

RESEARCH

Open Access



# Spillover from past recycling to green apparel shopping behavior: the role of environmental concern and anticipated guilt

Sejin Ha<sup>1\*</sup> and SoYeon Kwon<sup>2</sup>

\*Correspondence: sha5@utk.edu

<sup>1</sup> Department of Retail, Hospitality and Tourism Management, College of Education, Health, and Human Sciences, University of Tennessee, 1215 W. Cumberland Ave., Knoxville, TN 37996-1911, USA  
Full list of author information is available at the end of the article

## Abstract

This study explores catalytic behavior in the context of pro-environmental behaviors by examining the occurrence of spillover that performing recycling behavior promotes the likelihood to engage in green apparel purchases. Additionally, this study incorporates a potential mediator and a moderator, environmental concern and anticipated guilt, respectively, in order to explain the nature of the spillover process. The results of online survey data confirm the development of spillover in consumer behavior that past recycling behavior does spill over into green apparel/fashion product purchase behaviors through one's motivational belief toward the environment, environmental concern. However, anticipated guilt, a motivation factor, does not moderate spillover among pro-environmental behaviors, at least between past recycling behavior and green apparel shopping behaviors. Theoretically, this study contributes to and extends the literature on spillover in pro-environmental behaviors by testing spillover across distinctive pro-environmental behaviors. This study also provides lessons for fashion retail marketers and government agencies in learning the importance of the social and ethical aspects of consumers' green practices, beyond price/quality-based choices. Limitations and future research directions are discussed.

**Keywords:** Spillover, Green apparel shopping, Past recycling, Environmental concern, Anticipated guilt

## Introduction

Given the significance of environmental sustainability in our society, an issue of urgent interest is how to encourage consumers to adopt more environmentally sustainable lifestyles. Clearly, encouraging consumers to execute pro-environmental practices is crucial for achieving a sustainable environment (The World Business Council for Sustainable Development 2008). Indeed, household consumption accounts for more than 60 % of all environmental impacts, and 80 percent of the environmental impacts of consumption are produced during end use (UNEP 2010). This high level of response from a consumer standpoint to successful environmental sustainability has profound implications for consumer choices and behavior. In this regard, research increasingly pays attention to the concept of catalytic behavior, which reflects a spillover effect among diverse pro-environmental behaviors (c.f., Lanzini and Thøgersen 2014; The UK department for environment, food and rural affairs 2008; Thøgersen and Crompton 2009; Truelove et al. 2014).

Environmental behavior represents all sorts of behavior that save materials or energy from the environment (Lanzini and Thøgersen 2014; Stern 2000); pro-environmental behavior is defined as “behavior that harms the environment as little as possible, or even benefits the environment” (Steg and Vlek 2009, p. 309). Catalytic behavior in the context of pro-environmental behaviors means that performing one pro-environmental behavior, such as recycling, leads consumers to adopt other pro-environmental behaviors, such as purchasing green or environmentally-friendly products/services.

Perhaps surprisingly, however, research evidence on spillover in relation to pro-environmental behavior is limited; conceptual discussions have mainly been found (e.g., Thøgersen 1999, 2011; Truelove et al. 2014), but there is still a need for empirical investigation into this phenomenon. So the first research question raised is: *Are pro-environmental behaviors contagious? In other words, does performing one pro-environmental behavior encourage the likelihood that people will perform other such behaviors?*

Another important question that has been less explored in research is what causes the spillover to work. In other words, the mechanisms underlying the spillover of pro-environmental behaviors have not been identified yet. One potential mediator can be individuals’ general (common, cross-situational) motivation underpinning their pro-environmental behaviors (e.g., environmental concern and anticipated guilt) (Thøgersen 1999; Whitmarsh and O’Neill 2010). A second research question arises: *How does one’s general motivation concerning pro-environment practices facilitate spillover from one pro-environmental behavior to other environmentally responsible behaviors?*

In addressing these two research questions, the present study concentrates on two pro-environmental behaviors that fall into different categories: recycling behavior and green apparel purchase behavior. Barr et al. (2005) classified a range of pro-environmental behaviors into three: (1) purchase decisions (shopping, composing, and reuse), (2) habits (water and energy preservation), and (3) recycling. Lanzini and Thøgersen (2014) simplified behaviors in the environmental domain which include green purchasing and other pro-environmental behaviors. As different pro-environmental behavior groups play different roles in consumers’ lifestyles (e.g., socio-demographics, values) and behavior (Barr et al. 2005), types of pro-environmental behaviors associated with spillover need to be considered. Nonetheless, while research on spillover so far has generally discussed different pro-environmental behaviors belonging to the same category (e.g., Whitmarsh and O’Neill 2010), less attention has been paid to the spillover of pro-environmental behaviors across different categories (e.g., recycling contributing to purchase decisions). Thus, the value of this study is to extend the current understanding regarding spillover in pro-environmental behaviors by empirically examining: (1) if spillover occurs among different areas of pro-environmental behaviors (i.e., past recycling behavior and green apparel purchases) and (2) if general cross-situational motivations (i.e., environmental concern as a mediator and anticipated guilt as a moderator) play a role in the spillover effect.

## **Literature review**

### **Two views of spillover phenomena: self-perception theory and cognitive dissonance theory**

The formation of positive spillover (e.g., spillover from past recycling to green apparel consumption) can be explained by self-perception theory (Bem 1972) and cognitive

dissonance theory (Festinger 1957; Thøgersen and Crompton 2009). According to self-perception theory (Bem 1972), people infer their own attitudes and beliefs based on their own behavior. In this respect, performing a certain behavior may explain a general disposition a consumer holds regarding him/herself, which may in turn influence future behaviors. This notion implies that, in the context of consumers' performance of pro-environmental behaviors, if consumers recycle and reuse, this action may lead them to think of themselves as people who do care about the environment. Such pro-environmental beliefs in turn motivate them to create positive spillover by adopting other environmentally beneficial behaviors such as green product/service consumption more actively.

Additionally, Festinger's (1957) cognitive dissonance theory posits that people have a strong tendency to seek consistency in their cognitions (e.g., perceptions, attitudes) and behaviors. This theory also suggests that when a discrepancy in cognitions or behaviors occurs, this discrepancy, called cognitive dissonance, creates feelings of disturbance and discomfort (e.g., uncomfortable arousal), at least under certain circumstances. Therefore, people tend to avoid or diminish possible cognitive dissonance by making their thoughts, attitudes, and actions consistent. Accordingly, in the pro-environmental behavioral context, it is likely that people act congruently across diverse pro-environmental behaviors so that they maintain consistency in their perceptions of and attitudes toward the environment and/or environmental sustainability, minimizing the occurrence of cognitive dissonance.

Research in the psychology and marketing literature has demonstrated positive spillover across pro-environmental behaviors such as recycling, carbon offsetting, waste prevention, and green product choice behaviors (Cornelissen et al. 2007, 2008; Stern 2000; Thøgersen 2004; Thøgersen and Ölander 2003, 2006; Whitmarsh and O'Neill 2010). Experimental studies have shown that cognitive dissonance can cause environment-significant adjustments in behaviors (e.g., Aitken et al. 1994; Dickerson et al. 1992; Kantola et al. 1984). More recently, in meta-analysis research, Klöckner (2013) has identified habits as critical predictors of environmental behavior. Thøgersen (2004) has explained that the significant correlation between recycling and buying organic food is accounted for by the desire to avoid inconsistency in behavioral patterns. In a study developing a conceptual framework of spillover of pro-environmental behaviors, Truelove et al. (2014) has explained that divergent consequences of spillover effects (i.e., positive, negative, or no spillover) are due to the decision mode which people engage into initiate a pro-environmental behavior. Three decision modes suggested are calculation-based (stemming from the estimate of cost-benefit ratio), affect-based (derived from negative or positive emotions elicited from the decision context), and role-based (laden with a social role and rules of conduct associated with the decision context) decisions. In brief, the framework states that a role-based decision mode leads to positive spillover (one pro-environmental behavior enhances the likelihood of other pro-environmental behaviors) through identity reinforcement while a calculation-based and an affect-based decisions tend to result in no spillover and negative spillover (one pro-environmental behavior reduces the likelihood of additional pro-environmental behaviors), respectively.

Taking into account these two theoretical perspectives, the present study predicts the activation of spillover among different pro-environmental behaviors. Two different

pro-environmental behaviors of interest in this study are past recycling behavior and green apparel purchases.

### **Environmental concern as a mediator**

When spillover occurs, a question worthy of in-depth exploration is what factors facilitate spillover from one behavior to another behavior. Previous research examining spillover in pro-environmental behaviors has suggested various mediators such as general pro-environmental values and goals (e.g., social labeling, personal norm, social norm), skills and knowledge, self-efficacy, and pro-environmental motivation (e.g., pro-environmental identity) (Cornelissen et al. 2007; Thøgersen 1999, 2011; Whitmarsh and O'Neill 2010); this study focuses on role of an individual's motivation concerning pro-environmental practices as a mediator in the spillover as applied by self-determination theory.

Self-determination theory (Deci and Ryan 1991, 2000) views motivation as a driving force that enables people to act effectively and responsibly. Broadly, the theory identifies two types of motivation including internalized motivation and externalized motivation. Internalized motivation is activated when people act either because the behavior is enjoyable and challenging (intrinsic motivation) or because they endorse the values underlying the behavior (identified motivation). Non-internalized motivation, on the other hand, works when people act mainly due to either the expectation to receive a reward (external motivation) or the desire to avoid feeling guilty (introjected motivation) Deci and Ryan (1991, 2000). This theory further suggests internalized motivation and non-internalized motivation influence people differently; people demonstrate a behavior to a greater extent when they perceive that the motivation to do it comes from themselves rather than from an external, controlling cause.

Clearly, many pro-environmental behaviors (e.g., sorting and recycling materials, purchasing organic/environment-friendly products over conventional products) involve internalized motivation by which individuals volitionally perform behaviors, irrespective of whether they like those behaviors or not (Ölander and Thøgersen 1995). Empirical evidence has supported that internalized (self-determined) motivation inspires people to adopt environmentally responsible practices (Osbaldiston and Sheldon 2003; Pelletier et al. 1998; Thøgersen and Ölander 2003, 2006). More specifically, Thøgersen and Ölander (2003, 2006) suggested that spillover of pro-environmental behaviors is possible through the activation of common motivational causes pertaining to the environment (e.g., environmental concern). This study proposes environmental concern as a mediator which intervenes in spillover.

Environmental concern is defined as a global attitude toward improving the environment (Bamberg 2003; Crosby et al. 1981; Minton and Rose 1997; Ziao and McCright 2015; Zimmer et al. 1994). Environmental concern builds on the assumption that people perceive themselves as a central part of nature (Crosby et al. 1981), and such belief that one coexists with the environment has impact on pro-environmental behaviors (e.g., recycling) as a direct predictor (Schultz and Oskamp 1996) as well an indirect determinant (Bamberg 2003; Kilbourne and Pickett 2008). Bamberg (2003) examined consumers' information acquisition about green electricity products and providers and discussed that environmental concern indirectly influences pro-environmental behaviors by contributing to the generation of situation-specific beliefs (i.e., normative,

behavioral, and control beliefs) and by moderating the interplays among social norm, attitude, behavioral intention, and actual behavior. Further, Kibourne and Pickett (2008) proposed environmental concern as a psychological mechanism that predicts environmental beliefs leading to behaviors.

The stronger the values or beliefs an individual holds, the more the individual will behave consistently as desired in different domains (Thøgersen and Ölander 2003). That is, one's performance of something can evoke their general positive attitude towards the focal object, and this attitude functioning as a motivational force (action-based motivation) will uphold similar behavior changes and maintenance. Applying this to the pro-environmental behavioral context, when current or previous experiences with pro-environmental behavior (past recycling) may provoke a consumer to be more concerned about the environment and/or environmental issues. Then, the stronger environmental motivation will spread the consumer's performance of recycling to others, such as consumption-related pro-environmental settings (green product consumption). Accordingly, we predict that performing past recycling behavior will increase environmental concern which in turn leads to green apparel shopping behavior.

*H1* Environmental concern mediates the spillover from one pro-environmental behavior (past recycling behavior) to other pro-environmental behaviors (green apparel purchases). More specifically, increased environmental concern derived from performing recycling will increase the likelihood that consumers will engage in more pro-environmental behaviors.

#### **Anticipated guilt as a moderator**

Guilt represents an "unpleasant emotional state associated with possible objections to his or her actions, inactions, circumstances, or intentions" (Baumeister et al. 1994, p. 245). Guilt is a subjective emotional feeling drawn from a consumer's recognition that he/she has failed to accomplish something or has offended internal personal or social moral values (Dedeoglu and Kazançoglu 2010; Watson and Spence 2007). When someone views an action, situation, or intention as going against what is anticipated and/or as resulting in undesirable outcomes, the person feels guilty (Watson and Spence 2007). Research in psychology and marketing disciplines has investigated guilt from various angles, including its antecedents (e.g., failure at duties, self-regulation, dishonesty, sense of responsibility or control) (Keltner and Buswell 1996; Smith and Ellsworth 1985) and outcomes (e.g., seeking control over the consequences, taking corrective actions) (Ferguson and Stegge 1995; Lindsay-Hartz 1984) in guilt-laden consumption (e.g., impulse buying, overspending, compulsive consumption) and guilt-related marketing contexts (e.g., rewards programs, advertising) (c.f., Dahl et al. 2003). In the context of pro-environmental behaviors, guilt means a consumer's negative emotional state caused by the discrepancy between his/her knowledge that he/she should behave pro-environmentally and his/her recognition that he/she does not.

While guilt primarily corresponds to an emotion, anticipated guilt represents cognition as it often is conceived as a motivational belief (e.g., Lindsey 2005; Lindsey et al. 2007). Anticipated guilt refers to concerns about experiencing unpleasant feelings in the

future (Baumeister et al. 2007; Lindsey, 2005). The cognitive approach to anticipatory guilt has been confirmed in research studies investigating consumers' ethical decision making (Steenhaut and Kenhove 2006) and pro-social altruistic behavior (e.g., Lindsey 2005; Lindsey et al. 2007). In this study, anticipated guilt is considered one's motivational belief toward being environmentally responsible and is defined as beliefs about experiencing negative feelings when one thinks about the current environment and current practices and policies pertaining to the environment (Osbaldiston and Sheldon 2003).

Generally, people are regret-averse and try to avoid and regulate their regrets (Zeelenberg and Pieters 2007) and research shows anticipated guilt plays an important role in ethical-decision making (e.g., Steenhaut and Kenhove 2006). Osbaldiston and Sheldon (2003) also speculate that a person's motivation to ease feelings of guilt which happen when he/she fails to support environmentally responsible practices can encourage him/her to support desired behaviors. People who have strong beliefs about whether or not feelings of guilt will follow from environmentally harmful actions may easily bind their beliefs to pro-environmental performance such that spillover from one pro-environmental behavior to others would be more tightened. On the contrary, people with low anticipated guilt toward the environment will be less likely to work for the consistency across pairs of pro-environmental behaviors. Thus, we propose anticipated guilt as a moderator in spillover.

*H2* Anticipated guilt toward the environment strengthens the relationship between (a) past recycling behavior and green apparel shopping behavior and (b) past recycling behavior and environmental concern.

## Methods

In order to test proposed hypotheses, a web-based survey was administered. All measures of research variables were adopted from previous studies. With respect to spillover of pro-environmental behaviors this study focuses on two distinctive types of pro-environmental behaviors (Barr et al. 2005): (1) past recycling behavior and (2) green apparel purchases featuring one's apparel product purchase behavior in relation to pro-environmental marketing practice. The survey contained a series of questions designed to tap three areas: (1) respondents' pro-environmental behaviors including past recycling behavior and green apparel shopping behavior (purchases of environmentally friendly apparel/fashion products and apparel/fashion products made of recycled materials), (2) general pro-environmental motivation variables including pro-environmental concern and anticipated guilt, and (3) demographic information. Along with a brief introduction about the study, the definition of product reuse and recycling was provided as follows:

*Throughout this survey, product "reuse" refers to the return to use of complete products when possible and "recycling" refers to the processing of differentiating collection and refusing disposal of consumable items for recovery of materials or energy.*

Past recycling behavior captured the extent to which respondents differentiated collection and reuse/recycle products in the past 3 months using a 3-item scale from Kidwell and Jewell (2008). Using two items adopted from Kilbourne and Puckett (2008),

pro-environmental product purchase behaviors were captured in terms of (1) respondents' buying of environmentally friendly apparel products whenever possible and (2) respondents' buying of organic apparel product made from recycled materials whenever possible. General pro-environmental motivation was measured in terms of (1) environmental concern and (2) anticipated guilt. Both environmental concern (6 items) and anticipated guilt (3 items) were measured using scales from Kilbourne and Puckett (2008). All measures, continuous variables, were measured on a 7-point scale (Table 1).

Participants were recruited from members of a consumer panel provider in the U.S. Invitation emails were distributed to those aged 18 years or older living in the U.S. through an independent sampling solution provider. The survey was initially sent out to 10,000 individuals. A total of 743 individuals opened the link (click-through rate = 7.43 %) and 561 of them completed the survey (response rate = 5.61 %). The data screening process resulted in 462 responses usable for data analysis.

The mean age of the respondents was 47 years old ranging from 18 to 88, and 52.6 % were female. The sample was made up of 84.3 % Caucasians and 48.4 % with a 2-year or higher college degree. With respect to annual house income, 30.4 % were less than \$30,000; 30.9 % were between \$30,000 and \$60,000; and the rest were higher than \$60,000.

**Table 1** Confirmatory factor analysis

Factors/items	Factor loading	Construct reliability	Cronbach's alpha
Past recycling behavior		.98	.98
In the past 3 months, I engaged in product reuse and recycling ( <i>Not at all—very many times</i> )	.913		
How often have you done product reuse and recycling in the past 3 months? ( <i>Never—frequently</i> )	.945		
During the past year, I have engaged in product reuse and recycling ( <i>Never—frequently</i> )	.951		
Environmental concern ( <i>Strongly disagree—strongly agree</i> )		.92	.93
I am very concerned about the environment	.848		
Humans are severely abusing the environment	.869		
I would be willing to reduce my consumption to help protect the environment	.842		
Major political change is necessary to protect the natural environment	.770		
Anti-pollution laws should be enforced more strongly	.841		
Anticipated guilt ( <i>Strongly disagree—strongly agree</i> )		.92	.92
Because I am not politically more engaged in environment protection activities, I feel guilty	.913		
Because I do not give up more things I do to protect the envi- ronment, I feel guilty	.945		
Because I pollute the environment, I feel guilty	.801		
Green apparel shopping behavior ( <i>Strongly disagree—strongly agree</i> )		.73	.72 <sup>a</sup>
I buy of environmentally friendly apparel products whenever possible	.752		
I buy of organic apparel product made from recycled materials whenever possible	.763		

<sup>a</sup> Pearson's correlation coefficient

## Results and discussion

Data analyses were conducted in two phases. First, to test the proposed measurement model, confirmatory factor analysis (CFA) was performed with maximum likelihood estimation of the covariance matrix (AMOS 18.0). Second, regression analysis was performed to test the proposed hypotheses (IBM SPSS Statistics 23).

### Measurement model

CFA was performed to establish the fit of the measurement model for structural analysis. The CFA result of a model with all indicators indicated that one item of environmental concern construct and the shared error variance between environmental concern and anticipated guilt to be problematic. As a result, the environmental concern item was removed and the environmental concern and anticipated guilt variables were modeled to be covaried between their errors. The final model exhibits acceptable fit ( $\chi^2 = 155.62$ ,  $df = 59$ ,  $\chi^2/df = 2.64$ ,  $p < .001$ , CFI = .98, TLI = .98, IFI = .98, RMSEA = .060), indicating that the measurement model fits the data well. All coefficients were significant ( $z$ -value  $> 7.32$ ). Table 1 provides the items used in the final model, standardized factor loadings, construct reliabilities, average variance extracted (AVE) (Fornell and Larcker 1981), and Cronbach's alpha coefficients. The AVEs of all constructs were above the threshold value of .5, so the convergent validities of all constructs were confirmed (Fornell and Larcker 1981). Also, the AVE of each construct was greater than the shared variances (squared correlation coefficients) between all possible pairs of constructs, providing evidence for discriminant validity (Table 2). Thus, the analyses confirmed high construct validities of all latent constructs.

### Hypotheses testing

Our hypotheses concerned whether the interaction effect of level of anticipated guilt by past recycling behavior on green apparel shopping behavior was mediated by environmental concern. To test this moderated mediation, we used a bootstrapping procedure using the SPSS PROCESS macro (Hayes 2013). Among common approaches of mediated-moderation analysis (e.g., multi-group SEM analysis, Bayesian analysis), we chose the PROCESS because of two reasons: (1) the macro allows computing the indirect effect of anticipated guilt by one pro-environmental behavior (past recycling behavior) on another behavior (green apparel shopping behavior) through environmental concern

**Table 2 Measurement model evaluation**

	Past recycling behavior	Environmental concern	Anticipated guilt	Green apparel shopping behavior
Past recycling behavior	.94	.14	.00	.07
Environmental concern		.70	.19	.44
Anticipated guilt			.80	.09
Green apparel shopping behavior				.57

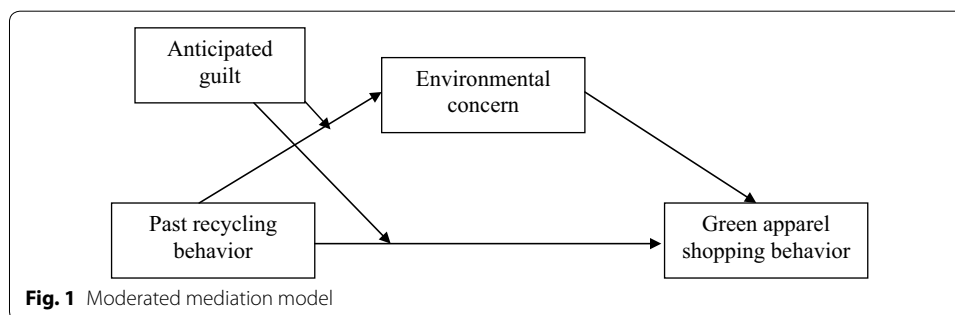
The numbers in diagonal line are the average variance extracted by each construct and the numbers above the diagonal show the squared correlation coefficients between the constructs



by considering the interaction effect of the IV (past recycling behavior) and the moderator (anticipated guilt) on the DV (green apparel shopping behavior), the interaction effect of the IV and the moderator on the mediator (environmental concern), and the main effect of the mediator on the DV *simultaneously* in a single model (Model 8, 5000 bootstrapping samples; see Edwards and Lambert 2007; Preacher et al. 2007) and (2) it is favored to model moderated variable effects as interactions over multi-group analysis when variables are measured as continuous (Bagozzi et al. 1992). By keeping original scores on the moderator variable, the analysis avoids loss of information resulting from converting a continuous variable to a dichotomous one.

First, the mediation effect of environmental concern between past recycling behavior and green apparel shopping behavior is presented in Fig. 1. The results reveal that past recycling behavior had a significant effect on environmental concern ( $B = .28, SE = .05, 95\% \text{ CI} = [.173-.379]$ ), which subsequently predicted green apparel shopping behavior ( $B = .15, SE = .01, 95\% \text{ CI} = [.121-.176]$ ). On the other hand, the direct effect of past recycling behavior on green apparel shopping behavior was found to be non-significant ( $B = .15, SE = .01, 95\% \text{ CI} = [.121-.176]$ ), after controlling for the effect of environmental concern. Consequently, environmental concern fully mediates the past recycling behavior—green apparel shopping behavior association, supporting hypothesis 1.<sup>1</sup>

Next, hypothesis 2 pertains to moderated mediation proposing that anticipated guilt would moderate the relationships that past recycling behavior had on green apparel shopping behavior through environmental concern. Results showed that there was no significant interaction between anticipated guilt and past recycling behavior both on environmental concern and on green apparel shopping behavior. In addition, the confidence interval for the index of moderated mediation included 0 ( $-.002, 95\% \text{ CI} = [-.007, .003]$ ). These results together implied no moderated mediation effect, failing to support hypothesis 2. Rather, the analysis revealed that anticipated guilt was related to environmental concern as a direct predictor instead of as a moderator. The results are presented in Table 3.



<sup>1</sup> To verify the mediation effect, we also ran a traditional mediation analysis suggested by Baron and Kenny (1986). Past recycling behavior predicted green apparel shopping behavior; past recycling behavior predicted environmental concern; environmental concern predicted green apparel shopping behavior; past recycling behavior no longer predicted green apparel shopping behavior after environmental concern was controlled. Full mediation was thus supported. In addition, bootstrapping with AMOS 18.0 (MacKinnon et al. 2007; Mallinckrodt et al. 2006) confirmed the full mediation model (past recycling behavior → environmental concern → green apparel purchases): direct effect (recycling—green apparel purchases) = .02 (ns), indirect effect = .24 ( $p < .05$ ).

## Conclusion

The purpose of this study was to investigate catalytic behavior in the adoption of different pro-environmental behaviors from the spillover perspective. Based on self-perception theory and cognitive dissonance theory, this study posited consistency in consumers' participation in pro-environmental behaviors. Moreover, this study attempted to explore the impact of two motivation variables, as suggested by the theory of self-determination (Deci and Ryan 1991, 2000). Two motivation variables of our interest were environmental concern and anticipated guilt as a mediator and a moderator, respectively. As anticipated, the results showed that consumer behavior associated with recycling does spill over into green apparel/fashion product purchase behaviors through one's motivational belief toward the environment, environmental concern. This finding supported self-perception theory and cognitive dissonance theory by providing empirical evidence on the occurrence of spillover in the consumers' pro-environmental consumption behavior context (e.g., Thøgersen 1999, 2004, 2011; Truelove et al. 2014). Such spillover was further produced through consumers' common motivation rooted in environmental sustainability, specifically, environmental concern. Yet, contrary to the prediction, anticipated guilt, a motivation factor, did not help in heightening spillover among pro-environmental behaviors, at least between past recycling behavior and green apparel shopping behaviors. The finding that an individual's internalized motivation (environmental concern) intervenes spillover between past recycling behavior and green apparel shopping behaviors is in line with the notion of self-determination theory.

The findings in this study imply unique value that extends prior understanding regarding spillover in pro-environmental behaviors. In particular, the finding that environmental concern works as a linkage (i.e., mediator) across different pro-environmental behaviors broadens the existing research perspectives on it. Most extant research on environmental concern, mainly built on the theory of planned behavior (Ajzen 1991), viewed environmental concern as a belief or an attitude which functions a direct antecedent to specific behaviors. Recent research then paid attention to different roles that environmental concern might play and demonstrated its indirect role (i.e., moderator) in controlling the formation of consumers' pro-environmental behavior (e.g., Bamberg 2003). This study adds another role of environmental concern in that, in the context of pro-environmental behaviors, environmental concern mediates a consumer's performance of pro-environmental behaviors across different settings (e.g., recycling translated

**Table 3 Model coefficients for the conditional process model**

Antecedent	Consequent					
	M (Environmental concern)			Y (Green apparel shopping)		
	Coeff.	SE	p	Coeff.	SE	p
X (Past recycling behavior)	.276	.052	<.001	.020	.016	.228
M (Environmental concern)				.148	.014	<.001
W (Anticipated guilt)	.42	.089	<.001	.018	.027	.522
X × W	-.016	.016	.322	-.002	.005	.522
Constant	2.787	.301	<.001	-.265	.098	<.010
	$R^2 = .287$			$R^2 = .286$		
	$F(3, 475) = 63.860, p < .001$			$F(4, 474) = 47.500, p < .001$		

into green apparel purchases). As different roles may be due to how environmental concern is defined (Bamberg 2003), further investigation into environmental concern in more depth may be beneficial.

Additionally, this study shows that spillover occurs across distinctive areas of pro-environmental behaviors (recycling and green apparel purchases) as segmented by Barr et al. (2005). The findings can enrich current understanding of spillover in pro-environmental behaviors by extending its scope from spillover between pro-environmental behaviors belonging to the same category to spillover between distinctive behaviors.

Beyond the theoretical implications, the results also offer guidelines for policy makers in identifying and implementing policy and communication strategies which will foster better environmentally-friendly lifestyles and society. First, pro-environmental behaviors are not independent. Policy and communication strategies which focus on a specific pro-environmental behavior can be effective to persuade people to adopt more pro-environmental activities, thus generating positive spillovers. This perhaps implies that letting people do something, instead of introducing what activity they should do, must be a critical cornerstone for behavioral changes towards environmentally responsible manners. Next, the practical significance of promoting internalized motivation has clearly been observed. Consumers who held strong self-determined motivations toward the environment seemed to spread positive change, in that they were then more likely to perform responsibly, and in turn tended to enhance their intentions to keep on behaving and shopping in environmentally-responsible ways. Public policy and communications should be designed in ways that people drive and strengthen their internal motivation and attitude toward socially responsible living. Doing so will facilitate the transformation of internal motivation and attitude into actual behaviors.

This study will also guide fashion retail marketers and government agencies in understanding the importance of the social and ethical aspects of consumers' green practices, beyond price/quality-based choices. First, having consumers engage in a pro-environmental behavior is a critical first step toward promoting pro-environmental behaviors. In doing so, communications claiming the synergistic value from collaborative works among household consumption, community, and retail industry would be effective for the promotion of greener lifestyles and green product purchases/consumption. Advertising and campaign messages that activate environmental concern and one's obligation to act in pro-environmental ways would be able to encourage spillover—performing one behavior leads people to adopt other pro-environmental behaviors. Additionally, the result about spillover between past recycling behavior and green apparel shopping behaviors can signify the potential contribution that corporate social/environmental performance can make to corporate marketing and financial performance. Corporate virtue and support towards social and environmental responsibility will pay off by affecting customers' choices for green products/services.

There are some limitations to this study, as with any research. Among many, only three environment-friendly activities (past recycling behavior, green apparel purchase, and green apparel use behavior) are examined in this study. Therefore, future research adopting a wide range of environmentally responsible behaviors can extend the results of the present study (e.g., energy saving, water conservation, travel mode choice). In addition, the use of cross-sectional data limits the validity of the findings. In general,

longitudinal analyses can be more appropriate in confirming spillover and causal relationships. Although the theoretical backgrounds and related research were used to alleviate the restrictions, future research using longitudinal analyses would be beneficial to confirm the present research and even to trace the spread of consumers' pro-environmental behaviors. Future research may also examine the comprehensive levels of general motivation toward the environment encompassing intrinsic, identified, external, and introjected motivation, giving consideration to different roles that each motivation plays in mediating catalytic behavior. Related to this, research needs to develop an expanded measure of pro-environmental motivation as this deserves an in-depth investigation as to whether or not behavior-specific and generic pro-environmental motivations work similarly and/or simultaneously. Another observation that warrants additional investigation is if and how anticipated guilt works in spillover phenomenon. Research has presented mixed views regarding its role (mediator or moderator) in spillover and our finding reveals that anticipated guilt has no moderating effect. Additional research is needed to understand the role of anticipated guilt in spillover. Finally, in order to identify boundary conditions, further work should consider possible moderators (e.g., taxonomy of pro-environmental behaviors, pro-environmental identity) that may regulate or facilitate the spillover between behaviors mediated by environmental concern.

#### Authors' contributions

SH designed the research, carried out data collection and analysis. Both SH and SK developed the literature review and drafted the manuscript. Both authors read and approved the final manuscript.

#### Author details

<sup>1</sup> Department of Retail, Hospitality and Tourism Management, College of Education, Health, and Human Sciences, University of Tennessee, 1215 W. Cumberland Ave., Knoxville, TN 37996-1911, USA. <sup>2</sup> Department of Management Information Systems, College of Business & Economics, Korea University, Sejong Campus, 2511 Sejong-ro, Sejong City 339-770, Republic of Korea.

#### Competing interests

The authors declare that they have no competing interests.

Received: 3 July 2015 Accepted: 24 June 2016

Published online: 28 August 2016

#### References

- Aitken, C. K., McMahon, T. A., Wearing, A. J., & Finlayson, B. L. (1994). Residential water use: Predicting and reducing consumption. *Journal of Applied Social Psychology*, 24(2), 136–158.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.
- Bagozzi, R. P., Baumgartner, H., & Yi, Y. (1992). State versus action orientation and the theory of reasoned action: An application to coupon usage. *Journal of Consumer Research*, 18, 505–518.
- Bamberg, S. (2003). How does environmental concern influence specific environmentally related behaviors? A new answer to an old question. *Journal of Environmental Psychology*, 23, 21–32.
- Baron, R., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182.
- Barr, S., Gilg, A. W., & Ford, N. (2005). The household energy gap: Examining the divide between habitual and purchase-related conservation behaviors. *Energy Policy*, 33, 1425–1444.
- Baumeister, R. F., Stillwell, A. M., & Heatherton, T. F. (1994). Guilt: An interpersonal approach. *Psychological Bulletin*, 115, 243–267.
- Baumeister, R. F., Vohs, K. D., DeWall, C. N., & Zhang, L. (2007). How emotion shapes behavior: feedback, anticipation, and reflection, rather than direct causation. *Personality and Social Psychology Review*, 11, 167–203.
- Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1–62). New York: Academic Press.
- Cornelissen, G., Dewitte, S., Warlop, L., & Yzerbyt, V. (2007). Whatever people say I am, that's what I am: Social labeling as a social marketing tool. *International Journal of Research in Marketing*, 24, 278–288.
- Cornelissen, G., Pandelaere, M., Warlop, L., & Dewitte, S. (2008). Positive cueing: Promoting sustainable consumer behavior by cueing common environmental behaviors as environmental. *International Journal of Research in Marketing*, 25, 46–55.

- Crosby, L. A., Gill, J. D., & Taylor, J. R. (1981). Consumer/voter behavior in the passage of the Michigan container law. *Journal of Marketing*, 45, 19–32.
- Dahl, D. W., Honea, H., & Manchanda, R. V. (2003). The nature of self-reported guilt in consumption contexts. *Marketing Letters*, 14(3), 159–171.
- Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska symposium on motivation: Perspectives on motivation* (Vol. 38, pp. 237–288). Lincoln, NE: University of Nebraska Press.
- Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227–268.
- Dedeoğlu, A. Ö., & Kazançoğlu, İ. (2010). The feelings of consumer guilt: A phenomenological exploration. *Journal of Business Economics and Management*, 11(3), 462–482.
- Dickerson, C. A., Thibodeau, R., Aronson, E., & Miller, D. (1992). Using cognitive dissonance to encourage water conservation. *Journal of Applied Social Psychology*, 22, 841–854.
- Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: A general analytical framework using moderated path analysis. *Psychological Methods*, 12, 1–22.
- Ferguson, T. J., & Stegge, H. (1995). Emotional states and traits in children: The case of guilt and shame. In J. P. Tangney & K. W. Fischer (Eds.), *Self-conscious emotions: The psychology of shame, guilt, embarrassment, and pride* (pp. 281–313). New York, NY: Academic Press.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 8, 39–50.
- Hayes, A. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford Press.
- Kantola, S. J., Syme, G. J., & Campbell, N. A. (1984). Cognitive dissonance and energy conservation. *Journal of Applied Psychology*, 69, 416–421.
- Keltner, D., & Buswell, B. N. (1996). Embarrassment: Its distinct form and appeasement functions. *Psychological Bulletin*, 122, 201–223.
- Kidwell, B., & Jewell, R. D. (2008). The influence of past behavior on behavioral intent: An information processing explanation. *Psychology and Marketing*, 25, 1151–1166.
- Kilbourne, W., & Pickett, G. (2008). How materialism affects environmental beliefs, concern, and environmentally responsible behavior. *Journal of Business Research*, 61, 885–893.
- Klößner, C. A. (2013). A comprehensive model of the psychology and environmental behavior—a meta-analysis. *Global Environmental Changes*, 23, 1028–1038.
- Lanzini, P., & Thøgersen, J. (2014). Behavioural spillover in the environmental domain: An intervention study. *Journal of Environmental Psychology*, 40(December), 381–390.
- Lindsay-Hartz, J. (1984). Contrasting experiences of shame and guilt. *American Behavioral Scientists*, 27, 689–704.
- Lindsey, L. L. M. (2005). Anticipated guilt as behavioral motivation: An examination of appeals to help unknown others through bone marrow donation. *Human Communication Research*, 31, 453–481.
- Lindsey, L. L. M., Yun, K. A., & Hill, J. B. (2007). Anticipated guilt as motivation to help unknown others. *Communication Research*, 34, 468–480.
- MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology*, 58(1), 593–614.
- Mallinckrodt, B., Abraham, W. T., Wei, M., & Russell, D. W. (2006). Advances in testing the statistical significance of mediation effects. *Journal of Counseling Psychology*, 53(3), 372–378.
- Minton, A. P., & Rose, R. L. (1997). The effects of environmental concern on environmentally friendly consumer behavior: An exploratory study. *Journal of Business Research*, 40(1), 37–48.
- Ölander, F., & Thøgersen, J. (1995). Understanding of consumer behavior as a prerequisite for environmental protection. *Journal of Consumer Policy*, 18, 345–385.
- Osbaldiston, R., & Sheldon, K. M. (2003). Promoting internalized motivation for environmentally responsible behavior: A prospective study of environmental goals. *Journal of Environmental Psychology*, 23, 349–357.
- Pelletier, L. G., Tuson, K. M., Green-Demers, I., Noels, K., & Beaton, A. M. (1998). What are you doing things for the environments? The Motivation toward the Environment Scale (MTES). *Journal of Applied Social Psychology*, 28(5), 437–468.
- Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypothesis: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42, 185–227.
- Schultz, P. W., & Oskamp, S. (1996). Effort as a moderator of the attitude-behavior relationship: General environmental concern and recycling. *Social Psychology Quarterly*, 59(4), 375–383.
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 48, 813–838.
- Steenhaut, S., & Kenhove, P. V. (2006). The mediating role of anticipatory guilt in consumers' ethical decision-making. *Journal of Business Ethics*, 69, 269–288.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behavior: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317.
- Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407–424.
- The UK department for environment, food and rural affairs (2008). Science and research projects: exploring catalyst behaviour—EV0508. <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=16384>
- The World Business Council for Sustainable Development (2008). Sustainable consumption: Facts and trends. <http://www.wbcsd.org/pages/edocument/edocumentdetails.aspx?id=142>.
- Thøgersen, J. (1999). Spillover processes in the development of a sustainable consumption pattern. *Journal of Environmental Psychology*, 20(1), 53–81.
- Thøgersen, J. (2004). A cognitive dissonance interpretation of consistencies and inconsistencies in environmentally responsible behavior. *Journal of Environmental Psychology*, 24(1), 93–103.

- Thøgersen J (2011). Spillover of pro-environmental behavior: Generalizing, a license to anti-social behavior, or neither? [http://badm.au.dk/fileadmin/Business\\_Administration/CV/John\\_Thoegersen\\_Spillover-STEEP.pdf](http://badm.au.dk/fileadmin/Business_Administration/CV/John_Thoegersen_Spillover-STEEP.pdf)
- Thøgersen, J., & Crompton, T. (2009). Simple and painless? The limitations of spillover in environmental campaigning. *Journal of Consumer Policy*, 32(2), 141–163.
- Thøgersen, J., & Ölander, F. (2003). Spillover of environment-friendly consumer behavior. *Journal of Environmental Psychology*, 23(3), 225–236.
- Thøgersen, J., & Ölander, F. (2006). To what degree are environmentally beneficial choices reflective of a general conservation stance? *Environment Behavior*, 38(4), 550–569.
- Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenbergh, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change*, 29, 127–138.
- UNEP (2010). Assessing the environmental impacts of consumption and production: Priority products and materials. [http://www.unep.org/resourcepanel/Portals/50244/publications/PriorityProductsAndMaterials\\_Summary\\_EN.pdf](http://www.unep.org/resourcepanel/Portals/50244/publications/PriorityProductsAndMaterials_Summary_EN.pdf)
- Watson, L., & Spence, M. T. (2007). Causes and consequences of emotions on consumer behavior: A review and integrative cognitive appraisal theory. *European Journal of Marketing*, 41(5/6), 487–511.
- Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviors. *Journal of Environmental Psychology*, 30(3), 305–314.
- Zeelenberg, M., & Pieters, R. (2007). A theory of regret regulation 1.0. *Journal of Consumer Psychology*, 17(1), 3–18.
- Zhao, C., & McCright, A. M. (2015). Gender differences in environmental concern: Revisiting the institutional trust hypothesis in the USA. *Environment and Behavior*, 47(1), 17–37.
- Zimmer, M., Stafford, T. F., & Stafford, M. R. (1994). Green issues: Dimensions of environmental concern. *Journal of Business Research*, 30(1), 63–74.

**Submit your manuscript to a SpringerOpen<sup>®</sup> journal and benefit from:**

- ▶ Convenient online submission
- ▶ Rigorous peer review
- ▶ Immediate publication on acceptance
- ▶ Open access: articles freely available online
- ▶ High visibility within the field
- ▶ Retaining the copyright to your article

---

Submit your next manuscript at ▶ [springeropen.com](http://springeropen.com)

---