-environmental identity, we anticipate consistent effects for both policy support and green purchases. Moreover, we expect individuals with a high pro-environmental identity to be less sensitive to the cost of the initial behavior.

H4: Negative spillovers are mediated by self-concept variables, namely pro-environmental identity and doing enough for the environment.

Finally, we aim to explore whether the mechanism of potential spillover effects from green purchases is due to moral licensing. To do this, we observe whether there are changes in self-concept variables of pro-environmental identity and "doing enough" after participating in the experiment. We expect increases in the values of these variables caused by behavior one (green purchases) to be predictive of negative spillovers in behavior two. If this is the case we can identify moral licensing as the mechanism driving the spillover. Figure 2 shows a diagram containing all the relationships that we address in our experiment.

5 Experimental design

5.1 Behavior 1

The initial purchase behavior took place in either a green or a conventional shop following Mazar and Zhong (2010) experimental design. Participants were randomly assigned to one of these shops and given $25 of experimental endowment to select products of their choice. Both shops had 12 products. The conventional shop had mostly conventional products (nine conventional and three green) and the green shop mostly green products (nine green and three conventional). Thus, independent of their preferences, participants were forced to spend relatively much money on green products in the green shop than in the conventional shop. The shops were designed as a list of products displaying a photo, a description, and the market price (see Appendix 1). The green products were labeled as "natural," "organic" or "recycled." Subjects could only buy one item of each product. The decision was incentivized through a lottery at the end of the experiment that randomly selected 10 participants to receive a voucher for the chosen products.

Importantly, in both the green and the conventional shops, there were six products that were the same. These six products consisted of green and conventional options for three product categories (deodorant, detergent, and kitchen towels). The conventional products and their green version had the same price. In order to test whether the price of green products moderates the direction of the spillovers, we used these six products. The price manipulation consisted in creating two additional shops where we altered the prices of green products relative to the conventional options, i.e., in one shop the three green products were cheaper
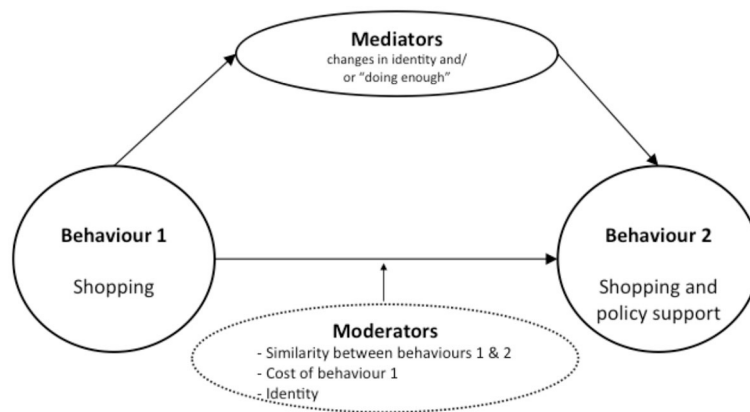
FIGURE 2
Mediators and moderators of spillover effects from green purchases.

than three conventional alternatives while in the other they were more expensive. In this manner, we could test for the cost of behavior 1 as a moderator of spillover effects. Note that the two additional green shops were identical to the original green shop in the products offered and prices. The only difference was that the three green options were cheaper than the three conventional alternatives in the cheap green shop and more expensive in the expensive green shop (see Appendix 1.2). The variation in prices was set proportionally to avoid differences in spending between treatments as a result of differences in the available endowment (see results of the manipulation check in SM3.2). For example, the conventional and green deodorant in the conventional and original green shop had a price of $4. In the cheap green shop, the green deodorant had a price of $3 and the conventional one a price of $5. In the expensive green shop, the prices were the opposite; the green deodorant was priced at $5 and the conventional deodorant was priced at $3. The same variation was made for the conventional and green options of detergent and kitchen towels.

5.2 Behavior 2

Behavior 2 was either a consumption decision or support for climate policies. In the first case, we presented participants with a virtual shop created by Schwartz et al. (2020) that replicated a natural setting of an online shop. The shop contained five products: an energy-efficient light bulb, a pack of conventional incandescent light bulbs at a slightly lower price than the energy-efficient light bulb, and three more expensive electronic products. Participants were given an experimental endowment of $5 to spend on only one product in the shop. They were instructed that the remainder of the endowment, i.e., the endowment minus the price of the selected product, would be received as a monetary bonus. The purpose of this was to make participants choose between the least expensive products, i.e., between the conventional and the green bulb, without creating demand effects[1] at the same time.

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1   Demand effects would take place if it was evident to participants that the researcher is interested in studying preferences for green products for which

In addition, to incentivize the choice between the two bulbs, the selected product would be received, together with the products selected in the first shop, in the form of a voucher for randomly selected participants.

For climate policy support, we employed a multi-item scale of climate policy support. The variable is constructed from responses to three questions exploring participants' level of support for policy measures that would imply a cost (time or money). Using a seven-point Likert scale (1 = "completely disagree" and 7 = "completely agree"), participants specified whether they agreed or disagreed with the statements "I would be willing to sign a petition to support an environmental cause," "I would be willing to pay more taxes to support greater government control of the sustainability of companies and products," and "I would be willing to pay more each month for electricity if it meant cleaner air." Reliability of multi-item constructs can be found in SM2. A value of Cronbach's alpha coefficient equal to 0.83 and of the average variance extracted score equal to 0.62 provide evidence for convergent validity of the construct of climate policy support.

5.3 Pro-environmental identity and "doing enough"

As noted, self-concept variables for pro-environmental identity and perceptions of "doing enough" for the environment were measured twice—once right after the experiment and another two months later. For the second measurement we got 1,181 responses from the 1,985 participants. While many authors perform baseline measures before the experiment, we refrained from this option to avoid contamination effects that could influence our experimental results. Rather, we let some time pass after the experiment (2

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a moral dimension is attached. This task, designed Schwartz et al. (2020) intends to reduce such effects by adding additional non-green products to the shop, hiding researchers intentions (it is no longer a decision between green and conventional products but rather a choice between different products).

months) before contacting again participants to obtain the baseline measures. This passing of time means participants' additional responses would have little influence from having participated in the original experiment but also lead to an attrition rate of around 40% which call for some caution when interpreting these results. To test for moral licensing as a mechanism of spillover effects, we used the difference between the first (during the experiment) and the second measure (2 months later), which allowed us to test whether, for example, identity had been primed after engaging in behavior 1.

(1) *Green identity*. A scale by Van der Werff et al. (2013) was employed. It included the following items: "Acting environmentally friendly is an important part of who I am," "I am the type of person who acts environmentally friendly," and "I see myself as an environmentally friendly person." Participants specified whether they agreed or disagreed with the statements using a seven-point Likert scale (1 = "completely disagree" and 7 = "completely agree"). The final measure was calculated as the mean of the three scores. A value of Cronbach's alpha coefficient equal to 0.95 provides evidence for the reliability of a multi-item construct.

(2) "*Doing enough*" *to protect the environment*. This variable was measured using the three-item scale, as proposed by Urban et al. (2021): "I contribute to the protection of the climate and the environment more than most other people," "I sufficiently contribute to the protection of the climate and the environment," and "In everyday life, I succeed in protecting the climate and the environment." Participants specified whether they agreed or disagreed with the statements using a seven-point Likert scale (1 = "completely disagree" and 7 = "completely agree"). A value of Cronbach's alpha coefficient equal to 0.90 indicates the reliability of a multi-item construct.

6 Results

Overall, behavior 2 corresponding to green choices represented 51% of choices (SD = 0.49; n = 1,181), and the mean support for climate policies across treatments was 4.74 (SD = 1.61; n = 803) on a seven-point scale. Table 1 depicts participants' choices and sample sizes across treatments (additional information including socio-demographics and further details about participants' decisions on behavior 1 and 2 can be found in SM3). Figure 3 shows the percentage of green choices and climate policy support across treatments. We observe that participants assigned to one of the green shops (i.e., the treated groups) more often chose the green product and expressed lower policy support than in the corresponding baseline.

To properly establish the magnitude of these effects, Table 2 presents the estimations of treatment effects on green choices and climate policy support compared to baseline. Model 1a is a logistic regression to estimate the effects of the different shops (behavior 1) on green choice. The results show that participating in the green shop tends to positively affect the probability of subsequently choosing the green option (β = 0.29; p = 0.080), which corresponds to a marginal effect of 7.1%. In other words, the probability of choosing the green product increases by 7.1 (see SM4). However,

TABLE 1 Sample details and choice across treatments.

	Sample size	Green choice (binary)	Mean policy support (1−7)
Total participants	1,985		
Green choice	1,182	611 (51.7%)	
Conventional shop (baseline)	304	138	
Green shop	291	153	
Green expensive shop	290	151	
Green cheap shop	297	169	
Climate policy support	803		4.74
Conventional shop (baseline)	203		5.05
Green shop	203		4.69
Green expensive shop	194		4.67
Green cheap shop	203		4.55

this effect becomes insignificant when adding basic socio-economic control variables (model 2a).

Model 1b is a linear regression estimating treatment effects on the level of policy support. In sharp contrast, participating in the green shop reduces support for climate policies by 0.37 points on a seven-point scale (p = 0.021), or by 5% (model 1b) compared to the baseline treatment. This effect is more robust than that of green choices and the estimated coefficient remains significant (p = 0.013) after including socio-economic variables. It is also worth mentioning that compared to green choices, the models predicting support for climate policies have a higher explicatory power (i.e., R-square). All the socio-demographic variables (except for income) predict policy support, with political affiliation being the most important. However, none of them are statistically significant in the case of green choices. These results support Hypothesis 1 regarding different spillover effects for different types of behaviors—while shopping in a green shop (vs. a conventional one) significantly reduces support for climate policies, it leads to an opposite effect when the subsequent behavior is similar.

With respect to Hypothesis 2, regarding the price of green products moderating the spillover effects, the effects are also different for green choices and policy support. Contrary to our hypothesis, participating in the cheap green shop increased the probability of a subsequent green choice by 11.5% (β = 0.46; p = 0.005) compared to baseline. However, in line with our hypothesis, in the case of policy support, participating in the cheap green shop decreased policy support by 7.14% (β = −0.51 p = 0.002). In both cases, participating in the cheap green shop exacerbated the strength of the spillover effects observed from the green shop. Moreover, the estimates for the effects of the cheap green shop on both pro-environmental decisions remain significant after the inclusion of socio-demographic variables (model 2a and 2b). Regarding the expensive green shop, we found no evidence that being assigned to this shop affected the subsequent green choices different than baseline (β = 0.27; p = 0.104). In the case of policy support, these effects are significant (β = −0.39;
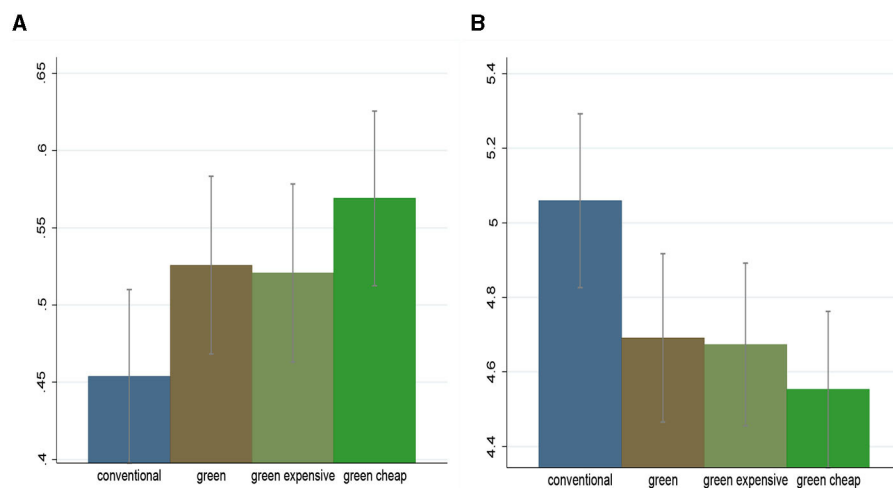
FIGURE 3
Spillover effects of green purchases on subsequent green choices and policy support. Bars show participants' mean **(A)** green choices and **(B)** support for climate policies in the control condition (conventional shop) alongside green shop treatments with the same and different prices. Error bars indicate 95% confidence intervals. **(A)** Mean green choices across treatments. **(B)** Mean policy support across treatment.

p = 0.017) but indistinguishable from those of green shop alone (z = 0.345; p=0.730, Mann–Whitney test). To properly establish the presence of price effects, we further test whether treatment effects are different between all green shops and find no differential effects between them (see Mann–Whitney tests in SM5). Therefore, we reject hypothesis 2: while results underscore that signaling green products as cheap exacerbates the strength of the spillover for both green choice and policy support (positive and negative respectively), we find no significant evidence that increasing/decreasing the cost of green products leads to different spillover effects.

Table 2 further shows pro-environmental identity as a predictor of both green choices and climate policy support. To test if apart from predicting it, identity moderates the spillover effects from green purchases, we interacted this variable with each treatment (see estimation in SM6). In order to visualize the differential effect of pro-environmental identity on green choices and policy support, we classified participants into low- and high-identity categories based on the median split of the variable and then separately plotted the interaction between green choices and treatments for each group of identity. High-identity individuals (526 out of 1,181 or 44.5% of our sample) were participants whose reported mean identity was around 6.3 (SD = 0.49) on a seven-point scale. Low-identity individuals (the remaining 55.4%) had a mean of 4.1 (SD = 1.21). The median split left the two groups unevenly balanced because the median value of the variable had a high frequency and was categorized under the 'low identity' group.

Figure 4 shows the treatment effects for both green choices and policy support by identity group. In the case of green choices, the mean green choices for high- and low-identity participants were indistinguishable for all the treatments, except for the expensive green shop. In this case, the direction of the spillover effect was determined by identity: purchases in the expensive green shop lowered the probability of low-identity individuals choosing green options compared to both green and cheap green

treatments. The opposite held true for high-identity individuals. In the case of policy support, high-identity individuals showed higher levels of support for policies than low-identity participants in all treatments. Nonetheless, the direction of the treatment effects was the same for both, which means there is no moderation effect from identity. Based on these results, we conclude there is little evidence to support Hypothesis 3. While identity predicted both pro-environmental behaviors, except for one case, it did not moderate the spillover effects of green purchases.

Finally, we address Hypothesis 4 in the case of climate policy support as for green choices we found no evidence of negative spillovers that could be explained by moral licensing. In particular we explore whether the negative spillover found for policy support is consistent with the notion of moral licensing. If this is the case, (a) green purchases should enhance self-concepts like pro-environmental identity or the perception of "doing enough" for the environment and (b) these increases should be associated with lower levels of policy support. To test whether this is true, we first explore the differences between post-experimental and baseline levels of identity and "doing enough" between treatments (SM7-8).
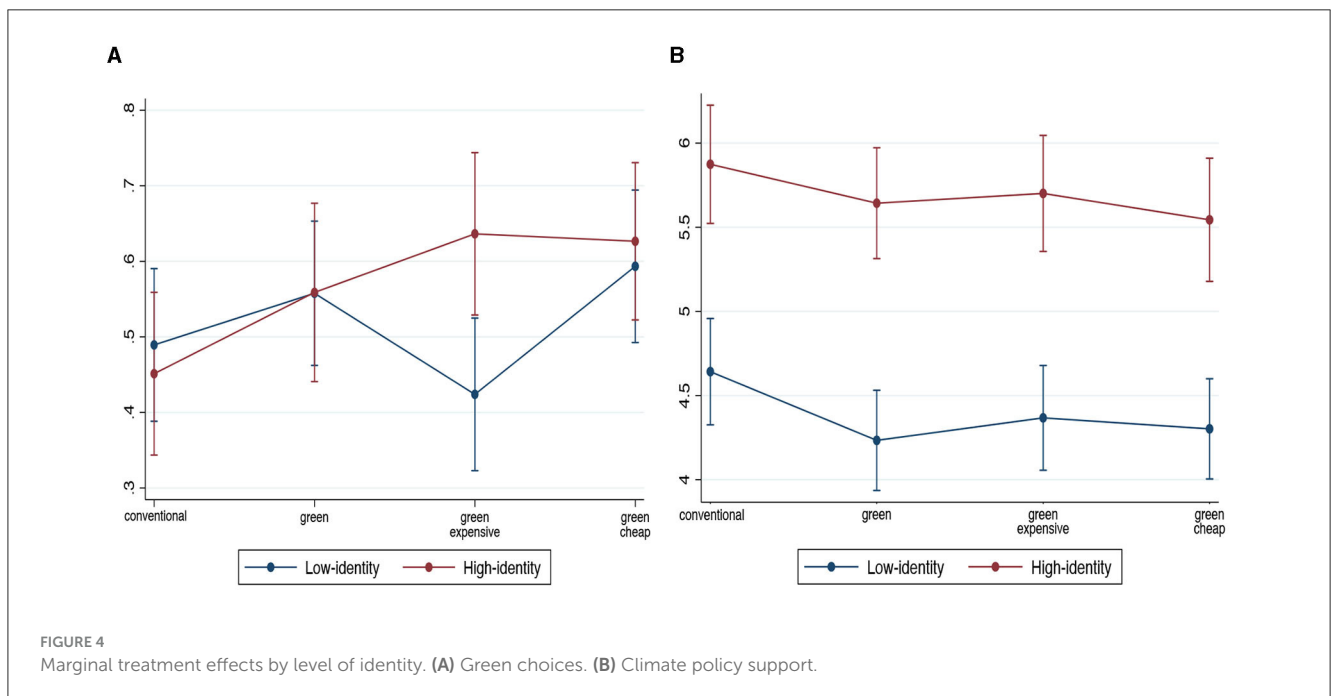
We found that overall the self-concepts of identity and "doing enough" increased for those with initially low levels, while they were lowered by the experimental treatments for those with initially high levels. This effect was independent of the type of treatment, i.e., those assigned to the green shops showed the same variations in identity and "doing enough" as those assigned to the conventional shop. In other words, the data suggests there were no significant effects of green shops on participants' pro-environmental identity or doing enough variables.

As an additional test, we analyse if, at the individual level, a boost in these self-concepts affects the probability of supporting climate policies. To do this, we regressed policy support on *changes* in identity and "doing enough." The results show that increases in these variables had a positive rather than negative effect on the level of policy support (SM9). These results are in the opposite direction

TABLE 2 Effects of green purchases on subsequent green choices and policy support.

	(a) Green choices			(b) Policy support		
	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
	Treatments	Socio-demographics	Identity	Treatments	Socio-demographics	Identity
Treatment (base = conventional)						
Green	0.288*(0.164)	0.252 (0.168)	0.353 (0.222)	−0.368**(0.159)	−0.353**(0.141)	−0.335**(0.164)
Green expensive	0.268 (0.165)	0.226 (0.168)	0.174 (0.223)	−0.386**(0.161)	−0.57***(0.141)	−0.569***(0.168)
Green cheap	0.463***(0.164)	0.404**(0.168)	0.484**(0.226)	−0.506***(0.159)	−0.565***(0.139)	−0.507***(0.167)
Socio-demographics						
Age		0.098 (0.069)	0.144 (0.091)		−0.196***(0.057)	−0.219***(0.065)
Female		−0.02 (0.12)	0.082 (0.161)		0.311***(0.101)	0.272**(0.119)
Education		−0.066 (0.087)	−0.032 (0.117)		0.236***(0.073)	0.071 (0.084)
Income		0.056 (0.045)	0.008 (0.058)		−0.025 (0.036)	0.029 (0.042)
Political affiliation (base = democrat)						
Republican		−0.069 (0.148)	−0.118 (0.2)		−1.739***(0.126)	−1.671***(0.154)
Independent		0.01 (0.148)	−0.095 (0.195)		−1.11***(0.119)	−0.887***(0.146)
Environmental identity						
			0.147***(0.056)			0.42***(0.043)
Constant	−0.185 (0.115)	−0.558 (0.383)	−1.347**(0.58)	5.059***(0.112)	5.837***(0.323)	3.827***(0.42)
Observations	1182	1153	673	803	790	470
R-squared	0.005	0.007	0.02	0.014	0.258	0.435

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

FIGURE 4
Marginal treatment effects by level of identity. **(A)** Green choices. **(B)** Climate policy support.

of the predictions based on moral licensing theory, namely that a primed pro-environmental identity triggers less climate policy support. Thus, we cannot accept Hypothesis 4 as we find no evidence for the underlying mechanisms mediating the negative spillover to climate policy.

7 Discussion

Our results show that depending upon the pro-environmental behavior itself following the green purchase, the direction of the spillover is determined. We find negative spillover effects from

green purchases to climate policy support, and positive spillovers to green consumption. These results are in line with the hypothesis of behavioral similarity that predicts positive spillovers between similar behaviors and negative spillovers between conceptually different ones (Thøgersen, 2004). Overall, these results have important policy implications that contribute to a small but growing literature showing that behaviors with relatively little environmental impact, such as green purchases in our case, can crowd out support for climate policies (Werfel, 2017; Hagmann et al., 2019; Knook et al., 2022). In such a context, policies promoting voluntary purchases of green products may not be worthwhile as support for more systemic (non-voluntary) policies is arguably more effective for climate change mitigation.

Moreover, our results make a contribution to literature by reconciling the apparently contradicting results from past research reporting positive and negative spillover effects from green purchases to different pro-environmental behaviors. It should be also considered that apart from behavioral similarity, the opposite direction of the spillovers we find for green choices and climate policy support may also be explained by differences in the perceived costs of performing these behaviors. In the literature, policy support is typically classified as a costly behavior (Tobler et al., 2012; Truelove and Gillis, 2018). In fact, Sparkman et al. (2021) suggest that the negative spillovers often found from pro-environmental behaviors to policy support (Maki et al., 2019) can be explicated by the policy framing. They argue that policies are typically framed as having high costs that fall exclusively on individuals rather than industry. Further research could investigate the underlying reasons behind this persistent negative spillovers from green purchases by exploring other policy frames that may lead to different cost perceptions and potentially to a different direction of the spillover.

The price scenarios examined in the experiment did not show robust evidence for moderation effects. However, the results revealed pathways for enhancing spillover effects. In particular, cheap green products enhanced the direction of the initially observed spillover, i.e., whenever green products where cheap subsequent climate policy support was even lower and green choices increased. These results do not support Gneezy et al.'s (2012) theory on costly behaviors as way to achieve behavioral consistency. While policy support was the lowest among participants assigned to the cheap green shop, shopping in the expensive green shop did not reverse this effect or trigger more support for climate policy, as the cost theory would predict. Moreover, in the case of green choices, signaling products as cheap enhanced positive spillovers. These results advocate the need for cost theory to also consider more than one behavioral category to test for spillovers, as it could be the case that costly signaling only triggers consistency among certain behaviors.

Regarding pro-environmental identity our results ascertain it is a central determinant of pro-environmental behaviors: participants with strong pro-environmental identity show high support for climate policies and buy on average more green products. Nonetheless, we do not find evidence of identity being a moderator of the spillover effects from green purchases in subsequent pro-environmental behaviors as previously suggested in the literature (Meijers et al., 2019). We only found this evidence in the case of green choices, where low-identity participants were affected by the price signal (expensive green shop) triggering a negative spillover

to subsequent green purchases. Yet, the remaining evidence did not show any moderating effects of identity on spillovers from green purchases.

Finally, with regard to moral licensing as the mechanism driving spillovers, our analysis showed no significant differences between treatments, i.e., participants assigned to green supermarkets did not show higher levels of pro-environmental identity or "doing enough" than those in the baseline, which was the basic condition to test for moral licensing. Additional variables such as self-efficacy, guilt feelings, preferences for consistency, cost perceptions of behavior 2 or further measures related to identity might be able to explain the psychological processes behind the negative spillover to policy support.

8 Limitations and further research

Our experiment has some limitations. In our experimental design green choices were incentivized while support for climate policies was a non-incentivized self-report. The latter could thus be subject to experimenter demand effects. This means that participants could report themselves as strong supporters of environmental policies at no cost. Interestingly, this was not the case in the experiment as there was high variability in the levels of policy support reported.

Another feature to be highlighted relates to the fact that, by design, subjects did not voluntarily choose to buy the green/conventional products in the shops, but were "forced" to choose products according to the shop assigned. Although this is clearly motivated in the design as a way to guarantee random assignment to behavior 1, spillovers might vary when consumers actually get to choose to buy green/conventional products. Moreover, the purchasing decisions in the experiment are not really costly, as participants do not actually spend money on products but are randomly chosen to receive a voucher to actually buy them.

Finally, note that the absence of robust price effects could be due to the fact that the manipulation was not strong enough to see the cost effects. Further studies may want to test for stronger price manipulations in order to test for their relevancy in a climate policy context.

9 Conclusion

Motivated by environmental and climate targets, consumers are increasingly encouraged to purchase green products. Here, we addressed the question of whether purchasing green products serves as an entry point to additional sustainable consumption behaviors and giving support to climate policy. In particular, we assessed whether spillover effects from green purchases were different across these behavioral categories and whether the price of green products plays a role as a moderator of potential spillover effects. The results demonstrate that behavioral similarity acts as a moderator of spillovers from green purchases, i.e., spillovers are positive for the same behavior (green purchases) but negative for dissimilar ones (climate policy support). These results serve as an explanation for previously inconclusive findings

regarding spillovers from green purchases to subsequent pro-environmental behaviors.

Importantly, we provide strong evidence for negative spillover effects from green purchases to climate policy support independent of price signals or pro-environmental identity. This contributes novel evidence to the debate on the role of green purchases in the context of climate change. It suggests that promoting green products as means of reducing emissions may backfire, by discouraging more effective strategies like giving support to ambitious climate policy.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Universitat Autonoma de Barcelona under protocol CEEAH5787. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JS: Conceptualization, Formal analysis, Investigation, Methodology, Writing—original draft, Writing—review & editing. SD: Conceptualization, Supervision, Writing—original draft, Writing—review & editing. JB: Conceptualization, Supervision, Writing—original draft, Writing—review & editing.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frbhe.2023.1283311/full#supplementary-material

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