

Article

Perceived Consumer Effectiveness as A Trigger of Behavioral Spillover Effects: A path towards Recycling

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Abstract: Increasing and promoting recycling is crucial to achieving sustainable consumption. However, this is a complex task that involves the interplay of beliefs, knowledge and situational factors in ways not yet understood. This study examines a spill-over model in which perceived consumer effectiveness influences the adoption of an easy task (carrying reusable shopping bags) and that, in turn, influences recycling. Using data from a national survey with a representative sample of 1286 respondents in Colombia, we test a hypothesized path using a mediation model. Our results suggest that the relationship between perceived consumer effectiveness and recycling is mediated by the use of reusable shopping bags. Thus, once the adoption of simple pro-environmental behavior is triggered by pro-environmental beliefs, spillover effects may ensue to favor the adoption of recycling behavior. This suggests that individuals may adopt pro-environmental behavior in stages or levels. Therefore, focusing on behaviors that require less effort (e.g., reducing/reusing) could be a starting point when it comes to encouraging the adoption of other behaviors that demand a greater level of effort such as recycling. This study suggests that attitudinal variables can be the starting point of spill-over effects.

Keywords: recycling; perceived consumer effectiveness (PCE); stepped behavior; pro-environmental behavior; spillovers

1. Introduction

The environmental challenges we currently face require the promotion of individual behaviors that contribute to sustainable consumption. The end-stage of consumption is one of the key spaces where specific actions can be executed by the consumers in order to reduce their impact on the environment. However, marketing and public policy efforts to act upon the so-called 5 R's (refuse, reduce, reuse, recycle and rot) (see [1]) have been very limited. Particularly, a greater degree of knowledge is required to understand factors that influence the adoption of these behaviors, one of which is recycling.

Recycling is a well-known, salient pro-environmental practice, as bad waste management at the household level can considerably hinder environmental sustainability [2–4]. However, as suggested by the almost 50 years of literature on recycling, such behavior is highly complex and promoting its adoption remains an unmet challenge as it encompasses a great number of variables, involving inner motivations as well as internal and external facilitators [5]. Another factor has to do with the fact that recycling is largely dependent on consumers' or end users' labor to function, requiring time, energy and skill to sort and collect items. Previous research also has established that no influencing variable acts alone [5,6], interactions among predictors should be incorporated in adoption models and emphasis should be placed on those variables that increase long-term commitment to recycling [5]—

the attitudinal variables being the most promising for this end. In spite of these studies, there is no account of an integrative approach focusing on the identification of a pervasive psychosocial mechanism or model to explain the adoption of complex pro-environmental behaviors (such as recycling), which would be useful for the design of effective interventions.

This research contributes to advancing existing knowledge in this direction. Our approach is integrative because we focus on understanding the nature of the interplay of attitudinal and behavioral factors as they influence recycling. We do so by proposing and testing a framework for the interaction of these variables based on the combination of well-established theories of behavior complexity and spillover effects. We posit that spillover effects can be triggered by individual beliefs when pro-environmental behaviors are purposefully affected taking into account their complexity. To test this idea, we use perceived consumer effectiveness (PCE) as an individual belief that activates recycling behavior by means of the intervention of another pro-environmental behavior that is simpler: carrying reusable bags. In this line, the perception of the effectiveness of individual action to protect the environment leads to the adoption of several pro-environmental behaviors in stages or levels. The first stages involve simple actions that are followed by other behaviors that require increasingly greater effort, specifically recycling.

PCE is a known antecedent of pro-environmental behaviors. Although previous research has shown the predictive power of PCE for knowledge, intentions and aggregated behaviors [7–12], to date, few studies have addressed the relationship between PCE and recycling behavior in particular, which makes PCE a good attitudinal variable for our model [13]. We therefore expect to identify an indirect effect that require spillover effects [14,15], according to which, the adoption of one behavior can trigger (even unintendedly) the activation of another related behavior. Thus, we test whether the link between PCE and recycling behavior is characterized by a spillover effect from a simpler pro-environmental reusing behavior (i.e., the use of reusable bags). Until now, few studies have harnessed the differences in the difficulty performing pro-environmental behaviors in order to promote their adoption (see [16]) and no one has used difficulty to analyze and promote recycling behavior in particular.

In short, the contribution of this research is to offer a novel integrative model for adopting pro-environmental behaviors that connect individual beliefs to spillover effects that occur in relation to increasingly difficult behaviors. We test this model using recycling as the target behavior, perceived consumer effectiveness as the attitudinal antecedent and carrying reusable bags as the intermediate behavior.

2. Theoretical Background And Research Hypotheses

2.1. Recycling Behavior

Recycling behavior is associated with the handling of waste material derived from individual and household consumption. Waste generation and impact constitute one of the main obstacles to environmental sustainability [2–4]. This has increased the relevance of recycling and has motivated ample research to find mechanisms to overcome the ‘green gap’ that exists for its adoption. From the theory of reasoned action (TRA), attitudes and subjective norms lead to intentions and these intentions lead to behaviors [17]. However, the ‘green gap’ has been defined as an attitude–behavior discrepancy [5] that stops individuals from turning their beliefs and intentions into real behavior. As prior research has argued, intentions are not always enough to predict behaviors, even more when those behaviors are out of the individual’s control [18]. Hence, as a complement of TRA, the theory of planned behavior (TPB) comes up to assert that an individual also needs control beliefs, based on the availability of requisite opportunities and resources, to carry out any behavior [19,20].

Because “several behaviors poses difficulties in their execution that may constraint people’s volitional control” [20] (p.665), focusing the attention on different factors—including such control beliefs (e.g., ease, ability and control)—is needed to advance in closing the green gap. Recycling is one of those behaviors and the phenomenon of green gap has constituted a key aspect in the literature on

the topic, motivating research into different factors that influence the adoption of recycling behaviors and that can be involved in mechanisms to promote it.

Factors Linked to The Analysis of Recycling Behavior

As we mention before, recycling, like many other pro-environmental behaviors is complex [6]. Thus, in studying it, authors have looked into different factors that can influence its adoption. Research on recycling can be organized into two historic perspectives. The first referred to the analysis of extrinsic motivations (e.g., financial incentives) [5] and demographic factors (e.g., age, gender, level of income, level of education and type of housing) [6]. It was soon found that extrinsic incentives were not sustainable in time and may not be very effective in promoting long-term behavioral changes. For example, Varotto and Spagnolli [21] point out that once the reward is suspended, recycling rates tend to return to baseline levels attributable to intrinsic motivation, which, therefore, seems to be unaffected by temporal extrinsic incentives. Regarding demographic variables, these have not shown significant predictive power, as they are the least influential factors in terms of recycling behavior as was highlighted in recent meta-analyses on the topic [6,22–24].

The second perspective places greater emphasis on the analysis of psychosocial variables including internal (e.g., pro-environmental attitudes and beliefs, environmental concern, personal norms, general satisfaction, locus of control) and contextual—also known as situational—factors (e.g., information and knowledge, social norms, legal environment, past behavior and personal effort) [5,6,8,10,23–28]. Situational factors also include variables associated with the existing convenience or available structure for recycling actions (i.e., external facilitators like time, money, access to the bins, effort needed to prepare, store and transport recyclable material and collection frequency) [5,6,27].

Among the factors linked to the analysis of recycling behavior, empirical results highlight psychographic variables. These variables have shown explanatory power on recycling [5,6] and they were central in the development of mechanisms that allow the adoption of such behavior to be sustainable over time [29]. For instance, several studies agreed that individuals' factors like self-identity, perceived behavioral control, past behavior, perceived consequences and personal and social norms were the most influential factors in terms of recycling, showing large effects sizes on this behavior [23,24]. Specifically, following the theories of reasoned action and planned behavior [19], attitudes and norms were highlighted as important variables explaining sustainable behavior, including recycling. Consistent with literature showing that a favorable evaluation of a particular behavior is likely to increase engagement in such behavior [19], research on recycling has found that positive, general and specific, attitudes towards recycling are strong antecedents of this behavior [23,24]. In addition, both personal and social norms have shown large positive effects on recycling suggesting that individuals "are more likely to recycle when they feel morally obliged to recycle, when they think others do so as well and when they believe others to approve recycling" [24] (p. 92). Other studies on recycling in developing countries have also found personal norms within the most impactful factors on recycling, suggesting that moral obligation is a key factor to encourage participation in household waste sorting [23].

One of these psychographic variables is perceived consumer effectiveness (PCE), conceptualized and measured as the degree to which the consumer believes that the effort made in terms of individual action in itself can make a difference [10,30]. In other words, PCE is a subjective estimate of a person's ability to be helpful in the solution of a problem [31,32]. In the environmental domain, PCE is the individual's estimation of the degree to which personal consumption activities contribute to the solution of environmental problems [7,10,33]. Given the specificity of the construct to the environmental domain, PCE has—for several years now—been considered a salient driver of pro-environmental behaviors [34,35].

2.2. PCE and Pro-environmental Behavior

Previous research has indicated a promising predictive power of PCE in relation to pro-environmental attitudes, intentions and self-reported behaviors [8,30,36–40]. For example, Kim and Choi [41] found that greater self-efficacy beliefs (i.e., PCE) influence green purchase behavior; while, Sharma and Dayal [11] showed the influence of PCE on both green purchase intentions and behaviors. Finally, Lee et al. [35] concluded that PCE was positively related not only to green purchases, but also to environmental activism and good citizen behavior. Even though many of these studies on PCE have focused on analyzing its relationship with aggregated behaviors (i.e., a set of pro-environmental activities) [10,12,38,42–44], different authors and empirical studies have referred to the explanatory value of PCE on specific behaviors [10,45,46]. For instance, Allen [7] focused on the use of energy and Habitzreuter [47] recently addressed disposal-related behaviors. Nonetheless, most of the studies focusing on PCE that have included recycling, do so as part of an element of wider sets of environmental conducts [8,36–38]. That is, the specific relationship between PCE and recycling behavior has received little attention. Evidence of this are the recent meta-analyses on determinants of recycling that show that PCE has not been included as a common factor in the study of this specific behavior [23,24]. However, with PCE being an important variable in the marketing field, Lee et al. [35] recently analyzed the relationship between this variable and the advertising advocating recycling behavior. Because their results show a positive effect of PCE on consumer willingness to engage in recycling, these authors recognize PCE as an antecedent to recycling intention behavior and emphasize the importance of incorporating this variable into work on motivating this pro-environmental behavior.

Thus, three important expectations that ensue from extant knowledge on factors linked to recycling make the study of this relationship relevant. First, there is explanatory power exhibited by psychographic variables on recycling behavior. Second, there is consensus in the literature regarding PCE playing a better role in the prediction of specific environmental behaviors. Third, there are findings related to the significant and positive relationships between PCE and sets of pro-environmental behaviors that include recycling [8,10,12,13].

This study therefore brings the extant theory about determinants on recycling behavior to propose PCE as another factor that deserves attention to understand why and how people are likely to engage in recycling. Moreover, it further examines this relationship between PCE and recycling involving the notion that no variable acts alone and, consequently, it is important to consider models that take into account interactions with other variables. We address behaviors such as other variables based on previous literature on interventions and strategies to encourage sustainable behaviors. From this perspective, the interplay among sustainable behaviors may trigger mechanisms to favor their adoption [15,16].

2.3. Interventions and Strategies to Promote Sustainable Behaviors (Recycling)

Several strategies have been implemented to promote sustainable behaviors; for example, interventions and advertising campaigns. Under the concept of advocacy advertising, some of these efforts aim to increase positive opinions about sponsoring organizations while other communication strategies aim to promote specific consumer action (e.g., pro-environmental action) [35]. Prior research has pointed out the importance of persuasive communication to encourage the specific sustainable behavior of recycling, mainly to increase knowledge as well as motivations and perceived skills to favor its adoption [48,49]. Varotto and Spagnolli [21] note that in addition to persuasive information, there are other psychological strategies to promote household recycling. They showed that feedback, commitment, incentives, physical environment alterations and social modeling have also been employed as interventions to encourage people to recycle. Among those interventions, environmental alterations and social modeling are the most effective. One possible reason for this is that modifying the physical environment to facilitate recycling and passing information via people who demonstrate personal engagement in recycling, helps in overcoming many barriers and activating important determinants of recycling.

Strategies or interventions that promote sustainable behaviors such as recycling could succeed or fail due to different reasons and conditions. For example, Mickaël et al. [50] note that interventions through feedback provide historical comparison with individuals' past behavior, which is effective in increasing both the frequency and the number of recyclables collected. As far as information campaigns go, companies need to go beyond merely providing information about the consequences (positive or negative) of people's behavior, and actually render the information understandable and actionable and aimed at achieving behavioral change [51].

These considerations about the message also encompass the approach and framing as elements of success. For example, the classic 'well baby appeal', which stresses the significance of individual action, may be more effective in achieving behavioral change, via PCE, than the 'sick baby appeal', which focuses on the importance and severity of the issue, when people already have to deal with high degrees of environmental concern [31,36,52]. In addition, Casado et al. [53] found that environmental messages framed in the future (vs. the past) were more effective in leading positive attitudes towards the ad, suggesting that these attitudes could be precursors of "higher intentions to act according to the advertised behaviors" [53] (p. 671). When the message to encourage sustainable behavior is linked to a specific brand, green ads could elicit favorable answers (attitudes and behaviors) from consumers if the environmental performance of the firm is consistent with its green claims (message). Otherwise, perceived greenwashing may arise [54] undermining the pro-environmental outcomes of the strategy.

An expected outcome of these strategies is the adoption of a target sustainable behavior; nevertheless, unexpected results of these interventions have ended up having effects on other behaviors. These unexpected relationships among pro-environmental behaviors have been addressed under the theoretical perspective of behavioral spillover.

2.4. Spillover among Pro-environmental Behaviors

A spillover is "an effect of an intervention on subsequent behaviors not initially targeted by the intervention" [15] (p. 128). In other words, this effect implies that conducting an initial behavior has the potential to leak into another subsequent behavior [14]. The spillover effect could be positive or negative. In the first case, by engaging in one behavior people are likely to adopt a subsequent related behavior [15,55,56]. For example, Lanzini and Thøgersen [57] reported that 'green' buying behavior leads to a range of other pro-environmental behaviors (e.g., use of public transport, printing on both sides of a piece of paper, recycling and saving water). In contrast, a negative spillover indicates that by engaging in one behavior people are likely to decrease the performance of another subsequent behavior or to increase a negative future behavior [15,55,56]. For example, Mazar and Zhong [58] found that when people went shopping in a green shop, they were then less likely to have ethical behavior. In addition, Tiefenbeck et al. [59] revealed that people reduced water use due to an intervention, but, on the other hand, they increased electricity use.

To test positive and negative spillovers, prior research has simply measured the correlations between behaviors [14,60]; some authors have manipulated the adoption of an initial behavior to observe the effect on a subsequent behavior [59,61,62]. In this research, we focus on a behavior's characteristics as an underlying mechanism that activates the spillover effect. In particular, we posit that behavior complexity may engage spillover effects over conducts of increasing complexity.

Spillover from Simple to Complex Behaviors

Adopting an initial behavior may act as a gateway to engaging in more challenging and impactful behaviors [14], but little is known about such gradual escalation. The classical approach about this type of spillover is the so-called 'foot in the door effect' [63] according to which, completing a small request (i.e., easy behavior) may lead to more challenging actions (i.e., harder behavior). Some authors and studies have embraced this idea. For example, Thøgersen and Noblet [64] tested how everyday 'green' behaviors encourage the acceptance of wind power policy. Lauren et al. [16] also studied how

easy water-related behaviors lead to more difficult water conservation and quality protection activities; their findings showed that engaging in easy behaviors could influence intentions and self-reported future engagement in difficult behaviors. Thus, these studies suggest that there could be a gradual engagement from easier to harder activities, what we call stepped behaviors, to foster the adoption of challenging ones.

Research on spillovers has analyzed the mechanisms that link the manipulation of an initial behavior or condition to the observation of a subsequent one (e.g., the increase of self-efficacy beliefs, the activation of norms, environmental self-identity or the priming of environmental concerns and pro-environmental goals) [16,56,65,66]. In this research, we used consumers' base PCE without interventions to activate it (e.g., through messages, incentives, campaigns). As such, we examined the predispositional value of PCE to initiate a cascade of stepped behaviors based on a spillover mechanism that goes from easy to complex.

For this research, we chose the use of reusable shopping bags as an easier task than recycling. Task complexity depends on three basic features: the components needed to perform it (i.e., expected outcomes, required actions and information cues), the interrelationships among these components and the variability of their relationships [67,68]. Given that the use of reusable shopping bags involves fewer components, interrelationships and changes to carry it out, we expected it to be an easier task than recycling. Recycling, in fact, involves several actions (e.g., cleaning, sorting, even taking material to specific recycling centers), information (e.g., proper recyclable material, different colors of bins to recycle) and multiple expected outcomes (e.g., proper separation of each material). Moreover, recycling implies the coordination of actions and information that tend to change over time (e.g., new materials to recycle, new centers to take materials to, systems that evolve from separate and collect). Such complexity results in an augmented perception of difficulty which impedes adoption [69]. Therefore, we expect the use of reusable shopping bags to be perceived of as less difficult than recycling.

Because spillover effects have been the result of different interventions to promote pro-environmental behavior, the antecedents of behavioral spillover have been taken for granted. Moreover, although recycling has been involved in the spillover mechanism to achieve other pro-environmental behaviors [70,71], the potential benefits of behavioral spillover such as encouraging people to recycle as a target behavior have not been as extensively explored. As a promising path to encouraging the performance of pro-environmental behaviors like recycling, the study of spillover effects as well as further empirical investigation are required before we can fully exploit the phenomenon [70]. Thus, one of the main contributions of this study is to extend the current understanding regarding spillovers by empirically examining: (a) whether PCE could be a possible antecedent of behavioral spillover; (b) whether spillover occurs from simple to complex in the context of waste-related behaviors.

2.5. Hypotheses Formulation

The empirical results on the antecedents of recycling behavior reviewed earlier, establish that predictive factors of recycling behavior may be interrelated. These analyses highlight the limitations of single variable explanations for behavioral change and encourage an examination of the relationships between the predictors of recycling [72]. Interestingly, most studies have looked at direct effects, and only a few have tested interactive models between predictors and recycling behavior [23,24,72,73]. We aim to fill this gap deepening the interactions between determinants and mechanisms that prompt recycling. Particularly, we propose a path in which PCE will influence the adoption of an initial easy behavior (i.e., the use of reusable bags), which will, in turn, influence recycling action. In this sense, we hypothesize PCE to be a driver of a positive spillover between these related behaviors. Because PCE is reported to have a positive and significant effect on different pro-environmental activities [8,36–38], including the willingness to engage in reusing and reducing behaviors [47], we therefore hypothesize that:

Hypothesis 1. *PCE is positively related with the behavior of using reusable bags.*

Positive spillover effects may be observed when the promotion of one pro-environmental behavior increases the likelihood of the adoption of other related behaviors [15]. These positive spillovers depend on different characteristics. One of these is the similarity between behaviors [15]. People engage in pro-environmental behaviors to achieve goals. Concurrent behaviors tend to be more likely to occur when they are embedded in similar categories of goals [74]. Moreover, seeking consistency, people concatenate behaviors that support the consistency of their actions [75,76]. Since reusing and recycling may be categorized under the same goal, we hypothesize that:

Hypothesis 2. *The use of reusable bags is positively related to recycling behavior.*

Previous literature on pro-environmental behaviors has asserted that attitudes and intentions are not sufficient in themselves to activate behaviors (i.e., the green gap) [77–79]. Thus, even if people believe that their actions may contribute to protect the environment, they may not act in consequence, mostly when the target behavior—recycling, for example—is complex. People favor easy behaviors [80], so they are more likely to adopt pro-environmental behaviors that are not costly [57]. This supports the notion of stepped behaviors that occur from simple to complex. Even the influence of PCE seems to be greater in routine, easy-to-perform behaviors than other costly behaviors which require more effort and knowledge [23]. In addition, PCE does not always directly predict sustainable behavior [81]. Hence, our reasoning is that PCE first triggers simple behaviors; i.e., not behaviors such as recycling. Thus, we hypothesize that:

Hypothesis 3. *PCE is positively associated with recycling through the behavior of using reusable shopping bags (easier behavior).*

Model

To test the hypotheses about stepped behaviors, we used a simple mediation model estimated first through linear regressions as described by Hayes [82] and then used a generalized structural equation modeling. In this model, we used environmental PCE as an independent variable, the use of reusable bags as a mediating variable, and recycling action as a dependent variable. A mediation model made it possible to assess both the direct, main effect of PCE on recycling behavior and the indirect path of the effect that takes place through the occurrence of the simpler reusing behavior. The relative size of the indirect and direct effects shows the magnitude and meaning of the stepped behavior approach. To make the analysis more pervasive, several sociodemographic variables used in the study of recycling behavior in previous studies (i.e., stage one of research on recycling) were taken as the control variables for this study (e.g., age, gender and household size).

We acknowledge the limitations of estimating a mediation model using cross sectional data [83], but we argue that, in spite of those limitations, our approach is still informative for a number of reasons. First, the main problem of using cross sectional data is the possible misrepresentation of causal processes that longitudinally unfold over time. In our case, our target phenomenon is not longitudinal. We posit that, conceptually, the nature of the stepped process follows an attitude-preference-behavior sequence aligned to notions such as the theory of planned behavior [19] where PCE antecedes increasingly complex behaviors that follow sequentially. However, there may be reverse causalities among the three constituents. For instance, someone who starts carrying reusable bags due to social influence may increase PCE consequently. Hence, we are not claiming that the phenomenon studied here is a causal, longitudinal process that flows from PCE to reuse, and then to recycle. Second, to the best of our knowledge, there have been no studies on recycling behavior that empirically test multiple stage behavioral process. Thus, we claim that testing a mediation model with a large representative cross-sectional sample of consumers offers a completely new perspective on recycling models that should motivate further research. Figure 1 shows the model that sets out the relationship between environmental PCE and recycling behavior, mediated by the behavior of using reusable bags.

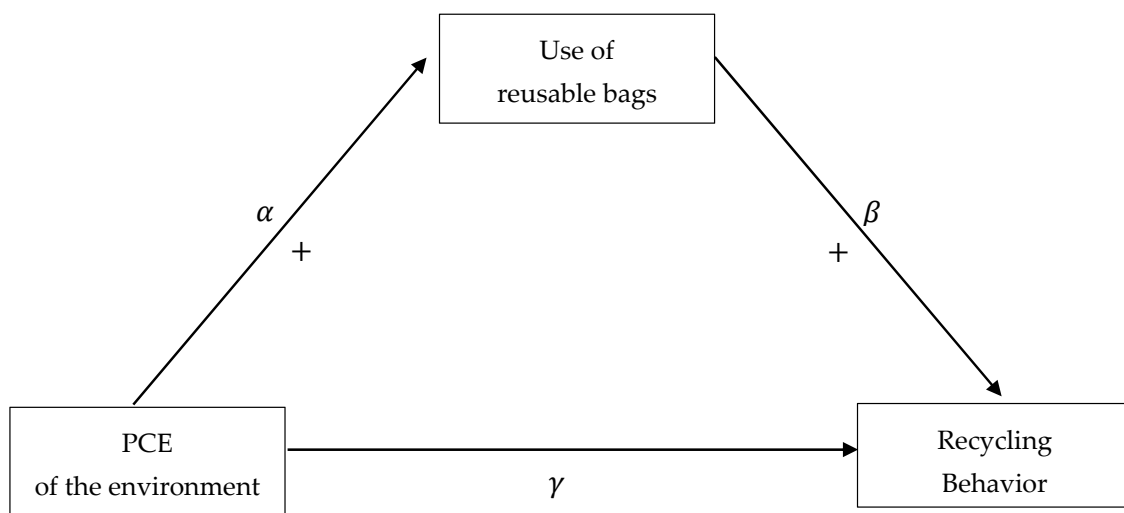


Figure 1. Model of mediation relationship between perceived consumer effectiveness (PCE) and recycling behavior.

3. Methods

Sample, Instruments and Data Collection

We test our hypotheses using a single cross-sectional design. Data were gathered through a survey on sustainable consumption habits and knowledge applied in Colombia at national level (Encuesta Nacional de Sostenibilidad y Biodiversidad, henceforth ENSB). It was a structured direct survey designed by the authors to test several research questions, including the present study. It consisted of face-to-face interviews with a representative sample of 1286 individuals across most regions of the country. It included over 120 questions about biodiversity knowledge, consumption habits, beliefs and opinions about sustainability issues as well as demographic information. Supplementary material 1 contains the full questionnaire. For the purposes of this study, we implemented questions that captured the self-reported frequency of separating organic and recyclable materials at household level, perceived consumer effectiveness (PCE) in the environmental domain and self-reported frequency of using reusable shopping bags. Other questions in the survey provided useful covariates as we will describe in subsequent analyses. Table 1 shows the questions as well as their measurement scale. A professional marketing research firm was hired to conduct data collection using a multi-stage random sampling procedure across the country.

Table 1. Operationalization of variables.

Variable	Items	Scale
<i>Dependent</i> Behavior (recycling)	I separate organic materials from recyclable ones.	4: Very frequently; 1: Never
<i>Independent</i> Environmental PCE	As an individual, I feel I cannot do a lot to care for the environment.	4: Totally agree; 1: Totally disagree
<i>Mediator</i> Behavior (use of reusable bags)	How often do you use reusable bags for shopping?	4: Very frequently; 1: Never

Our choice of measurement instruments for the main variables was mostly based on previous literature. PCE of environmental issues was measured using one of the items developed by Ellen et al. [10] who, based on an extensive review of the operationalization of PCE, showed the discriminant validity of that item (PCE of the environment) from other related constructs such as concern for the environment. Hence, we are using a measure with proven construct validity and reliability for the specific aspect of the underlying construct we are focused on. As it pertains to the

separation of organic and recyclable materials and frequency of using reusable shopping bags, we relied on self-reported behaviors. Due to the size and geographical distribution of the study, it was impossible to gather data on actual behavior. However, although the literature that has compared the relationship between self-reported and actual pro-environmental behaviors has found that self-reported behaviors may overestimate actual behaviors, the underlying common variance of the two variables consistently result in significant correlation [84]. Given that in this study, the focus is on the association of the variables, and not on determining actual levels of recycling and use of reusable bags, the limitations of using self-reports do not affect the validity of analyses and results.

4. Results

Table 2 contains a summary of descriptive statistics for the main variables and demographic information. The descriptive results show that respondents (60% female, 33% single, 76% with ages ranging from 18 to 52 years) perceive that individual actions are not very effective for environmental care (i.e., PCE); on average, they agreed with the statement that they cannot do much to care for the environment (Mean = 2.92, SD = 1.07). To the question on recycling, people answered that they frequently separate organic material from recyclable waste (Mean = 2.90, SD = 1.13). Finally, regarding reusing behavior, people reported using reusable bags to do the shopping, but not very often (Mean = 2.12, SD = 0.92).

Table 2. Descriptive statistics.

Variable	Mean	SD	Observations
<i>Dependent variable</i>			
Recycling behavior	2.90	1.13	1270
<i>Independent variable</i>			
Environmental PCE	2.92	1.07	1273
I cannot do a lot for the environment			
<i>Mediator variable</i>			
Reusing behavior (use of reusable bags)	2.12	0.92	1286
<i>Sociodemographics</i>	Frequency	Percentage	
Age			1285
(18–22)	169	13.2	
(23–27)	153	11.9	
(28–32)	136	10.6	
(33–37)	140	10.9	
(38–42)	124	9.6	
(43–47)	124	9.6	
(48–52)	109	8.5	
(53–57)	91	7.1	
(58–62)	79	6.1	
(63–67)	66	5.1	
(68 or over)	94	7.3	
Gender			1285
Male	509	39.6	
Female	777	60.4	
Marital Status			1286
Single	419	32.6	
Married	350	27.2	
Living together	401	31.2	
Divorced	61	4.7	
Widow/Widower	55	4.3	
Level of Education			1286
Elementary school	296	23.6	
High school	563	44.9	
Technical education	198	15.8	
Undergraduate program	169	13.5	
Postgraduate studies	29	2.3	

Pre-test: We first checked our assumptions about the differences in perceived difficulty between the use of reusable shopping bags and recycling. We conducted a survey with 167 people at a local university, including students, faculty and administrative staff and asked them to rate, on scale of 1 to 7 how difficult it is to “carry and use a reusable shopping bag,” “recycle at home,” and “recycle outside the home.” As expected, recycle was perceived as significantly more difficult ($M_{\text{recycle at home}} = 2.94$; $M_{\text{recycle outside}} = 3.31$; $M_{\text{reusable bags}} = 2.43$; $t_{\text{recycle at home—reusable bags}} = -3.55$; $p = 0.00$; $t_{\text{recycle outside—reusable bags}} = -5.36$; $p = 0.00$).

We then estimated the mediation model using SPSS and the PROCESS 2.11 plugin [82], which is based on OLS linear regression. Table 3 shows the results obtained. As we expected, there is a significant relationship between PCE and the use of reusable bags. The effect is negative ($\beta = -0.051$, $p = 0.034$) given that the question that operationalizes PCE is set out in terms of negation. Thus, the use of reusable bags is negatively related to the belief that individual action is not relevant in helping to care for the environment. This supports H1. In addition, there is a positive and significant relationship between the use of reusable bags and recycling behavior ($\beta = 0.146$, $p = 0.00$) validating the spillover hypothesis (i.e., H2). In contrast, the direct effect of PCE in recycling behavior is not significant ($\beta = -0.006$, $p = 0.85$) whereas the indirect effect is significant ($\beta = -0.007$; $LL95\% CI = -0.017$, $UL95\% CI = 0.001$). There seems to be no direct effect between PCE and recycling action, but this relationship seems to be completely mediated by an easier behavior such as the use of reusable bags. This supports H3. Thus, the path towards recycling is influenced by PCE as a trigger for a positive and significant relationship between related behaviors (i.e., spillover between reusing and recycling). With regard to the control variables, only age showed a positive and significant relationship with recycling behavior. Gender and household size did not reveal a significant relationship with the recycling variable.

Table 3. Results of mediation model: mediation relationship between PCE and recycling behavior.

Effects	Coefficient	SE	t	p Values	Bootstrapped 95% Confidence Interval	
					Low Level	Upper Level
Direct effects						
Environmental PCE -> Use of reusable bags	-0.051	0.024	-2.127	0.034		
Use of reusable bags -> Recycling behavior	0.146	0.034	4.236	0.000		
Environmental PCE -> Recycling behavior	-0.006	0.029	-0.190	0.849		
Indirect effects						
Environmental PCE -> Use of reusable bags -> Recycling behavior	-0.007	0.004			-0.017	-0.001
Total effects						
Environmental PCE -> Recycling behavior	-0.013	0.029	-0.442	0.659		
Control variables						
Age	0.042	0.010	4.090	0.000		
Gender	-0.065	0.065	-1.005	0.315		
Household size	-0.004	0.021	-0.180	0.857		

Robustness check: To assess the reliability of the results, we also estimated the mediation model through generalized structural equation modeling with a one-level ordered logit regression model using STATA 16. Ordered logit is used to adjust the analysis to the 4-level scale of the dependent variable (i.e., recycling behavior). To render the estimation comparable to the previous linear model, we included direct paths for age, household size and gender to recycling behavior. The estimation confirmed the result. We found an indirect effect of PCE on recycling mediated by use of reusable shopping bags (Coeff = -0.025 (SE = 0.012), $z = -2.05$; $p = 0.041$), whereas the direct effect was very small and statistically insignificant (Coeff = 0.00 (SE = 0.04), $z = 0.15$; $p = 0.87$). This result reinforces a very strong mediation of reusable shopping bags in the connection between PCE and recycling.

5. Discussion

In this research, we found evidence that supports the notion that recycling is the outcome of interactive processes that involve individuals' beliefs and spillover effects resulting from less complex pro-environmental behaviors. Until now, there has been no account of an integrative approach linking attitudinal and behavioral factors to explain complex pro-environmental behaviors like recycling. Thus, our research contributes to both, the extant literature on recycling behavior and the emerging, but promising literature on behavioral spillover as a mechanism to foster sustainable behaviors. Moreover, our results complement the literature of other fields, such as environmental marketing that have embraced sustainability as part of their theory and practices.

Regarding sustainability literature, we contribute to the understanding of multivariate, indirect-effects models to explain recycling (e.g., through beliefs) [73]. Specifically, we used perceived consumer effectiveness (PCE), as a key attitudinal and motivational variable, in accordance with literature that has emphasized the role of such variables to promote long-term pro-sustainable behaviors [5,6]. Results show that PCE does not act directly as a predictor of recycling behavior; instead, it is related to the use of reusable shopping bags, which, in turn, is related to recycling behavior. We obtained this result by estimating a mediation model using two different econometric approaches, which converged in their result. This approach contrasts to previous studies that have mostly focused only on direct effects between recycling and their predictors. The present work therefore supports that idea that to understand pro-environmental behaviors no one variable acts alone and that it is therefore essential to study the interactions between these variables. Our model offers a novel, replicable approach to model such interaction, including its mechanism (Spillovers) and a criterion for specifying and ordering mediators (complexity).

Our results contribute to the spillover literature. Our finding that reusing bags explained recycling behavior supports theories on spillovers that have stated similarity as one of the key features to favor positive spillover effects between behaviors [15]. In this case, people co-performed behaviors in similar categories (i.e., reusing and recycling) [74]. Moreover, this study adds to the little extant research on the relationship between simple and complex behaviors. Our results portray a model in which perceived effectiveness of individual action in caring for the environment (i.e., Environmental PCE) influences a type of behavior that is more accessible (easy or simple) for the individual, such as the use of reusable shopping bags, which is, in turn, related to the frequency of recycling behavior. From this perspective, acknowledging that pro-environmental behaviors vary in complexity may indicate that individuals adopt them sequentially, prioritizing fewer complex actions that are followed by more demanding actions. This idea also has important implications for intervention strategies and promotion policy that we will detail later.

This study also extends knowledge on the antecedents of spillover effects. Most research on spillovers has identified interventions (e.g., campaigns, incentives) as the drivers of spillovers between behaviors. No study has examined individual differences and beliefs as drivers of spillovers. We found that the perception of effectiveness of individual actions activates a chain of behaviors that facilitates spillover between category-related behaviors. This finding suggests that the perceptions of what an individual can do are key starting points to encourage positive behavioral spillovers. Future research is needed to find new drivers that could be involved in the path towards pro-environmental behaviors through the spillover mechanism. From a behavioral perspective, one of the most salient challenges in the field of environmental sustainability is how to overcome the discrepancies between individuals' attitude and behaviors towards environmental problems [5]. Taking all the previously explained results together, this study provides a new pathway to close the so-called 'attitude-behavior gap'. In the field of green marketing, most research has been focused on testing the effectiveness of persuasive communication in knowledge, motivations and intentions towards a targeted pro-environmental behavior. Future research on this field could involve our findings to test whether the simple to complex spillover mechanism also works in communication contexts. That is, whether the effects of

communication about simple behaviors could have an effect on responses regarding communication about complex ones.

5.1. Limitations

This study was based on an ample, multipurpose survey designed for a broad understanding of patterns of sustainable consumption that reached a representative sample for Colombia. Hence, it was impractical to use long multi-item measures of the main constructs we study (e.g., PCE). The limitation comes from the use of simplified one-item, self-reported measures of PCE, the use of reusable shopping bags and recycling behavior. The development and use of multi-item scales that allows a more nuanced measurement of PCE in the environmental context, as well as wider reports and objective observations of recycling behavior, may be valuable. It follows that this study is informative of the relationships among these variables. The actual prevalence of recycling use of reusable bags may be biased upwards. Moreover, using a survey, involves cross sectional self-reported information. Future research may use behavioral interventions and behavioral variables in order to further decompose the factors that influence their adoption or lack thereof. As such, we set out the possibility to make future measurements through experimental methods.

We tested a model in which a simple pro-environmental behavior (i.e., reusing) was set as a mediator in the relationship between beliefs (i.e., PCE) and a target complex behavior (i.e., recycling). This is a simplification of a possible system of multiple attitudes and behaviors that vary across complexity. Nonetheless our findings open a research agenda on the analysis of stepped behavior using longitudinal designs, for which it would be worth both confirming the present results on reusable bags and studying the mediating role of other pro-environmental behaviors that vary in complexity. Future research on the characteristics of each behavior (e.g., complexity) could also be relevant to identify how behaviors could also act as explanatory or mediator variables. These roles may provide clues on how to motivate the adoption of recycling behavior based on different routes (e.g., mediation, moderation). Future research may also be devoted to finding contextual, individual level facilitators, like PCE, that could be involved in shaping multiple behavioral paths towards pro-environmental behaviors through the spillover mechanism. The study of these factors could improve future interventions, strategies and policies to promote the adoption of pro-environmental behaviors.

Finally, this study coincides with existing literature that it is essential to understand the interactions among predictive variables in order to have a complete understanding of recycling behavior. In future studies, the linkage of other pro-environmental behavior and other attitudinal variables in relation to recycling behavior may contribute to completing the picture and developing adoption mechanisms that guide consumption strategies and policies towards environmental sustainability.

5.2. Managerial Implications

Recycling is an important issue in several domains. Besides the environmental impact, public organizations face social and economic demands due to improper waste management, and companies gain competitive advantages thanks to proper waste handling (e.g., circular economy models). Both, public and private organizations, need to maintain their efforts to promote recycling behavior as the starting point. Thus, our findings on the interaction between individuals' beliefs (i.e., PCE) and the spillover mechanism of reusing-recycling behaviors, have important implications for public policy and business strategy design.

Public organizations may take advantage of the synergies we found between reusing and recycling. Because people prefer easy tasks [85], focusing efforts on easier reducing/reusing behaviors may be cost-effective, as long as these simple practices produce positive spillovers on the complex behavior of recycling. Even though our research does not claim to have found causal effects between PCE and waste-related behaviors, we tested that having previous beliefs about the effectiveness of an individual's environmental action is a good way to activate this spillover mechanism. Thus, public campaigns in waste management should be focused on undertaking simple

actions to reduce waste (e.g., using reusable shopping bags) while PCE is emphasized through targeted communications.

Companies may adopt a similar path for their marketing efforts to promote recycling. Based on our research, marketing campaigns could direct their messages towards the adoption of easy behaviors as a strategy to encourage other more complex behaviors. Our results were obtained from waste-related behaviors; nevertheless, marketers may explore easier behaviors related to the complex ones they want to promote in other domains and focus their efforts on such simple actions.

Marketing teams could also take advantage of our results to design the message of their green communications. Our research coincided with previous literature that highlights the importance of emphasizing individual action in achieving environmental goals [35]. Moreover, our findings add a new perspective to improve these green messages. Besides using messages relating to PCE when environmental concern is high [31,37], stressing this belief about the effectiveness of consumers' action could be worth it when the goal of the communication is to promote easy pro-environmental behaviors as initial steps towards more impactful behaviors.

Given the spillover between the use of reusable shopping bags and recycling, companies could go beyond the classical slogan of 'reduce, reuse and recycle' and use the interplay between these behaviors strategically. If using shopping bags is an initial step to recycling, as our results suggest, marketers could use this behavior as an alternative BTL (below the line) media, sometimes more effective and less expensive than conventional media, as a first step in a communication campaign to promote waste management behaviors. Currently, different companies choose reusable shopping bags with sustainability messages as a merchandising branding material without any specific purpose. Knowing that the use of these bags could also encourage recycling, turns them into an attractive marketing tool that may be used more strategically.

The integrative model we proposed in this research offers a novel way to think about the interplay among multiple antecedents of the adoption of recycling behaviors. Subsequent research and applications may extend it to study the adoption of other pro-environmental behaviors and may attempt to test more complex paths using, for instance, serial mediation specifications. As has also been stated in previous research, the most effective behavior change programs involve a combination of strategies [72]. Our research illustrates how such integration of beliefs and behaviors takes place to increase recycling. This integration may also be applied to design mixed, multifaceted interventions in which incentives towards simple reusing behaviors, messages emphasizing perceptions of effectiveness and nudging should build synergy to encourage effective recycling.

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