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From plastic bottle recycling to policy support:
An experimental test of pro-environmental spillover

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Abstract

Little research has investigated the extent to which performance of one pro-environmental behavior (PEB) spills over to increase or decrease support for pro-environmental policies or the mechanisms underlying spillover effects. In this study, 283 U.S. university students were randomly assigned via situational manipulations to either recycle a water bottle, throw the bottle in the trash, or a control condition. All participants then completed surveys assessing environmental identity, guilt, and environmental worry, as well as support for a pro-environmental campus green fund. Results showed evidence for negative spillover among Democrats only, which was mediated by environmental identity: Democrats who recycled the water bottle had lower environmental identities and were less supportive of the green fund than those in the control condition. Neither Republicans nor Independents displayed spillover. The results have implications for those interested in increasing small, easy PEBs in hopes of gaining future support for environmental policies.

Keywords: pro-environmental behavior, spillover, moral licensing, recycling, identity, guilt

1. Introduction

1.1. Background

The climate system is experiencing unprecedented changes (IPCC, 2014a; Melillo, Richmond, & Yohe, 2014). Effects of these changes are currently being felt across the world and are becoming more severe (IPCC, 2014a; Melillo et al., 2014). To avoid catastrophic effects, climate scientists argue that temperatures must not rise more than 2° C relative to the pre-industrial era (IPCC, 2014a). However, only scenarios that include drastic reduction of global greenhouse gas emissions show any promise of stabilizing global temperatures below this threshold (IPCC, 2014a). Meeting this target will likely require a large-scale shift away from carbon-based energy sources; however, many scholars have also recognized that a reduction in energy demand through improvements in efficiency and lifestyle changes will also be needed (IPCC, 2014b).

Despite numerous calls in the U.S. to take action at a national level, legislation to ensure meeting those targets has not been passed. In response, the U.S Environmental Protection Agency began regulating greenhouse emissions of domestic power plants (particularly those that burn coal). Yet, these regulations have been hotly contested by Republicans in Congress (Gardner, 2011), exemplifying the political divide regarding climate change in the U.S. Polls show that even among Democrats, climate change is often ranked as a lesser priority than other policy issues such as hunger and homelessness, unemployment, healthcare affordability, and the economy (Riffkin, 2014). Thus, although there is great need for policy-level change to occur in the U.S. in order to meet worldwide emissions targets, the likelihood of passing climate change legislation in the near future is slim.

Recognizing this problem, researchers have proposed a “behavioral wedge”, a sort of stopgap measure, whereby individual household-level behavior changes can be adopted to help reduce emissions until comprehensive climate policy is enacted (Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009). Several studies have examined the effectiveness of interventions geared toward environment-related behavior change and have made recommendations on the best avenues to change environment-related behavior and resulting greenhouse gas (GHG) emissions (Abrahamse, Steg, Vlek, & Rothengatter, 2005; Bain, Hornsey, Bongiorno, & Jeffries, 2012; Carrico et al., 2011). It has been estimated that, when aggregated at a national level, a behavioral wedge could reduce U.S. emissions by as much as 7% (Dietz et al., 2009).

Although the concept of the behavioral wedge is intuitively appealing, some have suggested that individual behavior change campaigns can actually backfire and lead to less support for policy (Wagner, 2011). Specifically, Wagner (2011) has argued that people who adopt small, individual behaviors (e.g., recycling or changing out light bulbs) then feel they have done their part to solve the problem of climate change. They are, in turn, less inclined to support climate policy, which is arguably more effective than individual behavior at mitigating climate change (Stavins, 2008). Interestingly, little research has directly investigated the effect of performing small pro-environmental behaviors (PEBs) on environmental policy support.

1.2. Pro-environmental Behavior Spillover

Wagner’s (2011) criticism centers on the concept of behavioral spillover, the extent to which performance of a behavior in one domain carries over to increase (i.e., positive spillover) or decrease (i.e., negative spillover) the likelihood of performance of additional behaviors in that domain (Dolan & Galizzi, 2015; Susewind & Hoelzl, 2014; Thøgersen, 1999; Truelove,

Carrico, Weber, Raimi, & Vandenberg, 2014). In line with Wagner's (2011) argument, some researchers have found negative correlations between PEBs (Barr, Shaw, Coles, & Prillwitz, 2010; Weber, 1997), suggesting negative PEB spillover. However, several other researchers have found positive correlations between different PEBs (Berger, 1997; Bratt, 1999; Thøgersen & Ölander, 2006; Thøgersen & Ölander, 2003; Thøgersen, 1999; Whitmarsh & O'Neill, 2010), which may indicate positive PEB spillover.

Only a handful of studies has tested whether PEB correlates with environmental policy support. Specifically, purchasing environmentally-friendly products has been shown to be positively related to support for wind power development and policies supporting social justice (Thøgersen & Noblet, 2012; Willis & Schor, 2012). Further, performance of low cost environmental behaviors were positively correlated with support for climate policies among a Swiss sample (Tobler, Visschers, & Siegrist, 2012). On the other hand, farmers who have taken actions on their farm to adapt to climate change have shown less support for climate change policy (Weber, 1997). Although the correlational studies provide more evidence of positive, rather than negative, spillover between PEBs and policy support, causal conclusions cannot be drawn.

In an attempt to assess causality, some recent scholars have turned to experimental designs (Baca-Motes, Brown, Gneezy, Keenan, & Nelson, 2013; Lanzini & Thøgersen, 2014). In one of the most direct tests of spillover in the environmental domain, Baca-Motes and colleagues (2013) conducted a field study among hotel guests to assess the impact of committing to reduce towel use during their stay on both towel use and light use. They found evidence of positive spillover, with guests who made a specific commitment (vs. a general

commitment) and guests who received a lapel pin upon check in to make their environmental identities salient (vs. those who did not receive a pin) being more likely to reduce both towel use (targeted PEB) and light use (additional PEB) (Baca-Motes et al., 2013). In another recent study, Lanzini and Thøgersen (2014) investigated whether interventions designed to increase green purchasing via monetary or praise-focused interventions spilled over to other pro-environmental behaviors. They found evidence of positive spillover such that the monetary intervention increased green purchasing, which was in turn associated with increases in six of the nine secondary PEBs assessed (Lanzini & Thøgersen, 2014). Even more recently, Steinhorst, Klöckner and Matthies (2015) conducted a field study among German residents on spillover from reducing home electricity use to other environmental behaviors. They found that individuals who received energy saving tips in terms of environmental (CO₂) showed intentions to engage in non-targeted environmental behaviors outside of saving electricity (Steinhorst et al., 2015).

Overall, the evidence for spillover between PEBs seems to lean more toward positive rather than negative spillover. However, as described in more detail below, several experiments investigating spillover between PEB and other related, though non-environmental, behaviors have found evidence for negative spillover, muddying the waters. Additionally, no experimental research could be located that experimentally tested spillover from PEB to pro-environmental policy support. Taken together, these findings illustrate the need for additional experimental research.

1.3. Mechanisms Underlying Pro-environmental Behavior Spillover

Although little experimental research has been conducted to test the existence of spillover effects between PEBs, a relatively large body of psychological research has been drawn upon to theorize when and why PEB spillover effects might occur (for a review see Truelove et al., 2014). Proposed mechanisms assumed to underlie positive PEB spillover relate to identity and the motivation to behave consistently (Thøgersen & Crompton, 2009; Thøgersen & Noblet, 2012; Truelove et al., 2014), while negative spillover is expected to be mediated by moral licensing/guilt and feelings of worry or fear (Truelove et al., 2014). Most of the work testing these mechanisms relates to moral behavior more generally, not necessarily PEB specifically.

1.3.1 Identity

As a core part of one's self-concept, self-identity (how one defines one's self) influences everyday behavior (Fekadu & Kraft, 2001; Sparks & Shepherd, 2012; Terry, Hogg, & White, 1999). When an individual performs an initial behavior that they deem central to their identity, performing an inconsistent subsequent behavior leads to distressful cognitive dissonance, which could theoretically lead to behavioral change (Festinger & Carlsmith, 1959; Freedman & Fraser, 1966). Gneezy and colleagues found evidence of the mediating effects of prosocial identity on spillover between prosocial behaviors (Gneezy, Imas, Brown, Nelson, & Norton, 2012). Specifically, those who performed a costly initial prosocial behavior (compared to a costless behavior or no behavior) displayed increases in prosocial identity compared to the other participants and were, in turn, more likely to carry out a secondary prosocial behavior, demonstrating positive spillover (Gneezy et al., 2012). On the other hand, participants who

performed an initial, costless behavior demonstrated negative spillover, most likely because the easy behavior did not make participants' prosocial identity salient enough to motivate behavior consistency (Gneezy et al., 2012).

People hold multiple social identities (Brewer, 1991) and activation of any number of these identities could theoretically influence PEB spillover (Truelove et al., 2014). Most scholars theorizing about PEB spillover have focused on pro-environmental identity (Whitmarsh & O'Neill, 2010), though political party affiliation also has major relevance for PEBs (McCright, Dunlap, & Xiao, 2014). Therefore, we will examine each in detail.

1.3.1.1 Pro-environmental identity

Specifically within the realm of environmentalism, an individual's environmental values and identity as an environmentalist has been shown to influence PEB performance (de Groot & Steg, 2007; Whitmarsh & O'Neill, 2010). Those who self-identify as environmentalists are more likely to conserve water and energy, engage in pro-environmental consumer behaviors, and reduce their meat consumption (Van der Werff, Steg, & Keizer, 2014b; Whitmarsh & O'Neill, 2010).

Pro-environmental identity is also expected to influence PEB spillover. Engaging in an initial behavior alters or makes salient an individual's identity as an environmentalist, which leads to an increased likelihood that the individual will engage in other behaviors in alignment with this self-perception (Bem, 1967; Cornelissen, Pandelaere, Warlop, & Dewitte, 2008; Van der Werff et al., 2014b).

Evidence for the malleability of environmental identity and its role as a potential mediator of positive spillover effects has emerged from multiple studies (Poortinga, Whitmarsh,

& Suffolk, 2013; Van der Werff, Steg, & Keizer, 2014a; Van der Werff et al., 2014b; Whitmarsh & O'Neill, 2010). A recent field study in Wales found an increase in residents' environmental identity after a fee was implemented for plastic bag use, however this heightened environmental identity did not translate to increased performance of additional PEBs (Poortinga et al., 2013). Other researchers have been able to experimentally increase environmental identity by reminding participants of their previous engagement in PEBs (Van der Werff et al., 2014b). These reminders led to an increase in participants' environmental identities and subsequently increased their likelihood of adopting pro-environmental consumer behaviors and their likelihood of making more pro-environmental judgments in social dilemmas (Van der Werff et al., 2014b). Additionally, environmental self-identity was shown to mediate the relationship between recalling a past PEB (i.e., driving in a fuel efficient manner) and intention to perform a second PEB (i.e., reduce meat consumption) (Van der Werff et al., 2014b). These findings underscore the importance of environmental identity in explaining consistent engagement in pro-environmental behavior.

1.3.1.2 Political party identity

Beliefs about climate change and support for green energy policies have become an increasingly partisan issue in the United States (Dunlap & McCright, 2008; McCright et al., 2014; McCright & Dunlap, 2011). Specifically, Republicans are more likely to be among those who are dismissive or doubtful about climate change (Maibach, Roser-Renouf, & Leiserowitz, 2009), and are in turn among the least likely to perform individual PEBs such as recycling and energy conservation (Costa & Kahn, 2013; Leiserowitz, Maibach, Roser-Renouf, & Smith, 2010). Additionally, Republicans and those who identify as politically conservative are less supportive

of environmental policies and climate change policies than Democrats and liberals (Coley & Hess, 2012; Greenberg, 2004; McCright et al., 2014).

No existing work could be located by the authors that has investigated the existence of PEB spillover effects as a function of political party membership. Considering environmental protection is closer to Democrats' central political identity than that of other political groups' (Dunlap & McCright, 2008; Hamilton & Saito, 2014; McCright & Dunlap, 2011), Democrats should be more likely to exhibit positive PEB spillover. For Democrats, performance of an initial PEB is expected to make their identity as a Democrat salient (Gromet, Kunreuther, & Larrick, 2013; Hart & Nisbet, 2011), which is in turn expected to lead to environmental policy support. On the other hand, Republicans are less likely to view PEB as central to their identity (Gromet et al., 2013; Hamilton & Saito, 2014; Hart & Nisbet, 2011), so performance of an initial behavior is not expected to activate consistency effects. Thus Republicans would be expected to display no PEB spillover or perhaps negative spillover.

1.3.2 Moral licensing

Moral licensing occurs when someone performs an initial pro-social or moral behavior and then feels licensed to act in an anti-social or immoral way (Blanken, van de Ven, & Zeelenberg, 2015; Merritt, Effron, & Monin, 2010). Performance of an initial moral behavior is theorized to boost people's sense of moral self-worth, which in turn lessens their feeling of obligation to help in subsequent requests (and sometimes even increases their willingness to transgress). They feel they have already done their part and are said to be "resting on their laurels" or maintaining a moral balance sheet (Merritt et al., 2010; Thøgersen & Crompton, 2009).

Considering PEB is often framed as a moral behavior that is motivated by personal moral norms (Stern, 2000), several researchers have drawn on the moral licensing literature to explain negative PEB spillover effects. Although some moral licensing researchers have tested PEB as one of the two behaviors in their studies, no research has been located that investigates the existence of moral licensing effects between two PEBs. Mazar and Zhong (2010) found that after engaging in a shopping simulation in which they “purchased” products marketed as ecologically friendly, individuals were more likely to cheat and steal compared to their counterparts who purchased conventional products. The authors attributed this effect to an enhanced moral capital after engaging in the initial PEB that led to the licensing of later transgressions (Mazar & Zhong, 2010). Similarly, Karmarkar and Bollinger (2015) found that people who imagined bringing reusable grocery bags to the store were more likely to report they would buy a sweet indulgence at checkout, especially if they attributed bringing the bags to themselves rather than a requirement by the store. Other research has also investigated the role of moral licensing between behavior and policy support. Reminding individuals of their previous pro-social actions reduces the likelihood of supporting a local anti-pollution policy (Sachdeva, Iliev, & Medin, 2009). However, attempts to replicate this finding with different samples were not successful (Blanken, Van De Ven, Zeelenberg, & Meijers, 2014).

Although boosted feelings of moral self-worth (via moral licensing) are assumed to underlie negative spillover, little research has actually tested whether moral self-worth mediates the relationship between performance of sequential moral behaviors. One study demonstrated that virtuous behaviors lead to increased feelings of moral self-worth, which then lead to increases in subsequent immoral behavior (Khan & Dhar, 2006). However, Khan

and Dhar's (2006) study did not assess PEBs. Further, no work could be located that tested guilt as an explanation of the moral licensing effect among PEBs or other behaviors. Performance of an initial PEB has been theorized to lower feelings of guilt about one's contribution to environmental problems, which, in turn, may lead to lower likelihoods of performing additional PEBs (Truelove et al., 2014). It has been shown that people intend to perform PEBs in order to assuage negative emotions about the environment, such as guilt (Bamberg & Möser, 2007). Specifically related to recycling, those who are more motivated by guilt in performing PEBs recycle more compared to others (Koestner, Houliort, Paquet, & Knight, 2001). Thus, in the absence of guilt people may be less motivated to take environmental action. An important unanswered question we aim to answer in the present study is to what extent guilt can explain negative PEB spillover effects.

1.3.3 Single-action bias

A final explanation that has been proposed for negative spillover effects relates to worry about or fear of environmental problems (Truelove et al., 2014). Single-action bias occurs when individuals perceive less risk after a single mitigation action is taken and, therefore, become less likely to engage in additional ameliorative actions, even when those actions could be helpful (Weber, 1997). Similarly, an individual who performs one PEB to mitigate environmental problems, may then feel that the risk has been effectively minimized, leading to a reduced motivation to perform additional PEBs in the future (i.e., negative spillover).

Very little research has investigated the role of decreased worry about environmental problems resulting from PEB performance as an explanation for negative spillover. One group of researchers found that farmers demonstrated single action bias in their farming decisions

related to climate change (Weber, 1997; Hansen, Marx, & Weber, 2004): farmers who adopted practices on their farms to reduce climate risks were less supportive of policy to curb carbon emissions. Additional research is needed to test the viability of worry about environmental risks as an explanation of negative spillover effects.

1.4 Present Study

The present study was designed to fill two major gaps in the literature. First, we aimed to experimentally test whether spillover occurs between PEB and environmental policy support. Although some research has been conducted on PEB spillover, most of it is correlational in nature or is marred by inconsistent results. No previous work could be located by the authors that directly tested the effect of performing small green behaviors on support for environmental policy. Second, we sought to test the competing theories about the potential mediators involved in PEB spillover. Although identity, guilt, and worry have been proposed as explanations of spillover effects, little work has directly tested these relationships and none that could be located by the authors have done so when investigating PEBs.

To experimentally examine PEB spillover and its mechanisms, we created a situation in the laboratory where participants were nudged to perform an initial, easy PEB (recycling a plastic water bottle) or an initial environmental transgression (throwing a recyclable plastic water bottle in the trash), compared to control participants who were not asked to dispose of a water bottle. After this behavior, we measured levels of environmental identity, guilt, moral self-worth, and worry about climate change. Finally, we assessed participants' support for an environmental policy initiative (a proposal to raise tuition to support an on-campus green fund).

Because the initial behavior (recycling) is relatively easy and costless, we expected to find evidence of negative spillover onto policy support in line with findings by Gneezy and colleagues (2012) who found negative spillover following easy, costless behaviors (**H1**). We also expected that Democrats would be more supportive of the green fund than Republicans or Independents (**H2**) due the polarization of environmental concern and Democrats' greater support for environmental policies (Hamilton & Saito, 2014; McCright, Dunlap, & Xiao, 2013; McCright & Dunlap, 2011). Along these lines, we further expected that Democrats would display a small amount positive spillover from recycling to policy support (**H3**) due to identity effects (Clayton, 2003; Hamilton & Saito, 2014; Whitmarsh & O'Neill, 2010) that might temper and overwhelm the effect of the costliness of the behavior. We also expected that Republicans would exhibit negative spillover (**H4**) as they would be more likely to attribute their initial recycling behavior to the situation (Pittman, 1975; Zanna & Cooper, 1974) rather than to their role as an environmentalist (Truelove et al., 2014), which is at odds with their political party affiliation. Finally, we expected that environmental identity would mediate positive spillover (**H5**) and guilt (**H6**) and worry (**H7**) would mediate negative PEB spillover as proposed by Truelove et al. (2014).

2. Method

2.1. Participants

Two hundred and eighty-three undergraduate psychology students at a southeastern university participated in the study in exchange for extra credit. Participants were recruited from the psychology department subject pool. We removed 28 participants from the analyses for correctly guessing the true purpose of the study and 24 participants for failing the

manipulation check (as described in more detail below in section 2.2). The final sample ($N = 231$; 181 women) included mostly White participants (71.9%), with the remaining participants categorizing themselves as African-American (13.4%), Asian (6.1%), Pacific Islander (1.3%), American Indian or Alaska Native (.4%), other (6.1%), or missing (0.9%). The sample's age ranged from 20 to 54 years old with an average age of 24.4 ($SD = 5.1$) years old. Participants identified as members of the following political parties: Democrat (31.7%), Republican (22.6%), and Independent or other (45.4%), with one participant not identifying a party. In terms of annual family income, 18.6% reported incomes less than \$25,999, 27.3% between \$25K and \$49,999, 33.3% between \$50K and \$99,999, and 20.8% above \$100,000. Although the sample was drawn from the psychology department subject pool, we had a wide range of majors and class standing with 53% psychology majors, 21.2% freshman, 13% sophomores, 34.6% juniors, and 28.6% seniors, with 2.6% other. For comparison, the university has approximately 14,000 undergraduate students, with 56% female and 72% who identify as White.

2.2. Procedure

Participants were randomly assigned to one of three groups (two experimental groups and a control group). In the experimental groups, participants entered the lab at the same time as the experimenter and encountered a messy desk in the lab with papers and a clipboard strewn about as well as an empty plastic water bottle. The experimenter apologized for the mess and assured the participant that she would clean it up right away. As the experimenter began to clear the desk, she asked the participant if she would please assist in cleaning the mess by tossing the water bottle in the bin in the hall. The water bottles were surreptitiously marked with a number corresponding to the research participant. The experimental conditions

then differed based on where and what type of bin was placed in the hall. For the recycling condition, there were recycling and trash receptacles located side-by-side about 30 feet from the lab, around the corner in the usual place designated by the university. We placed a sign above the recycling bin stating that this university encourages recycling. For the trash condition, we placed a second trash receptacle immediately outside the lab. We staged the second trash bin with other materials, including some recyclable items such as white printer paper and a larger size plastic water bottle, to encourage throwing the bottle away in the trash bin. To minimize external attributions, participants in the experimental conditions were never told in which bin to place the water bottle, only to “toss” the bottle. In the control group, there was also a messy desk, but no water bottle was present and participants were not asked to assist the experimenter. Instead participants waited until the experimenter straightened up the desk. Then all participants began an on-line survey which consisted of measures of several constructs including environmental self-identity, guilt, moral self-worth, and global warming worry. The experiment took approximately 40 minutes to complete.

After the completion of the study, the researcher noted the location (trash vs. recycling bin) of the tossed water bottle to be certain it corresponded with the appropriate condition. In total, 24 participants (17 in the trash condition and 7 in the recycle condition) tossed the water bottle in the unintended bin. These participants were removed from the analyses.

2.2.1. Measures

The items used in this study were part of a larger project investigating pro-environmental attitudes, beliefs, and behavior. The environmental self-identity scale was adapted from Whitmarsh and O’Neill (2010) and included six items that were averaged to

create the scale ($\alpha = .78$; Table 1). Guilt was measured with six items embedded in the Dissonance Thermometer scale (Devine, Tauer, Barron, Elliot, & Vance, 1999; Elliot & Devine, 1994). All items loaded on one factor (all loadings $> .561$) in an exploratory factor analysis (EFA) with principal axis factoring and oblimin rotation. The factor score was used as the guilt scale ($\alpha = .89$). The global warming worry scale (Table 1) was formulated from five items adapted from Leiserowitz (2006) that generated a one-factor solution in an EFA with oblimin rotation and principal axis factoring (all loadings $> .598$). The factor score was used as the global warming worry scale ($\alpha = .76$), with lower scores representing more worry about global warming. Moral self-worth was measured with the following statement, "I am moral" on a scale from 1 (strongly disagree) to 7 (strongly agree) [please see Footnote 1 for an alternative measure of moral self-worth that yielded similar results]. Next participants read a short description of a proposal for an on-campus green fund to assist in maintenance of an on-campus preserve (PEB2; Table 1).

Participants also answered demographic questions for which they identified their sex, race, age, year in college, total family income, college major, fiscal conservatism (a one item measure assessing their political orientation on financial and economic issues), social conservatism (a one-item measure assessing their political orientation on social issues), and political party affiliation. The fiscal and social conservatism items were both measured on a 7 point scale, 1 (liberal) to 7 (conservative), and were averaged to create a Conservatism Score ($\alpha = .66$). For political affiliation, participants self-identified as Democrat, Republican, Independent, No affiliation, No preference, or other. We collapsed the latter four categories into an "Independent" group resulting in three political groups: Democrats, Republicans, and Independents. Evidence for the validity of the political party identification comes from a one-

way ANOVA conducted on the Conservatism Score across political parties. We found a significant effect of political party on conservatism, Welch statistic (2, 119.17) = 42.67, $p < .001$. Games-Howell post hoc tests revealed that Democrats ($M = 3.04$, $SD = 1.07$) were significantly less conservative than Republicans ($M = 4.98$, $SD = 1.23$), $p < .001$, and Independents ($M = 3.63$, $SD = 1.01$), $p = .001$, who were in turn significantly less conservative than Republicans, $p < .001$.

Table 1
Key survey items and response options

| Survey Items | Response Range |
|--|---|
| Environmental Self Identity (adapted from Whitmarsh & O'Neill, 2010) | |
| I think of myself as an environmentally-friendly consumer | |
| I think of myself as someone who is very concerned with environmental issues | |
| I would be embarrassed to be seen as having an environmentally-friendly lifestyle* | |
| I would not want my family and friends to think of me as someone who is concerned about environmental issues* | 1 = strongly disagree; 7 = strongly agree |
| To engage in environmentally-friendly behavior is an important part of who I am | |
| I am not the type of person oriented to engage in environmentally-friendly behavior* | |
| Guilt (Adapted from Devine et al., 1999 and Elliott & Devine, 1994) ("To what extent do you feel the following feelings right now ") | |
| Guilt | |
| Disappointed with myself | |
| Annoyed with myself | 1 = does not apply at all; 7 = applies very much |
| Angry with myself | |
| Dissatisfied with myself | |
| Disgusted with myself | |
| Global warming worry (adapted from Leiserowitz, 2006) | |
| How personally worried: Global Warming | 1 = very worried; 5 = not at all worried |
| Do you think the effects of global warming will be | 1 = catastrophic; 7 = beneficial |
| How serious do you think global warming is to non-human animals* | |
| How serious do you think global warming is to Humans* | 1 = not at all serious; 3 = serious |
| How serious are the current impacts of global warming around the world* | |

Moral self-worth

I am moral

1 = strongly disagree;
7 = strongly agree**Policy support**

As you may know, [school name] has a nature preserve on campus known as the “[school fund name]”. The [school fund name] Preserve is 382 acres and is located on the [location of preserve on campus]. The preserve can never be developed with buildings or roads and will stay as a forested area in the future. Students use the preserve to hike and view wildlife.

Funds are needed to maintain and restore certain parts of the [school fund name] and a “green fund” has been suggested as a potential way to provide funds to maintain the preserve. In the green fund, each [School name] student would be required to pay an additional \$20 each academic year on top of tuition to maintain the [school fund name].

1 = strongly oppose;
7 = strongly support

How much do you support or oppose the \$20 per student campus green fund to maintain the [school name] nature preserve?

*reverse scored

3. Results**3.1. Test of Main Hypotheses**

We conducted a 3 (experimental condition: recycling, trash, control) x 3 (political party: Republican, Democrat, Independent) between-subjects ANOVA on support for the green fund to test our main hypotheses that negative spillover would occur (H1), that Democrats would be more supportive of the green fund (H2) and more likely to display positive spillover (H3), and that Republicans would exhibit negative spillover (H4). Overall, the main effect for experimental condition was significant, $F(2, 220) = 3.49, p = .032$, while the main effect for political party was not $F(2, 220) = 1.66, p = .193$. Planned Fisher’s LSD tests (Seaman, Levin, & Serlin, 1991) showed that those in the control condition ($M = 5.49, SD = 1.33$) were significantly more supportive of the green fund than those in the recycling condition ($M = 4.94, SD = 1.66$), p

= .027, and the trash condition ($M = 4.76$, $SD = 1.67$), $p = .003$, providing evidence for negative spillover. No significant difference was found between the recycling and the trash conditions, $p = .489$ (Figure 1).

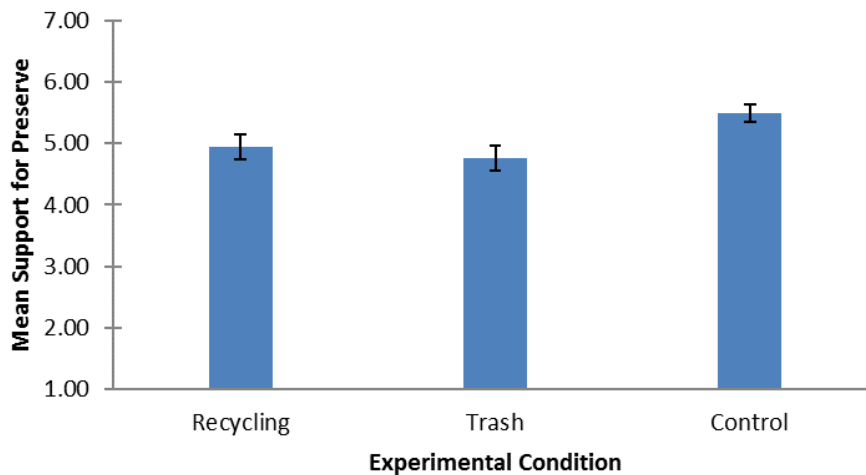


Figure 1. Main effect of the experimental condition: Support for the green fund was significantly lower in the recycling and trash conditions compared to the control condition, indicating negative spillover, while there was no significant difference between the recycling and trash conditions. Error bars represent standard errors.

The interaction between experimental condition and political party was marginally significant, $F(4, 220) = 1.97$, $p = .099$, so planned simple effects tests were conducted to examine the effect of experimental condition on support for the green fund within each party (Figure 2).

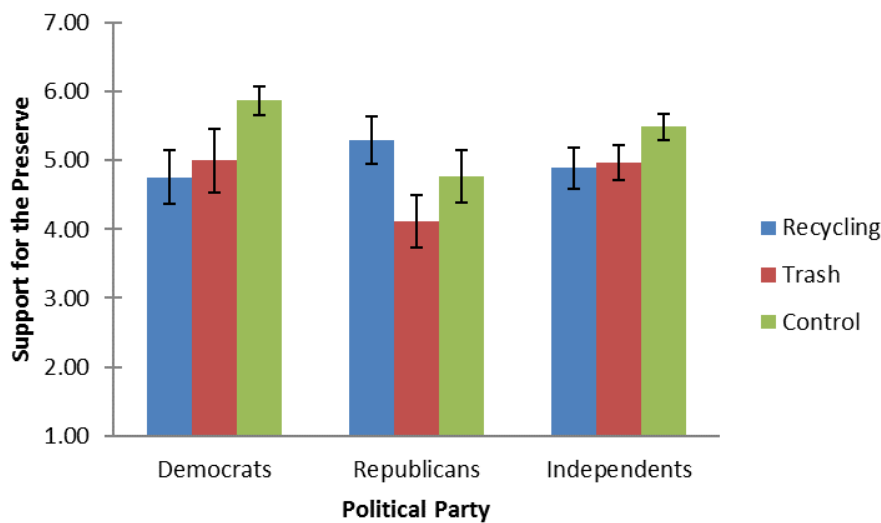


Figure 2. Simple main effects of experimental condition within Democrats and Republicans: Democrats in the recycling condition showed significantly lower support for the green fund than Democrats in the control condition. Republicans in the recycling condition showed significantly higher support than Republicans in the trash condition. Error bars represent standard errors.

For Democrats, the homogeneity of variances assumption was not met (Levene statistic $(2, 69) = 5.29, p = .007$), so a separate ANOVA was run instead of the usual simple effects test, which uses the omnibus error term. There was a significant effect of experimental condition on support for the green fund, Welch statistic $(2, 31.77) = 3.92, p = .030$. Games-Howell post hoc tests revealed that Democrats in the recycling condition ($M = 4.76, SD = 1.92$) were significantly less supportive of the green fund than Democrats in the control condition ($M = 5.88, SD = 1.18$), $p = .039$, showing that Democrats were exhibiting negative spillover. Among Democrats, no significant difference on support for the green fund was detected between the trash ($M = 5.00, SD = 1.81$) and the control conditions, $p = .228$, and between the recycling and trash conditions, $p = .917$.

There was a marginally significant simple effect of experimental condition for Republicans, $F(2, 220) = 2.65, p = .073$. People in the recycling group ($M = 5.29, SD = 1.45$) displayed significantly higher support for the green fund than those in the trash condition ($M = 4.11, SD = 1.61$), $p = .023$. There were no significant differences between the recycling and control conditions ($M = 4.76, SD = 1.56$), $p = .313$, and between the control and trash conditions, $p = .206$.

There was no simple effect of condition on support for the green fund among Independents, $F(2, 220) = 1.61, p = .203$.

3.2. Test of Mediation

3.2.1. Mediators of condition-PEB2 relationship.

In our mediation tests, we first tested whether our hypothesized mediators (environmental self-identity, guilt, and global warming worry) could explain the spillover effect between recycling (vs. not) and support for the green fund that we observed in our full sample. To reiterate, in Hypotheses 5, 6, and 7, we expected that if we found evidence of positive spillover, environmental self-identity would be the mediator (Truelove et al., 2014) and if we found evidence of negative spillover, guilt or global warming worry would be mediator(s) (Truelove et al., 2014). We ran a single-step multiple mediator model with guilt, global warming worry, and environmental self-identity as simultaneous mediators of the relationship between condition (recycling vs. control) and support for the green fund (Preacher & Hayes, 2008b) using the 5000 bootstrapping resampling method with bias-corrected confidence interval and point estimates (MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2008a). A significant indirect effect would provide evidence that the negative relationship we observed

between recycling (vs. not) and supporting the green fund was mediated by one of our hypothesized mechanisms. Dummy coding was used for the independent variable where the control condition was coded as zero while the recycling condition was coded as one. Note that we also reran all analyses with moral-self-worth as the potential mediator replacing guilt and the results were similar¹.

Although environmental self-identity (positively) and global warming worry (negatively) related to support for the green fund, there was no significant influence of condition on either of these mediators, nor on guilt (Figure 3, panel A). None of the indirect effects of condition (recycling vs. control) on support for the green fund through the hypothesized mediators was significant for the full sample (Table 2).

¹ Specifically, moral self-worth was not a significant mediator of the relationship between recycling vs. control condition and support for the green fund when examining the full sample or any of the subsamples. There was, however, a significant negative relationship between moral self-worth and support for the green fund among the full sample ($p = .004$), and among Independents ($p = .043$). When replacing moral self-worth for guilt in the mediation analysis of Republicans in the recycling vs. trash analysis, those who recycled felt marginally higher moral self-worth levels than those who put the bottle in the trash ($p = .086$). However, the indirect effect was not significant, just as with guilt as the mediator.

The pattern of the mediation analysis results was the same when the single item moral self-worth measure was replaced with a factor score of four items (compassionate, sympathetic, warm, and helpful) taken from Khan and Dhar (2006).

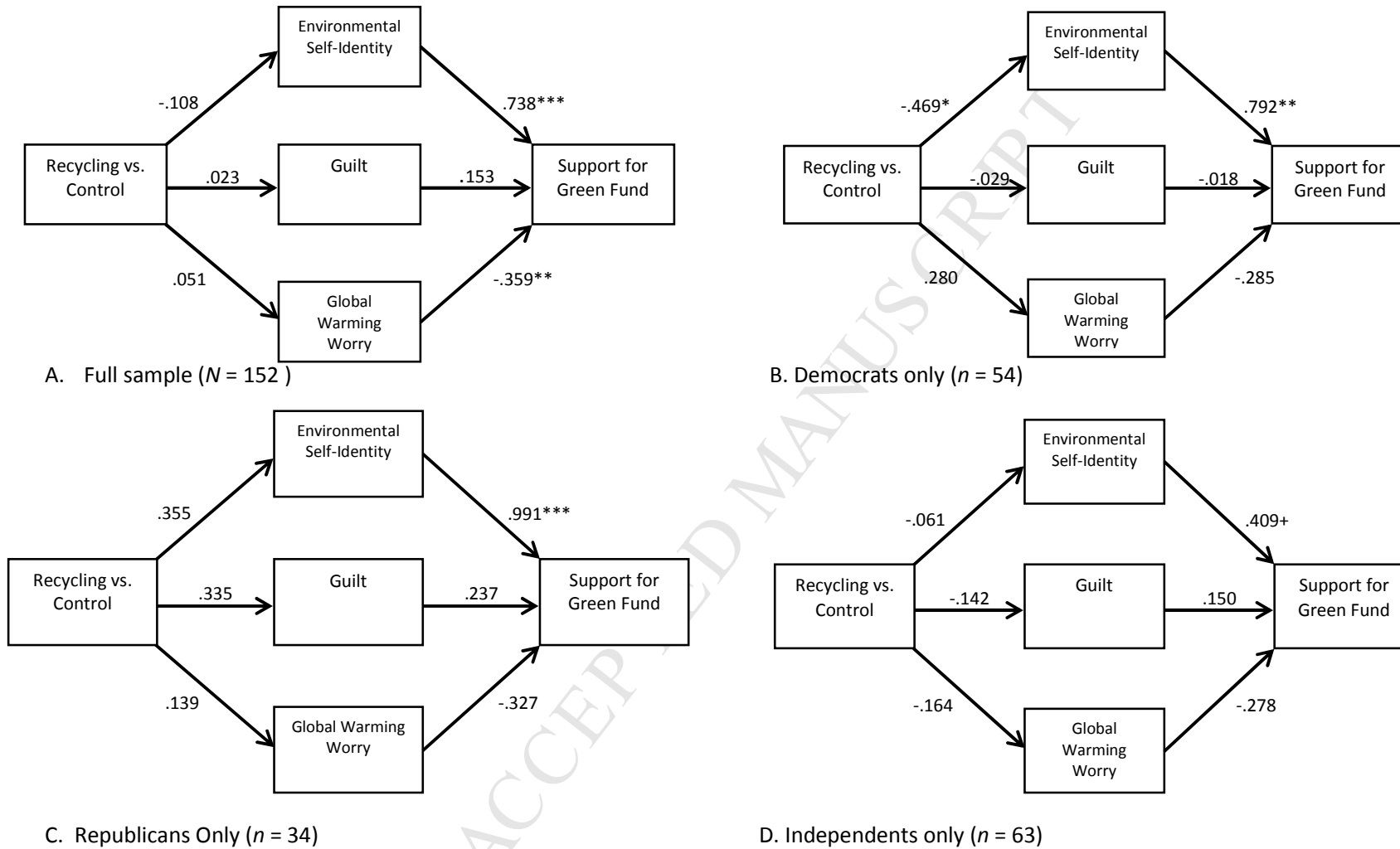


Figure 3. Mediation analysis of relationship between condition (recycling vs. control) and support for green fund for (A) full sample. (B) Democrats only. (C) Republicans only. (D) Independents only. All path coefficients are unstandardized. + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Second, we tested whether our hypothesized mediators could explain the simple effect of condition (recycling vs. control) on support for the green fund that we observed among Democrats (Figure 3, panel B). Among Democrats, the overall indirect effect was significant, meaning that the relationship between condition (recycling vs. control) on support for the green fund was mediated by the three mediators as a group (Table 2). Next, specific indirect effects from each mediator controlling for the other mediators were investigated (Preacher & Hayes, 2008a). Environmental self-identity was the only significant mediator of the relationship between experimental condition (control vs. recycling) and support for the green fund, controlling for the effect of global warming worry and guilt (Table 2). Compared to Democrats in the control condition, Democrats in the recycling condition had a lowered environmental identity, which was associated with a .394 unit decrease in support for the green fund.

Third, as a comparison for the mediation analysis of the condition (recycling vs. control) on support for the green fund that we ran on Democrats, we ran parallel analyses on Republicans and Independents. These analyses served mainly for descriptive comparisons as the simple effect of condition (recycling vs. control) on support for the green fund was not significant within these groups (as described above). For Republicans (Figure 3, Panel C) and Independents (Figure 3, Panel D), neither the individual indirect effects of condition on support for the green fund through global warming worry, guilt, or environmental self-identity nor the overall indirect effect of condition on green fund support through all three mediators as a set were significant (Table 2). Of note, for all samples, environmental self-identity was positively related to support for the green fund.

Table 2

Individual and total indirect effects in the mediation analysis between condition (recycling vs. control) and support for green fund.

| | Full sample | | | Democrats only | | | Republicans only | | | Independents only | | |
|----------|----------------|-----------|-------|----------------|-----------|--------|------------------|-----------|-------|-------------------|-----------|-------|
| | Point Estimate | BC 95% CI | | Point Estimate | BC 95% CI | | Point Estimate | BC 95% CI | | Point Estimate | BC 95% CI | |
| | | Lower | Upper | | Lower | Upper | | Lower | Upper | | Lower | Upper |
| E-ID | -0.079 | -0.311 | 0.096 | -0.394 | -1.051 | -0.024 | 0.351 | -0.202 | 1.190 | -0.028 | -0.342 | 0.101 |
| Guilt | 0.000 | -0.051 | 0.079 | -0.026 | -0.081 | 0.159 | 0.074 | -0.058 | 0.405 | -0.013 | -0.231 | 0.035 |
| GW Worry | -0.017 | -0.146 | 0.074 | -0.077 | -0.486 | 0.079 | -0.040 | -0.509 | 0.118 | 0.042 | -0.052 | 0.326 |
| Total | -0.097 | -0.357 | 0.139 | -0.497 | -1.040 | -0.019 | 0.387 | -0.378 | 1.278 | 0.002 | -0.347 | 0.220 |

Note: BC, bias corrected; Both point and 95% CI estimates are from the 5,000 bootstrap samples.

Table 3

Individual and total indirect effects in the mediation analysis between condition (recycling vs. trash) and support for green fund.

| | Republicans only | | |
|----------|------------------|-----------|--------|
| | Point Estimate | BC 95% CI | |
| | | Lower | Upper |
| E-ID | 0.433 | 0.031 | 1.205 |
| Guilt | 0.013 | -0.153 | 0.144 |
| GW Worry | -0.002 | -0.600 | 0.499 |
| Total | 0.454 | -0.112 | 1.2.74 |

Note: BC, bias corrected; Both point and 95% CI estimates are from the 5,000 bootstrap samples.

Next, we further investigated the significant simple effect of experimental condition (recycling vs. trash) on support for the green fund that we observed among Republicans. Although the original effect was not hypothesized, we tested whether our mediation model was a good fit to the data by conducting a single-step multiple mediator model with guilt, global warming worry, and environmental self-identity as simultaneous mediators of the relationship between condition (recycling vs. trash) and support for the green fund [Figure 4]. Dummy coding was used for the independent variable where the trash condition was coded as zero while the recycling condition was coded as one.

The overall indirect effect was not significant (Table 3). As for specific indirect effects, neither global warming worry nor guilt significantly mediated the relationship between condition (trash vs. control) and support for the green fund among Republicans. However, environmental self-identity was a significant mediator of the relationship between experimental condition (recycling vs. trash) and support for the green fund, controlling for the effect of global warming worry and guilt. Compared to Republicans in the trash condition, the higher support for the green fund from Republicans in the recycling condition was significantly mediated by environmental identity, as evident in the positive confidence interval of the indirect effect.

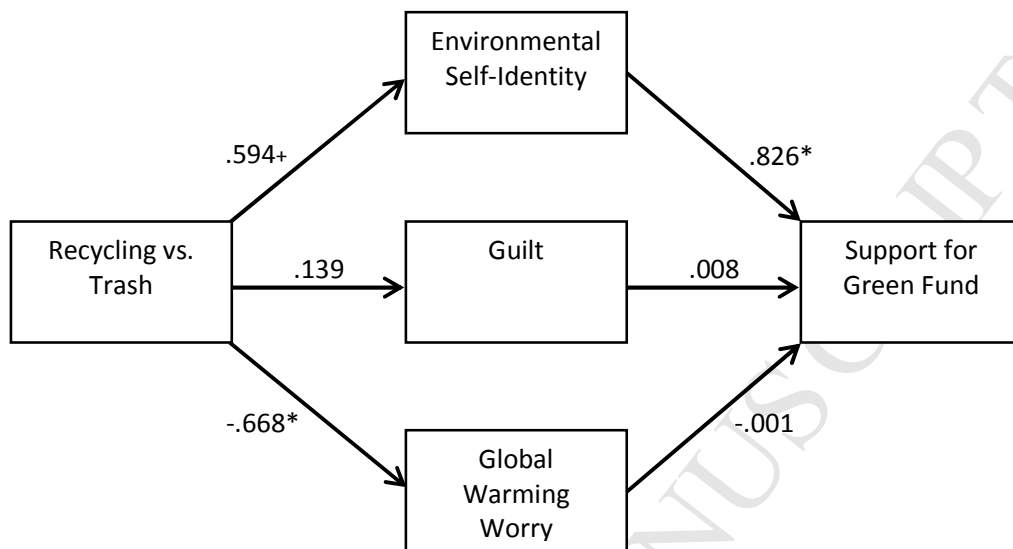


Figure 4. Mediation analysis of relationship between condition (recycling vs. trash) and support for green fund for Republicans ($n = 34$). All path coefficients are unstandardized. $+p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

In sum, environmental self-identity significantly mediated the simple main effect of support for the green fund observed across two particular levels of the experimental condition within each political party after controlling for the effect of guilt and global warming worry. Compared to Democrats in the control condition, Democrats in the recycling condition had significantly lower environmental self-identities, which in turn decreased their support for the green fund, showing negative spillover. Compared to Republicans in the trash condition, Republicans in the recycling condition had marginally significantly higher environmental self-identities, which in turn increased support for the green fund.

3.2.2. Mediators of PEB1-PEB2 relationship

Finally, as another test of spillover theories, we sought to examine the levels of the mediators among those who had exhibited a combination of behaviors consistent with positive spillover, negative spillover, and no spillover. Considering positive spillover has been theorized to be driven by environmental identity (Gneezy et al., 2012; Poortinga et al., 2013; Truelove et al., 2014), those who exhibit positive spillover (i.e., perform both PEB 1 and show support for the green fund) would be expected to have higher environmental identity levels than those who do not exhibit positive spillover. Similarly, because negative spillover has been theorized to be driven by guilt or moral self-worth and worry (Truelove et al., 2014; Weber, 1997), we expected that those who exhibited negative spillover (i.e., performed PEB1, but showed a lack of support for the green fund) would have higher levels of guilt and worry.

To test these ancillary hypotheses, we focused solely on the recycling group as all participants in this group had performed PEB1 (the first criteria for examining spillover). We split the recycling group based on PEB2 (support for the green fund). We created three groups operationalized as follows: positive spillover group (rated “slightly support”, “support,” or “strongly support” the green fund, $n = 46$), negative spillover (rated “slightly opposed”, “opposed,” or “strongly opposed” the green fund, $n = 16$), and no spillover (rated “neither support nor oppose” the green fund, $n = 5$). A series of one-way ANOVAs was performed on each of the three proposed mediators across the three spillover groups. There were no significant mean differences of guilt levels ($F(2,63) = .120, p = .888$) across the three spillover groups. For global warming worry, a main effect of spillover group was detected ($F(2,65) = 4.25, p = .018$). Post-hoc LSD tests showed that the negative spillover group worried *less* about

global warming, as indicated by the significantly scores on the Global Warming Worry Scale compared to the no spillover group, $p = .031$, and positive spillover group, $p = .009$. But no such difference was found between the positive spillover group and no spillover group, $p = .531$. For environmental self-identity, a significant difference was also detected across the spillover groups ($F(2, 65) = 3.93, p = .025$). Post-hoc LSD tests showed that the positive spillover group had a significantly higher value of environmental self-identity compared to the negative spillover group, $p = .010$. But no such difference was found between the positive spillover group and no spillover group, $p = .195$, nor between the no spillover and negative spillover groups, $p = .688$. The sample mean estimates of the proposed mediators across the different spillover groups are shown in Table 4.

Table 4

Sample estimates of the means of the proposed mediators across groups that showed positive, no, and negative spillover within the recycling condition. Standard deviations are shown in parentheses.

| | Positive spillover ($n = 46$) | No spillover ($n = 5$) | Negative spillover ($n = 16$) |
|------------------------|------------------------------------|-----------------------------|------------------------------------|
| Guilt | -.04a (.98) | -.09a (.00) | .11a (1.44) |
| Global warming worry | -.19a (.70) | -.39a (.76) | .37b (.75) |
| Environmental identity | 5.47a (.71) | 5.00a,b (.86) | 4.83b (1.10) |

Note: Means in the same row that do not share the same letter differ at $p < .05$.

4. Discussion

4.1. Evidence of Spillover

This study is the first that we are aware of to directly test spillover between a PEB and pro-environmental policy support. Previous scholars have suggested that people who perform small pro-environmental acts will be less supportive of policy to mitigate greenhouse gases

(Wagner, 2011). Although no research could be located that tests spillover between PEBs and policy support, Gneezy and colleagues' (2012) work on spillover between prosocial behaviors of varying difficulty led us to hypothesize that we would find negative spillover from the relatively easy initial PEB of recycling to support for the green fund (H1). Indeed, we found support for this hypothesis. Those who recycled were less supportive of the green fund than those in the control condition. This result provides initial support for Wagner's (2011) argument that performance of easy PEBs may undermine policy support, though this effect was moderated by political party affiliation.

Due to the politicization of environmental support in the U.S., we expected that Democrats would be more supportive of the green fund than Republicans or Independents (H2), Democrats would display a small amount of positive spillover (H3), and Republicans would display negative spillover (H4). We found no differences in support for the green fund between Democrats, Republicans, and Independents. This finding was unexpected given that recent research has found clear differences between members of the major political parties and their support for environmental policy (Hamilton & Saito, 2014). However, it may be that highly localized campus-based initiatives are less influenced by political affiliation than support for federal or state policy. Additionally, we found that Democrats displayed negative spillover between recycling and policy support, while Republicans did not display spillover, providing no support for H4, but also finding the opposite of what was expected for H3. Although we had hypothesized that identity activation and consistency effects would drive Democrats' behavior resulting in some positive spillover to green fund support, Democrats likely viewed recycling (the initial PEB they performed) as costless (Gneezy et al., 2012), as this PEB is likely habitual

among most Democrats (Coffey & Joseph, 2013). Thus, the initial behavior was likely not difficult enough to activate identity effects, even among Democrats, therefore licensing effects took hold.

Additionally, we aimed to create a condition where participants performed an anti-environmental behavior (threw a recyclable item in the trash) as a means for comparison as a secondary control group. Interestingly, among the full sample, those who recycled were not more supportive of the green fund than those who performed an anti-environmental behavior. In line with the wider moral licensing literature, both the recycling and the trash conditions could be viewed as prosocial conditions in that participants in these conditions are doing a favor for the experimenter, which could boost participants' moral self-worth levels. Performing this favor could have then licensed participants (Zhong, Liljenquist, & Cain, 2009) to be less supportive of the green fund. However, our results do not provide support for this interpretation. In an ancillary analysis, we found no differences in guilt levels between those who recycled or threw the recyclable item in the trash versus those in the control condition. Additionally, the pattern of results in our main analysis for the trash condition and the recycling condition were similar for Democrats in terms of support for the green fund, but not for Republicans. For Democrats, those in the trash and recycling conditions displayed similar levels of support for the green fund, whereas for Republicans, the trash condition elicited a unique pattern of results (i.e., lower support for the green fund) compared to those in the recycling condition. Though there is some evidence that recalling previous immoral behaviors results in compensatory moral action (Jordan, Mullen, & Murnighan, 2011), our findings do not support this conclusion. Additional work is needed in this area.

4.2. Mediating effects

This study was the first that we are aware of to simultaneously examine the ability of environmental identity, guilt, and worry to explain PEB spillover effects. As proposed by Truelove et al. (2014), we expected that environmental identity would mediate positive spillover (H5), such that those who performed an initial PEB would feel stronger environmental identities, which would in turn lead to increased support for the green fund. In the current study, the act of recycling (vs. control) did not significantly influence environmental self-identity levels among the full sample or among Republicans or Independents, though increased self-identity was associated with support for the green fund among all groups in the sample. However, among Democrats in our study, recycling actually led to *lower* environmental identities (compared to control participants), with higher environmental identities relating to higher support for the green fund. Thus environmental identity actually explained why *negative* spillover occurred among Democrats in our study. Perhaps, for Democrats, the group who is expected to perform PEBs as part of their political identity, the act of recycling was too easy to activate or boost their environmental identities above an already high baseline (compare to Van der Werff, Steg, & Keizer, 2014a and Van der Werff et al., 2014b for studies that have had difficulty increasing environmental identity levels).

Although previous research has shown that performance of easy, initial prosocial behaviors leads to negative behavioral spillover (e.g., Gneezy et al., 2012), no work could be located that has investigated the mechanisms underlying this relationship. Behavior difficulty may moderate spillover effects because those initial costless behaviors are not sufficient to signal identity (Gneezy et al., 2012; Truelove et al., 2014; Van der Werff et al., 2014a), and may

actually backfire by signaling a negative environmental identity as was observed in the current study. Specifically, Democrats in the current study who performed the easy PEB of recycling may have been reminded that they are not doing larger, more difficult PEBs on a regular basis, thus resulting in decreased environmental identities. Alternatively, performance of the easy initial behavior could have served as a reminder of progress toward Democrats' goal of being pro-environmental, leaving motivation to switch to other relevant goals (Susewind & Hoelzl, 2014). As motivation switches to other goals, the identities relevant to those new goals may become more salient than environmental identity. Because environmental identity is less important to the Republican and Independent political party affiliations, performance of the initial easy behavior may not have affected environmental self-identity levels in this study.

Behavioral difficulty may have contributed to these effects in other ways as well. Specifically, the difficulty of the secondary PEB in this study may have contributed to negative spillover. Spillover theory suggests that negative spillover is particularly likely to occur if the secondary behavior is perceived to be difficult (Truelove et al., 2014). The negative spillover found in the current study may reflect the fact that American college students, many of whom have little income and are already incurring student debt, may have seen the \$20 fee associated with the proposed policy to be cost prohibitive and therefore difficult. Further research is needed to explore these possibilities.

Although we found evidence of negative spillover among the full sample and among Democrats, neither of the hypothesized mechanisms of negative spillover (i.e., guilt, moral self-worth, and global warming worry) could explain why people who recycled (vs. control) were less supportive of the green fund, which is in contrast to H6 and H7. The act of recycling (vs.

control) did not lead to significantly lower levels of guilt (moral-self worth) or global warming worry among the full sample or any sample subgroups. Additionally, neither guilt nor moral-self worth was related to support for the green fund for any of the samples. Global warming worry was significantly associated with increased support for the green fund, in line with single action bias theorizing (Weber, 1997), among the full sample and showed the same pattern, though not significant, among all the subsamples. However, because the act of recycling did not influence global warming worry levels, our results do not provide evidence of the single action bias.

These results have implications for the leading theories of negative PEB spillover. No other studies could be located that have experimentally tested the ability of single action bias to explain negative PEB spillover via measuring worry about climate change. Additionally, although often assumed, no work could be located that tested the moral licensing explanation of negative PEB spillover by measuring guilt levels. Although this extension of previous research is a major strength of the current study, our findings are contrary to previous theorizing and show that, at the very least, the picture is more complicated than what has been proposed. Additional research is clearly needed.

One limitation of our study concerns the student sample. By using a student sample, we were able to create a situation where we observed an actual PEB in the lab as opposed to a self-reported behavior or a behavior in response to a hypothetical situation. Additionally, we used a policy support question that focused on the campus climate as opposed to a more abstract question about support for a national policy such as a cap and trade policy. Although student samples have inherent issues related to their generalizability (Henrich, Heine, & Norenzayan, 2010), they can be extremely useful in providing initial evidence about universal psychological

processes (Gaertner, Sedikides, Cai, & Brown, 2010). Considering our goal is to establish whether—and, if so, why—spillover exists between a PEB and policy support, our nonprobability sampling method is of less concern (Mook, 1983; Morling, 2012). Because this is the first study that could be located that simultaneously tested for the ability of guilt, environmental identity, and environmental worry to mediate spillover effects and that investigated spillover from a PEB to pro-environmental policy support, our results on this college sample provide a valuable empirical test of our theoretical model (Truelove et al., 2014). Considering this generation of college students have been raised on the new wave of environmental education including a focus on recycling and that they are recently entering the voting world, the existence of negative spillover among this sample is quite worrisome. Establishing the existence of the effects among this sample suggests that these findings could hold for other samples with other types of policies and other initial behaviors, but additional work is certainly needed to establish generalizability beyond a student sample.

Overall, we found negative spillover between performance of an easy PEB, recycling, and environmental policy support, which was driven by Democrats. However, we found little evidence that environmental self-identity, guilt, and global warming worry mediated the relationship between recycling and supporting an environmental policy in our study. Methodological issues such as ceiling (environmental identity) and floor effects (guilt) may be partly responsible for the null effects. Although our focus on environmental self-identity, guilt, and global warming worry allowed us to experimentally test the propositions of Truelove and colleagues (2014) that these variables underlie PEB spillover, recent researchers have proposed other variables that need further investigation. Goal achievement perspective (whether a

behavioral achievement is viewed as goal commitment or goal progress) has been shown to explain the relationship between a PEB (green purchasing behavior) and intention to perform prosocial behaviors (Susewind & Hoelzl, 2014). Additionally, personal norms and efficacy (Steinhorst et al., 2015) have been shown to mediate the relationship between saving energy and pro-environmental intentions. Future research should consider the role of goal achievement perspective, personal norms, and efficacy in explaining the relationship between PEB and policy support, while also examining guilt, global warming worry, and environmental self-identity. Nevertheless, this study provides initial evidence that performance of an easy PEB may in fact lead to less support for a pro-environmental policy.

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Highlights

- Negative spillover was found between recycling and environmental policy support
- For Democrats, recycling lowered environmental identities and later policy support
- Neither Republicans nor Independents displayed spillover