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Regulating behavioral spillovers: Regulatory focus moderates the link between perceived goal progress and engagement in subsequent behaviors

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I hereby declare that this PhD dissertation is my original work
and it has been written by me in its entirety.
I have duly acknowledged all the sources of information
which have been used in this dissertation.

This PhD dissertation has also not been submitted for any degree
in any university previously.

Huang Tengjiao
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Abstract

Behavioral spillover occurs when performing an initial behavior increases the likelihood of performing a subsequent behavior *(positive spillover)* or decreases this likelihood *(negative spillover*). The current research focuses on negative spillovers of pro-environmental behaviors (PEB), which has the implication of limiting individuals' environmental conservation efforts. To offer insights, three studies sought to explicate *how* and *for whom* negative spillovers would occur. I theorized that prior behaviors would negatively predict subsequent behaviors via greater perceived goal progress and that this negative association between perceived goal progress and subsequent engagement would be more pronounced for people with a strong (vs. weak) promotion focus. This is because promotion-focused individuals are more sensitive to gains (e.g., goal progress) and may discontinue their pursuits when they perceive a positive state has been attained (Zou et al., 2014). Across two studies, self-reported (Study 1, $N = 161$) and experimentally induced recall (Study 2, $N = 481$) of prior PEB led to greater perceived goal progress. However, its effect varied with a stronger promotion focus accentuating a negative spillover for PEB intentions in Study 1 but a positive spillover for environmental donation in Study 2. As Study 1 referenced a general collective goal of addressing climate change and Study 2 referenced a personal goal of addressing climate change, Study 3 ($N = 501$) sought to examine whether the observed differing spillover effects would be moderated by goal framing (i.e., collective vs. personal goal). Negative spillovers may be more pronounced for collective (vs. personal) goals as people feel that they can be relieved of the responsibility for expending further

effort toward the collective goals if they have previously contributed. However, Study 3 could not reconcile the inconsistent spillover patterns found in Studies 1 and 2. The implications of these findings and future directions are discussed.

Keywords: Spillovers; goal progress; regulatory focus; pro-environmental behaviors; goals

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Dedication

To my father, in loving memory.

Chapter 1: Introduction

Individual and societal goals can only be realized with consistent and sustained efforts. For instance, the climate crisis cannot be mitigated by occasionally refusing a single-use plastic carrier; instead, it is critical for people to repeatedly engage in a concerted set of pro-environmental behaviors. Therefore, to facilitate pro-environmental behaviors or other long-term goal pursuits, it is important to understand how performing one behavior might influence engagement in subsequent behaviors that align with the same goal. Behavioral spillover research seeks to address this important phenomenon— the effect of performing an initial behavior on subsequent behaviors (Nilsson et al., 2017; Lanzini & Thøgersen, 2014; Lauren et al., 2019). In spillover research, the initial behavior may be experimentally induced through an intervention to observe how this induced behavior subsequently affects the engagement in another related behavior (Nash et al., 2017; Truelove et al., 2014).

Evidence for *positive* behavioral spillovers has been documented, with the initial behavior *increasing* the likelihood of engaging in the subsequent behavior (Dolan & Galizzi, 2015; Nilsson et al., 2017). Some prospective pathways to positive spillovers include processes of self-perception (Bem, 1972), cognitive dissonance (Festinger, 1957), and self-identity (Whitmarsh & O'Neill, 2010). These explanations rest on people's preference for consistency and inclination to act in accordance with their self-view (Truelove et al., 2014). It is believed that people experience discomfort when they behave inconsistently, and the prior behavior serves as a signal of informing their self-view. For example, the positive spillover effect observed for recycling and organic food purchase has been attributed to the desire for consistency (Thøgersen, 2004). Pro-social identity has also been found to explain a positive spillover between pro-social behaviors (Gneezy et al., 2012).

Notably, empirical support has also been found for *negative* behavioral spillovers, which showed that initial behaviors *decrease* the likelihood of engaging in the subsequent behavior (Dolan & Galizzi, 2015; Verfuerth et al., 2019). The notion of moral licensing provides some insight into how negative spillovers may occur for virtuous behaviors (e.g., pro-social and pro-environmental acts; Galizzi & Whitmarsh, 2019; Tiefenbeck et al., 2013). Performing an initial virtuous behavior appears to license people to engage in dubious behavior without threatening their moral self-views (see Miller & Effron, 2010; Mullen & Monin, 2016). Research has found that recalling prior moral behavior can lower subsequent intention for pro-social behavior; recalling prior environmentally-friendly behavior can weaken subsequent support for a sustainable policy (Jordan et al., 2011; Noblet & McCoy, 2018).

Negative pro-environmental behavioral spillovers have also been explained by the contribution ethic (Thøgersen & Crompton, 2009) and single-action bias (Weber, 1997). These accounts suggest that prior goal-relevant behaviors may lead to a perception of goal progress, such as having contributed enough (Amir & Ariely, 2008) or having reduced the risk of an issue such as climate change sufficiently (Truelove et al., 2014). In turn, this inhibits later motivation for similar goal-relevant behaviors, resulting in the phenomenon of negative behavioral spillovers.

Positive behavioral spillovers are clearly ideal for effective goal pursuits, while negative behavioral spillovers are problematic. Worryingly, negative behavioral spillovers may systematically undo or undermine the positive contributions of the prior behavior (Ghesla et al., 2019; Höchli et al., 2019; Wolstenholme et al., 2020). Negative spillovers are prevalent in many domains. In the health domain, exercising can encourage the intake of unhealthy, caloric foods (Dimmock et al., 2015; Werle et al., 2015). In the moral domain, recalling one's prior good

deeds can encourage cheating (Jordan et al., 2011). In the environmental domain, purchasing green products can lead to increased water usage (Geng et al., 2016).

Importantly, the explanations for both positive and negative spillover effects, and their theorized pathways, have received mixed support, particularly for negative pro-environmental spillovers. In one research, the negative spillover from household pro-environmental behaviors to climate change policy support was not explained by moral licensing (Werfel, 2017). In a high-powered preregistered replication, recalling past green engagement did not show the hypothesized morally licensed weakened intention for pro-environmental behaviors or reduced support for a pro-climatic energy policy (Urban et al., 2021). Another two high-powered preregistered studies failed to show that endorsing a female presidential candidate would increase the tendency for discriminatory hiring practices as moral licensing would predict (Giurge et al., 2021).

Recent meta-analyses have identified several moderating factors that may reconcile mixed findings of pro-environmental spillovers. However, these moderators have mostly been confined to the attributes specific to the initial behaviors (e.g., difficulty) and the nature of the interventions (Geiger et al., 2021; Maki et al., 2019), overlooking the role of personal characteristics. Studies investigating the influence of personal characteristics have also been limited to the domain specific to the nature of spillovers. For example, people's pro-environmental and health attitudes have been studied respectively in pro-environmental and health spillovers (Brügger & Höchli, 2019; Henn et al., 2020). To date, one research has studied the moderating role of a domain-general dispositional variable (analytic vs. holistic mindset) in behavioral spillovers (Spaccatini et al., 2022). This research found that recalling a prior pro-environmental behavior led to a positive spillover among people with an analytical (vs. a

holistic) mindset as analytical thinkers tend to be less comfortable with and accepting of inconsistencies, thus encouraging them to behave consistently.

Building on recent theorizing of spillovers with a motivation framework (e.g., Höchli et al., 2019; Lanzini & Thøgersen, 2014; Margetts & Kashima, 2017), the present research endeavored to add novel knowledge to understanding behavioral spillovers in two ways. First, this research examined how perceived goal progress from prior behaviors may result in negative spillovers in the environmental domain. People often draw inferences from prior engagement to inform their subsequent behavior-related judgments (Albarracín & Wyer, 2000). One such inference is perceived goal progress. For example, some studies showed that moods convey information about how people are doing, which can help them decide how much effort they will need to further exert (Kaufmann & Vosburg, 1997). Positive moods can induce confidence about goal progress and lead people to lower their subsequent creative efforts (George et al., 2002). At present, the extent to which perceived progress influences later pro-environmental behaviors requires more research attention. This gap is important as pro-environmental goals are always ongoing, requiring upkeep in progress, given our race against rapidly occurring climate change and environmental depletion.

Second, this research contributes to the limited understanding of personal domain-general characteristics that may moderate behavioral spillover effects. Drawing on regulatory focus theory (Higgins, 1997, 1998), the current studies examined how people's regulatory style, in particular a promotion regulatory focus, may moderate behavioral spillovers.

Put succinctly, the current research theorized and tested the negative relationship between perceived goal progress from prior behaviors and the likelihood of performing subsequent behaviors (i.e., negative spillovers) as moderated by people's regulatory focus (namely,

promotion focus). Given the mixed findings on the direction of spillover effects, this research did not make specific predictions for the direct effect of prior behavioral engagement on subsequent engagement. Rather, this research focused on how perceived goal progress can explain negative behavioral spillovers and whether such negative spillover effects are more pronounced for promotion-focused individuals.

Chapter 2: Behavioral Spillovers within a Goal Context and the Role of Goal Progress

Goals are cognitive representations of desired end states that guide how people think and behave (Austin & Vancouver, 1996; Gollwitzer & Bargh, 2005). Of note, people typically engage in varied behaviors to pursue a goal (Kruglanski et al., 2002). For example, people may pursue the broad goal of leading a healthy lifestyle by eating healthily, exercising regularly, and having sufficient rest. The goal of leading a sustainable lifestyle can be pursued through various pro-environmental behaviors such as recycling, buying green products, and eating less red meat.

Applying a goal perspective, spillover behaviors can be examined based on their relevance to the same, conscious or subconscious, superordinate goal (Dolan & Galizzi, 2015; Galizzi & Whitmarsh, 2019; Höchli et al., 2019). Therefore, spillovers describe the influence of performing a prior goal-congruent behavior on the likelihood of performing subsequent goal-congruent behaviors (Brügger & Höchli, 2019).

Depending on the goal-relevant information people infer from their prior behavior, the direction of spillover effects can be either positive or negative (Liu et al., 2021; Werfel, 2017). For example, engaging in goal-relevant academic or dieting behaviors can lead people to perceive satisfactory goal progress that later causes them to procrastinate or eat unhealthily (i.e., negative spillovers). However, those same behaviors can also be construed as a sign of goal commitment, bolstering their determination and promoting further goal-relevant behaviors (i.e.,

positive spillovers) (Fishbach et al., 2006, 2009; Fishbach & Dhar, 2005). Positive spillovers result from people's perception that their prior behavior signals goal commitment, thus bolstering their determination and further encouraging subsequent goal-congruent behaviors (Geng et al., 2016). Negative spillovers result from people's perception that their prior behavior signals goal progress, thus promoting the view that they are in a satisfactory current state and leading to premature goal disengagement (Margetts & Kashima, 2017). These ideas have received empirical support, with perceived goal progress (vs. goal commitment) from prior behaviors lowering (vs. increasing) the likelihood of subsequent behavioral engagement in the domains of morality (Susewind & Hoelzl, 2014), environmentalism (Geng et al., 2016), academic and health (Fishbach & Dhar, 2005).

Upon closer scrutiny, perceived progress can both help and harm goal pursuit. Perceiving progress can lower the perceived difficulty of the goal and boost efficacy to energize goal pursuits (Schunk & DiBenedetto, 2021). Nevertheless, these perceptions can also increase the chances of disengaging from the goal prematurely before reaching it. Besides research on goal progress-versus-commitment perceptions, other theoretical and empirical support for the role of perceived goal progress in negative spillovers also exists. One explanation is progress bias, in which people misperceive that the positive contributions of a goal-congruent behavior outweigh the negative contributions of an equivalent goal-incongruent behavior to their goal progress (Campbell & Warren, 2015). Other explanations highlight how the perception of sufficiently high goal progress can inhibit goal pursuit. Perceiving sufficient progress toward a goal may urge people to switch between multiple goals (Louro et al., 2007; Thürmer et al., 2020), thus redirecting their subsequent efforts from the current goal to another (Carver, 2003; Carver & Scheier, 1998). Also, people may infer goal completeness from the progress made by their prior

behavior. For example, providing consumers with positive feedback on their purchase of green products led to less recycling behaviors than consumers who received negative or no feedback due to an induced inference of goal completeness (Longoni et al., 2014).

The mediating influence of perceived goal progress in negative spillovers also aligns with other theoretical accounts such as moral licensing, contribution ethic, and single-action bias. These accounts suggest that regarding prior behavior as evidence of making sufficient progress (e.g., establishing their moral self-image[1], having done their part, or reducing the perceived risk of climate change) fosters a sense of fulfillment that inhibits subsequent goal-congruent behaviors.

In sum, perceived goal progress may be key to untangling positive versus negative spillovers. Specifically, the mediating role of perceived goal progress is theorized for negative, rather than positive, spillovers. This is because the current research mostly taps on the extent to which people perceive that they are making sufficiently high progress toward the goal. In that vein, research has shown that individuals' regulatory foci impact their perception of progress and behaviors during goal pursuit (e.g., Toyama, 2022). The following two sections unpack how individual differences in regulatory focus may moderate goal progress perceptions and their effects on subsequent behaviors (i.e., negative spillovers).

Chapter 3: Regulatory Focus Theory

Regulatory focus theory (Higgins, 1997, 1998) distinguishes between two functionally distinct types of coexisting motivational orientations—promotion focus and prevention focus—that serve different basic survival needs and guide goal pursuit. Promotion focus facilitates the

[1] This applies to the perspective that moral licensing effects occur via moral credits rather than moral credentials (see Merritt et al., 2010).

fulfillment of growth needs (e.g., advancement, nurturance), whereas prevention focus facilitates the fulfillment of security needs (e.g., protection, safety) (Higgins, 2000; Lockwood et al., 2002).

Consistent with the focus on advancement- vs. security-based needs, each regulatory focus is sensitive to different desired goal end states and deploys different behavioral strategies to attain those states (Brendl et al., 1995; Higgins, 1998; Scholer et al., 2019). A promotion focus orients people toward their hopes and aspirations, pursuing their *ideal* self-standards, whereas a prevention focus orients people toward the duties and obligations represented in their *ought* self-standards (Molden et al., 2008; Shah et al., 1998).

Given that promotion-focused and prevention-focused individuals desire different end states (ideals vs. oughts), they also deploy different behavioral strategies that are more effective in attaining those states. Under a promotion focus, people prefer eager strategies in striving for potential gains (i.e., a state where positive outcomes are present) and avoiding nongains (i.e., a state where positive outcomes are absent), even at the expense of errors and losses (Crowe & Higgins, 1997). Under a prevention focus, people favor vigilant strategies in maintaining nonlosses or status quo (i.e., a state where negative outcomes are absent) and avoiding losses (i.e., a state where negative outcomes are present), even at the expense of forgoing potential gains (Molden, 2012).

Chapter 4: Regulatory Focus Moderates the Role of Perceived Goal Progress in Behavioral Spillovers

Governed by differential sensitivity to various outcomes, people's predominant regulatory focus shape how they process and respond to goal progress information. Driven to attain gains and avoid nongains, promotion-focused people may perceive higher levels of perceived goal progress from prior behaviors to signal the successful attainment of advancement

and gains. In turn, this discourages engagement in subsequent goal-congruent behaviors. One research found that after achieving considerable (vs. little) progress toward the goal of redeeming a cash coupon, promotion-focused people were less likely to spend money and collect stamps for a reward loyalty program (Chan & Ho, 2017). Similarly, perceiving progress toward a moral goal from a previous moral behavior reduced the likelihood of a subsequent moral behavior among promotion-focused (but not prevention-focused) people (Schwabe et al., 2018). More direct evidence for how perceived goal progress guides promotion-focused people's regulatory efforts comes from Zou et al.'s (2014) research on risk-taking behaviors. After making a major (vs. a minor and no) financial gain from a prior risky stock choice, promotion-focused people were less likely to make a risky stock choice in spite of the potential to make a further gain (Studies 1 and 2). Promotion-focused people's tendency to switch from a risk-taking to a risk-averse behavioral tactic was only observed after they perceived having made sufficient progress toward a gain-framed goal state from their initial risky investment (Studies 3 and 4). Together, these studies suggested that perceived goal progress predicts negative spillovers more strongly for promotion-focused people.

Unlike promotion focus, the role of prevention focus in moderating the relationship between perceived goal progress and subsequent goal-congruent behaviors is less clear. Perceived goal progress may predict positive behavioral spillovers more strongly among prevention-focused people. In one research, after achieving considerable (vs. little) progress toward their loyalty reward goal, prevention-focused consumers were more likely to spend money and earn more reward loyalty stamps (Chan & Ho, 2017). It was reasoned that prevention-focused people are motivated to avoid losses and are more attuned to the potential costs (losses) of future goal-congruent behaviors. Higher (vs. lower) levels of progress signal to

prevention-focused people that their investment in subsequent behaviors would not be as costly as their investment in prior behaviors.

However, perceiving goal progress from prior behaviors may bear little relevance for prevention-focused people. Instead, what seems to matter to prevention-focused people is gleaning information about the status quo from their prior behaviors (Schwabe et al., 2018; Zhang et al., 2014). The finding that prevention-focused consumers were more motivated by a high (vs. low) progress state in Chan and Ho's (2017) research has been reinterpreted in terms of their concern with reaching a satisfactory status quo (Higgins et al., 2020). Specifically, prevention-focused consumers may have been more motivated because the high progress state, but not the low progress state, signaled the attainability of a satisfactory status quo (fully stamped loyalty card). Other research also showed that the motivation to maintain the status quo, but not the perception of goal progress, accounted for prevention-focused people's tendency to behave morally after performing a previous moral behavior (see Study 4, Schwabe et al., 2018).

As the perception of making progress toward a positive goal state is more relevant for the promotional regulatory style than the preventional regulatory style, the present research focused the investigation on the moderating role of promotion focus and the mediating role of perceived goal progress in understanding behavioral spillovers. It was predicted that:

Hypothesis 1. Perceived goal progress mediates the negative relationship between engagement in prior behaviors and engagement in subsequent goal-congruent behaviors (i.e., a negative behavioral spillover).

Hypothesis 2. The negative relationship between perceived goal progress and engagement in subsequent goal-congruent behaviors is moderated by the extent to which people

endorse a promotion focus, with the relationship being more pronounced for people with a stronger (vs. weaker) promotion focus.

Integrating these hypotheses, it was also predicted that:

Hypothesis 3. There is a moderated indirect effect of engagement in prior behaviors on engagement in subsequent goal-congruent behaviors through perceived goal progress, with the negative relationship between engagement in prior behaviors and subsequent behaviors being more pronounced among people with a stronger (vs. weaker) promotion focus. In other words, the predicted negative behavioral spillover effect would be stronger at higher (vs. lower) levels of promotion focus.

Chapter 5: Overview of Studies

This research aimed to test the theorized goal-based account of spillovers (see Figure 1) in the domain of pro-environmental behaviors. Study 1 used a correlational design to examine the theorized relationships among prior pro-environmental engagement, perceived goal progress, regulatory focus (promotion focus), and subsequent pro-environmental engagement. To offer causal evidence, Study 2 experimentally manipulated engagement in prior goal-congruent (pro-environmental) behaviors. As disparate findings in spillover effects were discovered across Studies 1 and 2, Study 3 sought to explore the role of goal types by manipulating perceived goal progress and goal types (see Figure 2 and Chapter 8).

For all three studies, filler measures were presented before the outcome measures of subsequent engagement. The purpose of the filler measures is to introduce a temporal separation between the prior and subsequent behavioral engagements, which helps to reduce the concern of demand characteristics (Portmann et al., 2021) and ensure both types of engagements are sufficiently distinct (Ghesla et al., 2019).

Chapter 6: Study 1

Study 1 drew on a correlational design to test the theorized account (see Figure 1) in the context of pro-environmental behaviors.

Participants and Procedures

Two hundred thirty-three undergraduate students from Singapore Management University completed an online questionnaire for course credit. Participants who failed either the quality, attention, or honesty check were excluded from analyses. This resulted in a sample of 161 participants (M_{age} = 21.10, SD_{age} = 1.84; 84.5% female; 74.5% Chinese). Participants first answered questions measuring individual differences in regulatory (promotion and prevention) focus. They then reported their prior engagement in pro-environmental behaviors and their perceived progress toward a pro-environmental goal (the goal of addressing climate change). Next, they answered fillers measuring emotions relevant to regulatory focus and perceived outcome efficacy and responded to measures of subsequent pro-environmental behaviors.

Five measures of subsequent pro-environmental behaviors were administered—two intention measures of engagement in future pro-environmental behaviors (one included repeated items that were asked about their prior pro-environmental engagement and one new measure; the items were randomly presented), a measure of pro-environmental policy support, a measure of willingness to donate to an environmental charity, and a measure of willingness to craft a persuasive pro-environmental message. The pro-environmental behavioral intention and policy support measures were presented in a randomized manner before the donation and message crafting measures. Climate change skepticism[2] was also measured as a covariate because the goal

[2] Climate change skepticism was coded as 1 ("I believe climate change is occurring, and human activities are having significant effects on climate change"), 2 ("I believe climate change is occurring, and human activities are not having significant effects on climate change"), and 3 ("I do not believe climate change is occurring"), with higher scores reflecting greater disbelief in climate change and its anthropogenic nature.

of addressing climate change would mostly apply to individuals that believe climate change is occurring. For brevity's sake, the Materials section covers the measures of the key variables, but the Appendix presents the full set of measures.

Materials

Regulatory Focus

To assess individual differences in chronic regulatory focus, participants completed Higgins et al.'s (1997) regulatory focus strength measure. They were instructed to list and rate attributes that describe their ideal and ought selves quickly and accurately. Their response times in listing and rating these ideal and ought attributes were recorded to compute their respective promotion and prevention focus scores.

Participants were first given some practice questions to get familiarized with the task (e.g., listing and rating their favorite color). Next, they were provided with definitions of ideal self-attributes (attributes of the person they would ideally like to be or they wish to be) and ought self-attributes (attributes of the person they should be or they believe their duty or responsibility to be). They then listed the attributes in a seemingly random manner: one ideal, two oughts, one ideal, one ought, two ideals, and one ought. Participants provided two ratings for each attribute, one being the ideal or ought extent rating (i.e., the extent they would ideally like or ought to have the attribute) and the other being the actual extent rating (i.e., the extent they actually possess the attribute). These ratings were made on a 1 (*slightly*) to 4 (*extremely*) scale. For each attribute, three response times were recorded: the time taken to list the attribute, the time taken to provide the ideal or ought extent rating, and the time taken to provide the actual extent rating.

To compute promotion and prevention focus composite scores, the three response times for each attribute were log-transformed before being summed (Higgins et al., 1997; Shah et al.,

1998). As output primacy is one gauge of chronic accessibility, the promotion (prevention) focus composite score was computed using the average response times for the first three ideal (ought) attributes (see Higgins, 1996; Shah & Higgins, 2001). Reliabilities were calculated with the nine response times for each regulatory focus dimension and yielded acceptable results (promotion focus $\alpha = .64$, prevention focus $\alpha = .74$). These reliabilities are comparable to those found in other published research (e.g., Freitas et al., 2002; Zou et al., 2014). The signs for promotion and prevention focus composite scores were reversed, with higher scores (shorter response times) indicating a stronger promotion or prevention regulatory focus.

Engagement in Prior Goal-Congruent (Pro-environmental) Behaviors

To measure prior pro-environmental engagement, participants reported the frequency they perform several pro-environmental behaviors (e.g., "how often do you turn your personal electronics off or in low-power mode when not in use?", Brick et al., 2017). Participants were informed that these behaviors contributed to the goal of addressing climate change and rated their engagement from 1 (*never*) to 5 (*always*) or N/A (*not applicable*). Before checking the reliability and forming an aggregate score, "N/A" ratings were coded as missing. To suit the nature of the sample (Singaporean undergraduate students), 17 of the 21 behavior items were administered ($\alpha = .77$[3]).

Perceived (Pro-environmental) Goal Progress

Participants were asked to consider their prior pro-environmental engagement and indicate their progress toward the goal of addressing climate change. They rated six items such as "I have made sufficient progress toward the goal of addressing climate change" (adapted from Schwabe et al., 2018) from 1 (*strongly disagree*) to 7 (*strongly agree*) ($\alpha = .90$).

[3] Reliability was based on pairwise omission of missing values.

Engagement in Subsequent Goal-Congruent (Pro-environmental) Behaviors

To examine the nature of spillover effects, participants completed measures capturing their intentions for pro-environmental behaviors, support for pro-environmental policies, willingness to write an environmental persuasion message, and donation to an environmental charity as proxies for subsequent goal-congruent engagements.

Intentions for pro-environmental behaviors included two measures— the 17 items repeated from the prior engagement scale (Brick et al., 2017) and six items taken from Zaval and colleagues' (2015) scale. The 17 repeated items were modified to capture intentions for future engagement (rather than prior engagement) ($\alpha = .82$[4]). For example, "how often do you turn your personal electronics off or in low-power mode when not in use?" was reworded to "turn your personal electronics off or in low-power mode when not in use". The other six items[5] include "take showers that are 5 minutes or less" and "buy green products instead of regular products (e.g., dishwashing detergent), even though they cost more" ($\alpha = .54$). Items from both intention measures were randomly shown on the same page. Participants indicated the likelihood of engaging in these behaviors in the next three months (1 = *not at all likely* to 5 = *very likely* or N/A = *not applicable*). Similar to the prior pro-environmental engagement items, "N/A" responses were coded as missing before testing the reliabilities and computing the aggregate scores for each subsequent pro-environmental intention scale.

Due to an error, only a subset of the participants was given the correctly worded version of the repeated prior behavior items. Among the sample of $N = 161$, only 58 participants saw the

[4] Reliabilities for both behavioral intention scales are based on pairwise omission of missing values.
[5] Unless specified as repeated items, pro-environmental behavioral intention items will refer to this 6-item measure thereafter.

correct version. Analyses involving the repeated prior behavior measure included these 58 participants only and are reported in the footnotes.

Subsequent support for pro-environmental policies was measured with participants rating 11 policies such as "focus more on environmental labeling of products" from 1 (*strongly against*) to 7 (*strongly for*) ($\alpha = .83$, Harring et al., 2017).

To measure willingness to make an environmental donation (adapted from Tam, 2019; Zaval et al., 2015), participants were first told they had a chance to win an extra $10 bonus. They then specified the amount ($0 to $10) they would donate to an environmental charity (Trees for the Future) if they won this bonus.

Willingness to write an environmental persuasion message (adapted from Dong et al., 2021) was assessed by introducing participants to a purported future intervention to motivate pro-environmental habits. They were given a chance to either contribute to this intervention by crafting a short pro-environmental message or to carry on with the next part of the survey. The environmental persuasion message outcome variable was coded as 0 (did not write a message) and 1 (wrote a message).

Results

Analytical Approach

The current research used a two-fold analytical approach to test the moderated mediation account of spillover effects. First, mediation analyses were performed using PROCESS macro Model 4 for R (Hayes, 2022) to test the role of perceived goal progress in mediating the relationship between prior engagement and subsequent engagement. Second, the moderated mediation analyses were performed using PROCESS macro Model 14 for R (Hayes, 2022) to examine whether promotion focus moderates this mediated relationship.

Separate sets of mediation and moderated mediation analyses were performed for each of the five subsequent pro-environmental behavior outcome measures, with bootstrapping set to 10,000 resamples using bias corrected 95% confidence intervals and all interaction terms mean-centered. Moderated mediation analyses tested the influence of promotion focus while controlling for prevention focus. This accounts for the shared variance between promotion and prevention focus scores due to individual differences in response times (Higgins et al., 1997; Scholer et al., 2010). All analyses controlled for climate change skepticism, but analyses that excluded climate change skepticism as a covariate were also conducted. Any discrepancies between these sets of analyses are reported.

Table 1 summarizes the descriptive, reliability, and correlational statistics of the key variables[6].

Mediation Analyses

Prior engagement in pro-environmental behaviors positively predicted participants' perceived goal progress (b = 0.79, SE = 0.18, p < .001, $F(2, 158) = 9.54$, $R^2 = 0.11$). In turn, perceived goal progress negatively predicted subsequent support for pro-environmental policies (b = -0.13, SE = 0.06, p = .034, ΔR^2 = . 08) and donation to an environmental charity (b = -0.47, SE = 0.21, p = .026, ΔR^2 = . 05) and was negatively, but not significantly, associated with subsequent intentions for pro-environmental behaviors (b = -0.01, SE = 0.04, p = .813, ΔR^2 = .08) and writing of a persuasive environmental message[7] (b = -0.23, SE = 0.22, p = .278, OR = 1.26). The indirect effect of prior pro-environmental engagement via perceived goal progress

[6] Analyses for one of the five outcome measures (i.e., repeated pro-environmental behavioral intentions) were performed for a subset of the full sample and reported in the footnotes (see Study 1 Methods Section). Thus, Table 1 only presents the statistics for the remaining four outcome measures.

[7] Since willingness to write an environmental persuasion message was scored as a dichotomous variable, it was analyzed in a logistic regression model and expressed in log-metric odds. Odds-ratio was manually calculated.

was significant for subsequent pro-environmental policy support (b = -0.10, SE_{boot} = 0.06, 95% CI_{boot} [-0.26, -0.004]) and environmental donation (b = -0.37, SE_{boot} = 0.20, 95% CI_{boot} [-0.88, -0.06]) but not for subsequent pro-environmental behavioral intentions (b = -0.007, SE_{boot} = 0.03, 95% CI_{boot} [-0.07, 0.06]), and environmental message writing (b = -0.19, SE_{boot} = 0.19, 95% CI_{boot} [-0.64, 0.12]; see Table 2). The results were similar for the repeated pro-environmental behavioral items[8]. As noted, the above sets of analyses controlled for climate change skepticism, but the findings remained consistent when climate change skepticism was excluded as a covariate.

These results provide some support for Hypothesis 1, with a negative spillover documented for subsequent environmental policy support and donation but not for the remaining subsequent engagement outcome measures.

Moderated Mediation Analyses

As expected, analyses showed that promotion focus significantly interacted with perceived goal progress to predict intention for subsequent pro-environmental behaviors (b = -0.07, SE = 0.04, p = .050[9], ΔR^2 = .02). This interaction was not found for subsequent pro-environmental policy support (b = -0.09, SE = 0.05, p = .111, ΔR^2 = .01), environmental donation (b = -0.06, SE = 0.19, p = .764, ΔR^2 = .0005), environmental message writing (b = -0.09, SE = 0.23, p = .704, OR = 1.09; Table 3). The results for subsequent intention for repeated prior pro-environmental behaviors[10] were similar. The conditional effects of perceived goal progress on

[8] Prior pro-environmental engagement positively predicted perceived goal progress (b = 0.86, SE = 0.28, p = .003, $F(2, 55)$ = 4.85, R^2 = 0.15). Perceived goal progress was not significantly associated with subsequent intentions for repeated prior pro-environmental behaviors (b = 0.02, SE = 0.05, p = .768, ΔR^2 = .34). The indirect effect of prior engagement via perceived goal progress was not significant (b = 0.01, SE_{boot} = 0.05, 95% CI_{boot} [-0.09, 0.11]).

[9] This interaction was statistically, not marginally, significant with an exact p-value was .0497 and a confidence interval of [-0.14, -0.0001].

[10] Promotion focus did not significantly interact with perceived goal progress to predict repeated prior pro-environmental behavioral intentions (b = -0.01, SE = 0.05, p = .765, ΔR^2 = .0009).

subsequent pro-environmental behavioral intentions were not significant at the mean, or at 1 *SD* above and below the mean of promotion focus (-1 *SD*: b = 0.06, SE = 0.05, p = .253; mean: b = -0.009, SE = 0.04, p = .804; +1 *SD*: b = -0.08, SE = 0.05, p = .123). The Johnson-Neyman procedure (Preacher et al., 2007) was used to further probe the interaction beyond ±1 *SD* of the mean. Although this showed no region of significance, the negative effect of perceived goal progress on subsequent pro-environmental behavioral intentions was marginally significant only for participants with a stronger promotion focus (e.g., at promotion focus score of 3.30: b = -0.24, SE = 0.12, p = .050[11]; see Figure 3a). The index of moderated mediation was significant for subsequent pro-environmental behavioral intentions (b = -0.06, SE = 0.03, 95% CI_{boot} [-0.13, -0.006]).

Excluding climate change skepticism as a covariate, the interaction between perceived goal progress and promotion focus became stronger (b = -0.08, SE = 0.04, p = .030, ΔR^2 = .03). The conditional effects of perceived goal progress on subsequent pro-environmental behavioral intentions were still not significant at the mean, or at 1 *SD* below and above the mean of promotion focus (mean: b = -0.009, SE = 0.04, p = .821; -1 *SD*: b = 0.07, SE = 0.05, p = .195; +1 *SD*: b = -0.09, SE = 0.05, p = .095). Further probing this interaction, the Johnson-Neyman method showed that promotion focus scores moderated the association between perceived goal progress and pro-environmental behavioral intentions when promotion focus scores were 1.68 to 3.30 (see Figure 3b). Perceiving goal progress negatively predicted pro-environmental behavioral intentions for people with a stronger promotion focus. However, perceiving goal progress was not significantly associated with their behavioral intentions for people with a weaker promotion focus (scores less than 1.68). The index of moderated mediation remained significant for

[11] This was marginally significant with an exact p-value of .0504 and a confidence interval of [-0.48, 0.0004].

subsequent pro-environmental behavioral intentions (b = -0.06, SE = 0.03, 95% CI_{boot} [-0.13, -0.009]). Otherwise, the main findings remained similar when climate change skepticism was not controlled for.

Partially supporting Hypotheses 2 and 3, these results showed that the negative association between perceived goal progress and subsequent pro-environmental engagement (pro-environmental behavioral intentions) was moderated by participants' promotion focus, and perceived goal progress mediated the moderated indirect effect of prior pro-environmental engagement on subsequent pro-environmental behavioral intentions.

Discussion

Study 1 established preliminary evidence of negative spillovers. Participants with more prior pro-environmental engagement showed weaker support for pro-environmental policies and willingness to donate to an environmental charity. This negative spillover was mediated by the perception of more goal progress. The negative influence of perceived goal progress on subsequent pro-environmental engagement (namely, pro-environmental behavioral intentions) was also pronounced for participants with a stronger promotion focus. There was also some support for the hypothesized moderated mediation model for subsequent pro-environmental behavioral intentions.

Chapter 7: Study 2

To further provide causal evidence for the theorized account, Study 2 manipulated prior engagement in pro-environmental behaviors. Study 2 was pre-registered prior to data collection (https://osf.io/5wsbm/?view_only=3f5ab303d8fc4fb2a216faa2f2766c07).

Participants and Procedures

An a priori power analysis (Faul et al., 2009) showed that 316 to 430[12] participants were needed to detect the interaction effect (Perceived Goal Progress × Promotion Focus) found in Study 1 with 80% power at $\alpha = .05$. To further buffer for poor data (e.g., dishonest or inattentive responding), Study 2 targetted and recruited 530 American participants to participate in an online survey via CloudResearch in exchange for a cash token.

The survey started with the regulatory focus strength measure used in Study 1. Following this, participants were presented with a task that manipulated their engagement in prior pro-environmental behavior, a measure of their perceived goal progress, and some filler scales used in Study 1. However, one distinction is that the perceived goal progress items were mostly reworded to refer to participants' personal pro-environmental goal ("my goal of addressing climate change") rather than a broad pro-environmental goal ("the goal of addressing climate change"). Finally, participants responded to two subsequent pro-environmental engagement measures administered in Study 1, namely the behavioral intentions measure and the charity donation measure. This was to keep the duration of this online experiment brief. The full set of materials can be found in the Appendix.

Study 2 used similar exclusion criteria (honesty and attention[13] checks) as per Study 1, including additional exclusion criteria based on participants' responses to the manipulation task. This removed 41 participants who provided semantically unmeaningful (e.g., "Well one of the survey") or inappropriate (e.g., "I never try to help the environment […] I threw my trash out into the street") responses on the manipulation task. These cases were independently determined by two blind raters, with disagreements being reconciled by a separate rater. Another three

[12] This range is based on the interaction effect, excluding and including climate change skepticism as a covariate.
[13] The attention check measure used in Study 2 was a simpler version of an instructed-response attention check used in Study 1. This measure only required participants to select a particular option.

participants were excluded as they found it extremely difficult[14] to recall and describe the behavior for the manipulation task. Finally, five participants failed either the honesty check or attention check. The final sample comprised 481 participants (M_{age} = 37.59, SD_{age} = 11.42; 60.1% female[15]; 79.4% White[16]).

Materials

Regulatory Focus

The study began with the same idiographic measure of regulatory focus (promotion focus α = .80, prevention focus α = .82) used in Study 1.

Manipulation of Engagement in Prior Goal-Congruent (Pro-environmental) Behaviors

Next, participants were randomly assigned to recall and describe in detail either a pro-environmental behavior that they have engaged in during the past week (prior engagement condition) or a neutral behavior from their typical Tuesday routine (control condition) (Jordan et al., 2011). This manipulation is based on the experimental task used in pro-environmental and health spillover literature (e.g., Brügger & Höchli, 2019) and moral licensing literature (e.g., Jordan et al., 2011). In the final sample, 239 participants were assigned to describe a pro-environmental behavior, and 242 participants were assigned to describe a routine behavior.

To determine the effectiveness of the manipulation, two blind coders rated the environmental friendliness of participants' recalled behaviors from 0 (*not at all environmentally friendly*) to 3 (*very environmentally friendly*) (adapted from Brügger & Höchli, 2019). The

[14] It should be noted that this exclusion criterion was not pre-registered and was based on participants' perceived difficulty ratings of the task from 1 (*not at all*) to 5 (*extremely*).
[15] Gender was measured with seven options: male, female, non-binary, transgender, intersex, others (please specify), and prefer not to say. The reported percentage includes one participant who specified "both" for the "others" option and four participants that preferred not to disclose their gender.
[16] Ethnicity was assessed with eight choices: White, Black or African American, Indian, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, Multiracial (please specify), and Others (please specify). The reported percentage includes seven participants that specified being of either European (n = 2), Hispanic (n = 4), or Latino (n = 1) origin.

reliability of these ratings was computed using the '*irr*' package in R (Gamer et al., 2019) and showed an acceptable intraclass correlation coefficient (ICC) of .85. Aggregated ratings of both coders were used as a manipulation check to confirm that the participants in the prior engagement condition recalled more environmentally friendly past behaviors (as reported in the Results section).

Perceived Goal Progress

The six items of perceived goal progress per Study 1 were used in Study 2 but adapted to capture one's personal pro-environmental goal progress. This was done by rewording all instances of "the goal" with "my goal". The other two items that were not revised read: "I can now focus on goals other than addressing climate change" and "I have achieved my goal of addressing climate change for the moment". These six items were rated from 1 (*strongly disagree*) to 7 (*strongly agree*) ($\alpha = .91$).

Engagement in Subsequent Goal-Congruent (Pro-environmental) Behaviors

Finally, participants responded to two rather than five pro-environmental engagement measures to keep the survey brief. To examine spillover effects, a measure of pro-environmental behavioral intentions and an environmental charity donation task were presented in a random order to measure engagement in subsequent goal-congruent behaviors.

Intentions for subsequent pro-environmental behaviors were measured with 19 behavior items (adapted from Brick et al., 2017), in which 17 behaviors were used in Study 1. Participants indicated their likelihood of engaging in these behaviors over the next three months (1 = *not at all likely* to 5 = *very likely*, N/A = *not applicable;* $\alpha = .83$). The two behavior items that were added to Study 2 read "drive slower than 60mph on the highway" and "eat local food (produced within 100 miles)" because these items were applicable to the current American adult sample. As

in Study 1, "N/A" responses were coded as missing before determining the reliability and aggregate score for this scale.

The same measure of environmental charitable donation in Study 1 was administered (adapted from Tam, 2019; Zaval et al., 2015). Participants indicated the amount they would donate to an environmental charity (Trees for the Future) and would keep for themselves, if they won an additional $10 bonus.

Results

Analytical Approach

Table 4 reports the descriptive, reliability, and correlational statistics of the key variables. To first ascertain the effectiveness of the prior engagement manipulation, an independent samples *t*-test was performed in R. Following the same analytical approach in Study 1, mediation analyses were performed with PROCESS macro Model 4 for R (Hayes, 2022). Next, moderated mediation analyses were conducted with PROCESS macro Model 14 for R (Hayes, 2022). Separate sets of analyses were performed for each of the two measures of subsequent pro-environmental engagement, with each analysis testing the influence of one regulatory focus while simultaneously controlling for the other. Bootstrapping bias corrected 95% confidence intervals were obtained with 10,000 sampling iterations, and all interaction terms were mean-centered. For all analyses, prior engagement in pro-environmental behaviors condition was dummy coded (1 = pro-environmental engagement, 0 = control). The reported results controlled for climate change skepticism, and any discrepancies in findings that exclude climate change skepticism as a covariate are noted.

Manipulation Check

The manipulation was effective, with coders rating the behaviors recalled in the prior pro-environmental engagement condition (M = 1.55, SD = 0.81) as more environmentally friendly than the behaviors recalled in the control condition (M = 0.04, SD = 0.20), $t(265.93) = -28.10$, $p < .001$.

Mediation Analyses

As expected, recalling a prior pro-environmental (vs. control) behavior was positively associated with perceived goal progress (b = 0.72, SE = 0.12, $p < .001$, $F(2, 478) = 21.95$, R^2 = 0.08). Unexpectedly, perceived goal progress positively predicted subsequent pro-environmental behavioral intentions (b = 0.15, SE = 0.02, $p < .001$, $\Delta R^2 = .14$). Perceived goal progress was, as expected, negatively related to subsequent environmental donation (b = -0.06, SE = 0.10, p = .528, $\Delta R^2 = -.04$[17]) but not significantly so. There was a positive and significant indirect effect of prior pro-environmental engagement via perceived goal progress for subsequent pro-environmental behavioral intentions (b = 0.11, SE_{boot} = 0.03, 95% CI_{boot} [0.07, 0.17]). This indirect effect was not observed for subsequent environmental donation (b = -0.05, SE_{boot} = 0.07, 95% CI_{boot} [-0.20, 0.10]; see Table 5). These findings remained consistent when climate change was excluded as covariate.

Overall, these results did not support Hypothesis 1. Perceived goal progress mediated a positive (instead of a negative) relationship between prior engagement and subsequent engagement, which differed from the hypothesized direction and the findings in Study 1.

Moderated Mediation Analyses

[17] The R^2 value decreased from the exact R^2 of 0.0841 for the model with prior behavior predicting perceived goal progress to the R^2 of 0.0451 for the model with prior behavior predicting subsequent environmental donation via perceived goal progress.

Promotion focus significantly interacted with perceived goal progress to predict subsequent donation to an environmental charity (b = 0.14, SE = 0.07, p = .044, ΔR^2 = .008). The conditional effects of perceived goal progress on subsequent donation behavior were not significant at the mean, or at 1 *SD* below and above the mean of promotion focus (mean: b = -0.02, SE = 0.10, p = .824; -1 *SD*: b = -0.22, SE = 0.13, p = .104; +1 *SD*: b = 0.17, SE = 0.15, p = .239). The Johnson-Neyman method was used to further probe this interaction and showed that promotion focus moderated the association between perceived goal progress and donation behavior when promotion focus scores were -3.80 to -2.69 (see Figure 4a). For people with a weaker promotion focus (scores less than -2.69), perceiving goal progress negatively predicted donation behavior. For people with a stronger promotion focus (scores more than -2.69), perceiving goal progress did not significantly predict their donation behavior. The index of moderated mediation was significant for subsequent environmental donation (b = 0.10, SE = 0.06, 95% CI_{boot} [0.005, 0.23]; see Table 6). Thus, the results showed that the indirect negative effect of prior pro-environmental engagement on subsequent environmental donation via promoting perceived goal progress was found among participants with a weaker promotion focus but not among those with a stronger promotion focus as hypothesized.

When climate change was excluded as a covariate, the interaction between promotion focus and perceived goal progress became stronger (p = .008), and the conditional effect of perceived goal progress on subsequent donation behavior became significantly positive at 1 *SD* above the mean of promotion focus (b = 0.29, SE = 0.14, p = .043). The Johnson-Neyman method showed not only a negative spillover for participants with a weaker promotion focus (scores of -1.87 and below) but also a positive spillover for participants with a stronger promotion focus (scores of 1.24 and above; see Figure 4b). Further, the conditional indirect

effect of prior engagement on subsequent donation behavior via perceived goal progress also became significantly positive at 1 *SD* above the mean of promotion focus (*b* = 0.21, *SE* = 0.12, 95% CI_{boot} [0.02, 0.48]).

However, when considering the dependent measure of subsequent pro-environmental behavioral intentions, promotion focus did not interact with perceived goal progress to predict subsequent behavioral intentions (*b* = 0.004, *SE* = 0.01, *p* = .753, ΔR^2 = .0002; Table 6). Relatedly, the index of moderated mediation was not significant (*b* = 0.003, *SE* = 0.01, 95% CI_{boot} [-0.02, 0.03]).

Overall, the findings are inconsistent with Hypotheses 2 and 3, as perceived goal progress mediates a positive rather than a negative relationship between prior engagement and subsequent engagement in terms of pro-environmental behavioral intentions. Further, for environmental donation behavior, there was a negative spillover found among participants holding a weaker promotion focus and a positive spillover found among participants holding a stronger promotion focus (when climate change skepticism was not controlled for).

Discussion

To recapitulate, Study 1 supported the hypothesized model, demonstrating a negative pro-environmental behavioral spillover mediated via perceived goal progress, which was more pronounced under a stronger promotion focus. In contrast, Study 2 demonstrated a positive pro-environmental behavioral spillover mediated via perceived goal progress for subsequent pro-environmental behavioral intentions. Also, a negative spillover for environmental donation mediated via perceived progress was observed at lower but not higher levels of promotion focus. Conversely, a positive spillover for environmental donation mediated via perceived progress was

found under higher levels of promotion focus but only when climate change skepticism was excluded as a covariate.

To speculate, the variation in findings may be attributable to whether the pro-environmental goal was a broad collective goal ("the goal" of addressing climate change) or a personal one ("my goal"). Therefore, Study 3 attempted to reconcile these findings by manipulating the type of pro-environmental goal that was made salient when individuals evaluated the perceived progress of the goal.

Chapter 8: Study 3

Studies 1 and 2 showed a differing pattern of results. One conjecture for this discrepancy is the use of differential wording when measuring the perception of goal progress across the two studies. For Study 1, perceived goal progress items mostly referred to serving a seemingly broad collective pro-environmental goal ("the goal of addressing climate change"). For Study 2, these items mostly referred to serving a personal pro-environmental goal ("my goal of addressing climate change"). Engagement in pro-environmental behaviors can be construed as contributing to the goal of addressing climate change at the individual level and collective level (Fritsche et al., 2018; Landmann & Rohmann, 2020; Rees & Bamberg, 2014).

Personal goal attainment largely relies upon individuals' motivations to take their own actions. In contrast, collective goal attainment requires members of a collective group (e.g., society, humankind) to act together. People may withhold their individual effort in group endeavors. As people may feel less responsible for their actions in groups and regard their contributions to be unidentifiable, they tend to expend less effort (socially loaf) when working collectively than when working individually (Karau & Williams, 1993; Latané et al., 1979).

Similarly, people may view their individual efforts as unnecessary, thereby free-riding on the efforts of others (Kerr & Bruun, 1983; Sweeney, 1973).

The actions of a single individual, while important, may contribute little to the attainment of a collective goal. Compared to collective goals, perceiving individual progress toward a personal goal may signify greater potential for goal attainment. Therefore, subsequent efforts may also be perceived as more effective for attaining personal goals than for collective goals, which are also dependent on the contribution of others. Thus, individuals may expect that expending subsequent goal-directed efforts can translate into the attainment of personal goals, but less so for the attainment of collective goals.

I argue that this consideration of expected goal attainment also matters more to promotion-focused (vs. prevention-focused) individuals. Promotion-focused individuals construe goals as ideals and engage in goal pursuit when they see opportunities for advancement (Hui & Molden, 2014; Shah & Higgins, 1997). These opportunities would be more apparent for goals with a greater chance of being achieved. In contrast, prevention-focused individuals construe goals as oughts and engage in goal pursuit when they see the goal is necessary (Freitas et al., 2002; Zaal et al., 2011), even if the chances for goal attainment are not high. Accordingly, promotion-focused individuals place more weight on the expectancy for goal attainment than prevention-focused individuals for high-value goals (Shah & Higgins 1997; Zaal et al., 2012), with promotion-focused individuals being more motivated to pursue subsequent goal-directed behaviors only when goal attainment is likely. In the context of the valued goal of social change, promotion-focused individuals expressed willingness to engage in collective action to the extent that they believed goal attainment was likely (Zaal et al., 2012). This research showed that prevention-focused individuals' willingness for collective action did not depend on their

expectancy of goal attainment as they believed this valued goal should be pursued regardless of its expected attainment.

Building on this line of reasoning, Study 3 sought to test a moderated moderation account (see Figure 2), in which personal/collective goal types and regulatory focus would each moderate the association between perceived goal progress and subsequent pro-environmental engagement. It is speculated that perceived progress toward a personal goal would lead to higher levels of subsequent pro-environmental engagement among individuals with a stronger (vs. weaker) promotion focus; however, perceived progress toward a collective goal would lead to lower levels of subsequent pro-environmental engagement among individuals with a stronger (vs. weaker) promotion focus (Hypothesis 4).

> *Hypothesis 4.* Promotion focus and goal type would moderate the relationship between perceived goal progress from engagement in prior behaviors and engagement in subsequent behaviors. In the context of a personal goal, there would be a positive behavioral spillover that is more pronounced for individuals with a stronger (vs. weaker) promotion focus. In the context of a collective goal, there would be a negative behavioral spillover that is more pronounced for individuals with a stronger (vs. weaker) promotion focus.

It should be noted that the focus of Study 3 is to test the joint moderating effects of goal type and regulatory focus on the relationship between perceived goal progress from prior pro-environmental engagement on subsequent pro-environmental engagement rather than the individual moderating effects of goal type and regulatory focus.

Study 3 used a 2 × 2 between-subjects design that manipulated perceived goal progress (low vs. high) and goal type (personal vs. collective). This experiment was pre-registered[18] prior to data collection (https://osf.io/fc3eb/?view_only=dfaacb8f2b28432d8b340bf9892686b2).

Participants and Procedures

Since Study 3 is a 2 × 2 experiment, an a priori power analysis for a two-way ANOVA with the 'pwr2' package in R (Lu et al., 2017) was conducted to derive a rough estimate for sample size. The analysis recommended a total of 404 participants for detecting conservatively small effects (for perceived goal progress and goal type) of 0.1 with 80% power at $\alpha = .05$. Considering that Study 3 mainly tested a three-way interaction effect (perceived goal progress × goal type × promotion focus effect) and the potential for data exclusions (e.g., dishonest or inattentive responding), the study sought to recruit 600 participants. These participants were recruited from CloudResearch and compensated for participating in an online survey. Participants first completed the regulatory focus strength measure used in Studies 1 and 2. One difference was that after participants completed this measure, they answered some questions[19] about their experience in completing it in Study 3.

They then completed a task that manipulated their perceived goal progress from prior pro-environmental engagement and answered a perceived progress manipulation check. Following this, they responded to a task that manipulated goal type and a corresponding

[18] In the pre-registration, the results for Study 2 that excluded climate change skepticism as a covariate (i.e., showing a positive spillover under a stronger promotion focus) were reported.

[19] These questions were included as some (excluded) responses in Study 2 showed that participants may submit careless and nonmeaningful answers (e.g., writing a number) or blank responses. To address this, Study 3 set these regulatory focus strength attributes as forced-response fields that required non-numeric text. Submitting a numeric answer or a blank response would prompt participants to re-submit their answer to proceed. As the regulatory focus strength measure is time-sensitive, it would be unclear if longer response times capture a weaker form of regulatory focus or a delay due to the submission of unacceptable answers. Thus, these follow-up questions were used to identify and screen out participants that faced technical difficulties with submitting their answers or provided non-valid answers for this measure.

manipulation check. This task required participants to elaborate on how one of their prior pro-environmental behaviors can contribute to either a personal or collective pro-environmental goal. Finally, after answering the same filler scales used in Studies 1 and 2, participants completed two subsequent pro-environmental engagement measures shown in a randomized manner. These subsequent engagement measures comprised the behavioral intentions scale used in Study 1 and the charity donation question used in Studies 1 and 2. These two outcome measures were selected as they each showed a significant perceived progress × promotion focus interaction across Studies 1 and 2.

Study 3 employed the same covariate (climate change skepticism) and exclusion protocol (honesty and attention[20] checks) per Study 2 to screen out irrelevant, poor quality, or suspicious responses. Applying these criteria first removed 24 participants for indicating no prior pro-environmental engagement. An additional 25 participants were excluded as their responses to the goal manipulation task either made little sense (e.g., "one time work long time") or explicitly noted that their selected behavior does not relate to or help with climate change (e.g., "I did not litter because it just looks horrible. […] It has nothing to do with "climate change" as that is a natural process that has occurred since the earth was formed."). Third, participants who either experienced some technical difficulties with the regulatory focus measure or provided non-valid answers were excluded. Finally, 24 participants who failed either the honesty or attention check were excluded. The final sample consisted 501 participants (M_{age} = 37.62, SD_{age} = 11.37; 55.7% female[21]; 75.0% White[22]).

[20] Study 3 used the same instructed-response attention check measure administered in Study 2.
[21] The same measure for gender in Study 2 was used. The reported percentage includes eight participants who chose not to disclose their gender.
[22] Ethnicity was measured using the same eight options in Study 2. The reported percentage includes nine participants that selected "Others" and specified being of either European (n = 1), Western Indian (n = 1), Hispanic (n = 2), Latino (n = 2), or Mexican (n = 1) origin, or provided vague answers (n = 2).

Since Study 3 used the same idiographic measure of regulatory focus in the preceding two studies, the Measures Section will discuss the materials for other remaining key variables. The full set of materials can be found in the Appendix.

Materials

Regulatory Focus

As per Studies 1 and 2, the same idiographic measure (promotion focus $\alpha = .81$, prevention focus $\alpha = .82$) was used to measure regulatory focus.

Manipulation of Perceived Progress from Engagement in Prior Goal-Congruent (Pro-environmental) Behaviors

Participants were randomly assigned to one of the four conditions: low perceived progress toward a personal pro-environmental goal, high perceived progress toward a personal pro-environmental goal, low perceived progress toward a collective pro-environmental goal, or high perceived progress toward a collective pro-environmental goal. For the low perceived progress conditions, participants were provided with a list of 12 pro-environmental behaviors and asked to select the behaviors they had engaged in the past month. For the high perceived progress conditions, participants were given the same instructions but with a list of four pro-environmental behaviors. These four behaviors were also included in the low perceived progress (i.e., 12 behaviors) condition. Of import, the remaining eight behaviors in the low perceived progress condition were less commonly engaged in and more costly (e.g., buying an electric car, volunteering time for environmental causes). This contrasts with the four behaviors which are more common and less costly (e.g., not littering) in the high perceived progress condition.

To elaborate, this manipulation was inspired by the research on the availability heuristic and experienced ease of recall (Schwarz et al., 1991). For example, this line of research showed

that asking people to recall more (vs. less) examples of assertive behaviors led to self-attributions of lower (vs. greater) assertiveness. This is also similar to manipulations used in other studies that vary the difficulty of behavioral ratings to manipulate the extent of prior engagement (Lacasse, 2016). In the "few behaviors" condition, participants would find it difficult to indicate engagement in many behaviors because they selected behaviors they engaged in *most of the time*. In the "many behaviors" condition, participants would find it easier to indicate engagement because they selected behaviors they engaged in *at least occasionally*.

In the current goal progress manipulation task, participants were expected to indicate less engagement in the "12 behaviors" condition compared to the "four behaviors" condition and therefore perceived less goal progress in the former condition. Participants were given the option to specify that they did not previously engage in any of the presented pro-environmental behaviors for all conditions. Depending on their assigned goal type, participants also read that these pro-environmental behaviors contributed to either a personal or collective goal. Sample behaviors on both lists include "Recycle", "Not litter", and "Use reusable products (e.g., shopping bags, containers)".

Manipulation of Personal/Collective Goal Type

To further manipulate goal type[23], participants were asked to select one of their prior pro-environmental behaviors and explain how this behavior can contribute to either their personal or the collective goal of addressing climate change.

Engagement in Subsequent Goal-Congruent (Pro-environmental) Behaviors

[23] As part of some initially collected data (n = 50), many participants reported their pro-environmental behaviors without explaining how the behaviors could positively impact their personal or the collective goal. This suggested that the task instructions may not have been clear enough. Thus, this manipulation was refined for subsequent batches of data collection by including an example of how a behavior can contribute to either their personal or the collective pro-environmental goal (see Appendix).

To determine the nature of spillover effects, participants completed a pro-environmental behavioral intentions scale and an environmental charitable donation task as proxies for subsequent goal-congruent behaviors.

The pro-environmental behavioral intentions scale is the same six-item measure administered in Study 1 (Zaval et al., 2015), in which participants rated the likelihood they would perform six pro-environmental behaviors in the next three months from 1 (*not at all likely*) to 5 (*very likely*) and N/A (*not applicable*) ($\alpha = .65$). As per Studies 1 and 2, the reliability and aggregate score for this measure were evaluated after coding "N/A" responses as missing. Participants' willingness to make an environmental donation was assessed with the same donation task per Studies 1 and 2 (adapted from Tam, 2019; Zaval et al., 2015).

Results

Analytical Approach

Table 7 displays the descriptive, reliability, and correlational statistics for the key variables. First, an independent samples *t*-test was performed in R to test the efficacy of the perceived goal progress from prior engagement manipulation. Second, descriptive statistics were examined to confirm the effectiveness of the goal type manipulation. Third, moderated moderation analyses were conducted with PROCESS macro Model 3 for R (Hayes, 2022). Bias corrected 95% confidence intervals were estimated with 10,000 bootstrap sampling iterations and with interaction terms mean-centered. Perceived goal progress was dummy-coded (1 = high perceived progress, 0 = low perceived progress condition), and so was goal type (1 = collective goal, 0 = personal goal condition). As with Studies 1 and 2, each subsequent engagement measure was analyzed separately. Where the influence of promotion focus was tested, prevention focus was included as a covariate. Climate change skepticism was included as a covariate in all

models. Discrepant findings due to the inclusion of this covariate are reported, if any. The moderated moderation analyses were also repeated after excluding participants that failed the goal type manipulation check and are reported in a footnote.

Manipulation Checks

As a manipulation check for perceived goal progress, participants rated on three items such as "I have made sufficient progress toward the goal of addressing climate change" and "I feel I have made progress toward the goal of addressing climate change" (1 = *strongly disagree* to 7 = *strongly agree*; adapted from Schwabe et al., 2018). Before answering the manipulation check items, participants were reminded of the number of behaviors they selected among the number of behaviors they were presented with. The three items were aggregated to form a composite score (α = . 75). However, participants in the low progress condition (M = 3.74, SD = 1.34) perceived similar progress as those in the high progress condition (M = 3.82 , SD = 1.30), $t(499) = -0.67$, $p = .502$. One potential explanation is that the task mostly manipulated participants' level of perceived progress but not the perceived adequacy of this progress. Exploratory analysis with the item that captured the level of perceived goal progress ("I feel I have made progress toward the goal of addressing climate change") showed that perceived goal progress from prior engagement manipulation was effective. Participants perceived greater goal progress in the high progress condition (M = 4.37 , SD = 1.41) than those in the low progress condition (M = 4.10 , SD = 1.49), $t(499) = -2.04$, $p = .041$. This possibility is further elaborated on in the Discussion section.

For the goal type manipulation check, participants were asked to indicate if their behaviors were described as contributing toward their personal or the collective goal of

addressing climate change. This manipulation was somewhat effective, with 363 (72.5%) participants accurately identifying their assigned pro-environmental goal type.

Moderated Moderation Analyses

Although there was limited support for the effectiveness of the perceived progress and goal type manipulations, the planned main analyses were still conducted. Results showed that perceived goal progress did not significantly predict subsequent intention for pro-environmental behaviors (b = -0.05, SE = 0.11, p = .622) nor donation to an environmental charity (b = 0.18, SE = 0.36, p = .613). Perceived progress did not significantly interact with promotion focus nor with goal type to predict subsequent pro-environmental behavioral intentions (perceived progress × promotion focus: b = -0.13, SE = 0.09, p = .117; perceived progress × goal type: b = 0.07, SE = 0.15, p = .662) and subsequent environmental donation (perceived progress × promotion focus: b = -0.17, SE = 0.29, p = .556; perceived progress × goal type: b = -0.43, SE = 0.50, p = .389). The interaction between promotion focus and goal type also did not predict either two forms of subsequent pro-environmental engagement (pro-environmental behavioral intentions: b = 0.02, SE = 0.09, p = .825; environmental donation: b = -0.19, SE = 0.28, p = .507). Of import, the three-way interaction between perceived goal progress, promotion focus, and goal type did not predict subsequent pro-environmental behavioral intentions (b = 0.15, SE = 0.12, p = .215, F(1, 491) = 1.54, ΔR^2 = .003) nor environmental donation (b = 0.48, SE = 0.40, p = .230, F(1, 491) = 1.45, ΔR^2 = .003). These results are summarized in Table 8 and remain consistent when climate change skepticism is not controlled for. It is also worth noting that excluding participants who

failed the goal type manipulation check did not change these results[24]. Exploratory analyses with the perceived goal progress manipulation check as the predictor provided mixed support[25].

Together, the findings did not support Hypothesis 4 as there was no significant interaction between perceived goal progress, promotion focus, and goal type on either two types of subsequent pro-environmental engagement.

Discussion

[24] Analyses showed that perceived goal progress did not predict either type of subsequent pro-environmental engagement (pro-environmental behavioral intentions: b = -0.05, SE = 0.12, p = .675; environmental donation: b = -0.17, SE = 0.41, p = .673). Perceived goal progress also did not significantly interact with promotion focus (pro-environmental behavioral intentions: b = -0.05, SE = 0.09, p = .600; environmental donation: b = -0.02, SE = 0.33, p = .943) nor with goal type (pro-environmental behavioral intentions: b = -0.02, SE = 0.18, p = .902; environmental donation: b = -0.59, SE = 0.61, p = .337). The three-way interaction between perceived goal progress, promotion focus, and goal type did not significantly predict behavioral intentions (b = 0.13, SE = 0.15, p = .393) or donation behavior (b = 0.75, SE = 0.51, p = .143). This pattern of results remained consistent when climate change skepticism is not controlled for.

[25] The exploratory analyses were performed with the 3-item perceived goal progress manipulation check measure. Results indicated that perceived goal progress positively predicted subsequent intention for pro-environmental behaviors (b = 0.15, SE = 0.04, p < .001) but not environmental donation (b = -0.05, SE = 0.14, p = .750). Perceived goal progress interacted with promotion focus to predict pro-environmental behavioral intentions (b = -0.07, SE = 0.03, p = .015) but not environmental donation (b = 0.06, SE = 0.10, p = .534). No significant interactions between perceived goal progress and goal type were found for either type of subsequent pro-environmental engagement (pro-environmental behavioral intentions: b = 0.01, SE = 0.06, p = .822; environmental donation: b = 0.12, SE = 0.19, p = .542). A significant three-way interaction between perceived goal progress, promotion focus, and goal type was found for pro-environmental behavioral intentions (b = 0.11, SE = 0.04, p = .012) and not for environmental donation (b = -0.04, SE = 0.15, p = .785). Decomposing this significant three-way interaction showed that the interaction between perceived goal progress and promotion focus negatively predicted pro-environmental behavioral intentions for a personal pro-environmental goal (b = -0.07, F(1, 491) = 5.95, p = .015) but not for a collective pro-environmental goal (b = 0.04, F(1, 491) = 1.45, p = .229). For people with a weaker promotion focus (1 *SD* below the mean), perceiving progress toward a personal goal was positively associated with pro-environmental behavioral intentions (b = 0.24, SE = 0.05, p < .001) and perceiving progress toward a collective goal was not associated with behavioral intentions (b = 0.11, SE = 0.06, p = .056). For people with a moderate (mean) promotion focus, perceiving progress toward either a personal goal or a collective goal positively predicted pro-environmental behavioral intentions (personal goal: b = 0.15, SE = 0.04, p < .001; collective goal: b = 0.16, SE = 0.04, p < .001). For people with a stronger promotion focus (1 *SD* above the mean), perceiving progress toward a collective goal positively predicted pro-environmental behavioral intentions (b = 0.21, SE = 0.05, p < .001) but perceiving progress toward a personal goal did not predict behavioral intentions (b = 0.06, SE = 0.06, p = .303). These exploratory analyses did not support Hypothesis 4 as it suggested a positive spillover for a collective pro-environmental goal among people with a strong promotion focus rather than a negative spillover, as hypothesized. Analyses also did not show the hypothesized significant positive spillover for a personal pro-environmental goal among people with a strong promotion focus.

Study 3 sought to reconcile discrepant findings from Study 1 and Study 2. Unfortunately, the results remained inconclusive as the main analyses in Study 3 did not reach statistical significance. Study 3 did not find significant positive or negative spillover effects, nor did promotion focus or goal type moderate these spillover effects.

One explanation as to why perceived goal progress did not predict subsequent pro-environmental engagement relates to the nature of the manipulation. It appears that Study 3 effectively induced the level of goal progress but not its perceived sufficiency. This contrasts with the manipulation of prior engagement in Study 2; it is understandable for participants to perceive greater and sufficient goal progress from recalling a pro-environmental behavior than from recalling a neutral behavior. Likewise, with the measure of prior engagement in Study 1, participants perceived more and sufficient goal progress after indicating the frequency of their engagement in several pro-environmental behaviors. In Study 3, participants indicated their engagement (but not the frequency of this engagement) in pro-environmental behaviors. This meant that they would indicate engagement in a behavior if they had recently performed it once. However, the perceived sufficiency of goal progress is likely achieved through multiple and repeated instances of pro-environmental engagements. Having performed all of the four behaviors one time is unlikely to induce the perception of making sufficient goal progress in the high perceived progress condition. For instance, recycling, using reusable products, turning off electronics when not in use, and not littering may only result in perceived sufficient goal progress when these behaviors are repeatedly engaged in.

Chapter 9: General Discussion

Conceptualizing behavioral spillovers within the theoretical lenses of goals and goal orientation (i.e., regulatory style), this research hypothesized the mediating role of perceived goal

progress in negative spillovers and the moderating role of promotion focus in amplifying such negative spillovers. Results from three studies provided mixed support for these predictions in the domain of pro-environmental behaviors.

Similar to the existing literature, the current research also discovered mixed positive and negative behavioral spillovers (Nash et al., 2017). Although perceived goal progress negatively predicted subsequent pro-environmental engagement in Study 1, perceived goal progress positively predicted subsequent pro-environmental engagement in Study 2. Total and direct effects of prior engagement on subsequent engagement were also positive and significant in Study 1 but not significant in Study 2. Zero-order correlations also showed mixed results, with prior engagement being either positively correlated with some subsequent engagements (e.g., intending to perform pro-environmental behaviors and supporting environmental policies in Study 1) or not correlated with some subsequent engagements (intending to perform pro-environmental behaviors and donating to an environmental charity in Study 2). This is consistent with some research that showed a lack of spillover effects (e.g., Poortinga et al., 2013).

Divergent results on the role of promotion focus in moderating behavioral spillovers were also unexpected. Study 1 first offered some support for the expected moderating influence of promotion focus on the hypothesized negative behavioral spillovers via perceived goal progress. Contrary to the prediction and finding of a negative behavioral spillover observed in Study 1, Study 2 showed that perceiving greater goal progress from prior engagement encouraged more subsequent engagement (i.e., a positive behavioral spillover) among people with a stronger promotion focus. Three caveats should be noted for Study 2's findings. First, this positive spillover became nonsignificant after controlling for individual differences in climate change skepticism. The zero-order correlations in Study 2 revealed that climate change skepticism was

negatively related to both perceived goal progress and subsequent pro-environmental engagement (donation). It is reasonable that climate change skeptics do not see pro-environmental behaviors as beneficial, leading to less perceived goal progress. Second, Study 2 revealed a negative spillover under a weaker promotion focus rather than under a stronger promotion focus as in Study 1. Therefore, the results surrounding the moderating role of regulatory focus were mixed. Third, the significant findings were found for specific, but not all, subsequent pro-environmental engagements (e.g., pro-environmental behavioral intention in Study 1 and environmental charity donation in Study 2).

One potential explanation for the divergent spillover findings was the differential wording of goal types when perceived progress was measured in these two studies. Specifically, Study 1 mostly referenced broad collective goals, whereas Study 2 referenced personal goals. The positive spillover observed for the personal goal context in Study 2 is in line with recent research on the interactive effects of feedback on past pro-environmental behaviors and state-induced (not chronic) regulatory focus shaping intentions for subsequent pro-environmental behaviors (Lalot et al., 2022). While there were mixed findings for the role of a promotion focus, the most highly-powered study (Study 4) in Lalot et al.'s (2022) research found that promotion-focused participants who received positive feedback (vs. negative and no feedback) showed stronger intentions for sustainable festive celebrations. It is reasonable to argue that the positive feedback they received reflected high goal progress. Another recent research showed the interactive effects of goal progress information and chronic regulatory focus on subsequent efforts for a personal academic goal (Toyama, 2022). Promotion-focused students were motivated to study more hours for an exam when they focused on the remaining amount of progress they had to make to attain this goal (progress to be made from their current state to their

end state) compared to the amount of progress they had accomplished (progress made from their initial state to their current state). In the current research, the perceived goal progress measure emphasized participants' end goal state and not their initial goal state (e.g., "I have come closer to my goal of addressing climate change", "I have made considerable progress toward my goal of addressing climate change"). This might have directed participants' attention to the remaining amount of goal progress they needed to attain their personal goal, thus motivating greater subsequent goal-directed effort. In this light, these research findings align with Study 2's finding that a positive spillover is observed for a personal goal, particularly among promotion-focused people.

Bridging Studies 1 and 2, it was speculated that promotion-focused people are more likely to exhibit a positive spillover via perceived goal progress when a personal goal is involved. However, promotion-focused people are more likely to exhibit a negative spillover via perceived goal progress when a collective goal is involved. It is because, in response to a collective goal, promotion-focused people may believe that they have already done their part. Therefore they may choose to lower subsequent pro-environmental engagement.

Study 3 set out to test these ideas, examining whether perceived progress toward a personal goal (vs. a collective goal) from prior engagement would positively (vs. negatively) predict subsequent engagement, which would be more pronounced for promotion-focused people. However, Study 3 did not show the expected moderation of a personal versus a collective goal in accounting for the different directions of spillover effects.

Of note, the positive spillover found in Study 2 may seem contrary to research that showed that perceiving goal progress from a prior risky investment could discourage promotion-focused people's choice of a subsequent risky investment (Zou et al., 2014). One key difference

between the prior research and the current research is the nature of the behavioral domain. In Zou et al.'s (2014) research, engaging in a subsequent risky behavior provided promotion-focused participants not only with the opportunity to make further financial gain but also the possibility to make a financial loss. Promotion-focused people would have found the choice of a subsequent risky option less attractive as it would not be worth losing their current financial gain, displaying a negative behavioral spillover. Unlike this, the nature of the subsequent pro-environmental behavioral engagement in the current research would only provide promotion-focused participants with the chance to further advance, but not regress from, their current pro-environmental goal state. Thus, the current research also points to how the observed negative spillover effect for promotion-focused people's risk-taking behaviors may not generalize to other behavioral domains that do not involve a risk of losing their goal progress.

From a goal-systemic perspective, the observed lack of spillover effects and findings for some subsequent pro-environmental engagements may be expected. While people may engage in various behaviors as means to pursue a goal, some of these behaviors may serve more than one goal at the same time (i.e., multifinality; Kruglanski et al., 2002). For example, conserving electricity not only contributes to a pro-environmental goal but also to a financial goal of saving money (Geng et al., 2019); purchasing green products not only contributes to a pro-environmental goal but also to a goal of affirming one's social status (Braun Kohlová & Urban, 2020). Other pro-environmental behaviors (e.g., educating oneself about the environment) may be viewed as unifinal means, serving a single goal of pro-environmentalism. Pro-environmental behaviors that act as multifinal means (vs. unifinal means) would be less strongly associated with each individual goal, and thereby people may perceive these behaviors as less instrumental in achieving each goal (Zhang et al., 2007). As such, people are less likely to pursue such multifinal

goal means when only one of the goals that these behaviors serve is made salient. As the current research emphasized the single focal goal of addressing climate change, it is possible that participants were less keen to subsequently pursue pro-environmental behaviors that serve other goals in addition to serving the focal goal over behaviors that serve only the focal goal. Related to the consideration of different goal means, people can also be selective about the means they use to attain a goal. For example, recall the significant finding for pro-environmental policy support observed in Study 1. Undergraduate students may have believed that supporting these pro-environmental policies would make an impactful contribution that comes at a limited immediate personal cost to them. As students, they would be less likely to bear the brunt of regulations such as paying increased household electricity taxes.

More broadly, this speaks to the possibility that the link between perceived goal progress and engagement in subsequent goal-congruent behaviors is moderated by behavioral and goal-related attributes. One such moderator might be the perceived instrumentality of the subsequent engagement in addressing the pro-environmental goal. The perception of having made little (vs. substantial) goal progress would signal that goal attainment is distal (vs. proximal). Perceiving little goal progress may mostly influence people's engagement in behaviors that they believe have the most potential to facilitate their goal progress and increase the likelihood of their goal attainment (i.e., highly instrumental behaviors). Another moderator might be the perceived difficulty or costliness of the subsequent engagement. Expending substantial goal-directed effort in the immediate past, potentially signaled by the perception of making significant goal progress, may lead people to subsequently exert less effort (Shah & Kruglanski, 2008). As such, perceiving greater (vs. weaker) goal progress may shape engagement in subsequent behaviors that are easier or less effortful (vs. difficult or effortful). The possibility of behavioral difficulty

explaining the present varied findings across different measures of subsequent pro-environmental engagement is further discussed in the Limitations (Chapter 11).

One final moderator might be the perceived importance of the pro-environmental goal. One research found that underperforming on a goal (e.g., a poor environmental knowledge score that indicated a low propensity to benefit the environment) weakened commitment for further goal-congruent efforts (e.g., lowered willingness to volunteer for environmental activities), but this negative effect was dampened for a more (vs. less) important goal (Devezer et al., 2014). This research also showed that the effect of performing well on a goal on further goal-congruent efforts did not differ across levels of perceived goal importance. Thus, the influence of perceived goal progress on subsequent engagement might be more pronounced when the goal is perceived as less (vs. more) important.

Chapter 10: Theoretical and Practical Implications

Although the studies provided mixed evidence, this research still contributes to theory and practice. Theoretically, the current adds to the literature by applying a goal perspective to studying spillovers. For example, it is important to identify goal-relevant conditions under which positive or negative spillovers may occur. Prior research showed that one such condition is the extent to which prior and subsequent behaviors tap on similar resources (e.g., money or time) in attaining the goal of environmental sustainability (Margetts & Kashima, 2017), with a positive spillover being found for resource-similar prior and subsequent behaviors. Drawing on the regulatory focus theory (Higgins, 1998), the current research also advances such theorizing by investigating the moderating role of an individual disposition (promotion focus) in behavioral spillovers. However, given the mixed evidence for the moderating influence of promotion focus in Studies 1 and 2, more research is required to explicate its role in behavioral spillovers.

The current research also examined the mediating role of perceived goal progress in behavioral spillovers. The goal literature has evinced that progress toward a goal can influence people's subsequent motivation and efforts (Hull, 1932; Kivetz et al., 2006), with people showing greater motivation and effort in goal pursuit when they are closer to goal attainment. Although not empirically substantiated, the current research provides suggestive evidence for the differing roles of perceived progress toward a personal goal and perceived progress toward a collective goal in subsequent actions, which differ in perceived goal attainability via individual efforts. Specifically, when the goal can be attained through individual efforts (a personal goal), perceiving sufficient progress from prior behaviors can positively predict subsequent goal-congruent actions (Study 2). Conversely, when the goal can only be achieved through collaborative efforts (a collective goal), perceiving sufficient progress from prior behaviors can negatively predict subsequent goal-congruent actions (Study 1).

Practically, the current research can inform policymakers seeking to effect change by designing interventions and campaigns. Although the current research does not provide a straightforward solution, it does demonstrate the importance of how a focus on sufficiently high goal progress on either a personal or a collective level may lead to contrasting spillover effects. It also suggests how such a spillover effect would be amplified for people with a promotion focus.

Chapter 11: Limitations and Directions for Future Research

Notwithstanding these contributions, the current research has limitations that should be addressed in future research. The cross-sectional data collected across three studies provided little insight into how long these observed spillovers would last. It is unclear if these effects would similarly occur when prior and subsequent engagements are separated over a longer time period (Lu et al., 2021; Truelove et al., 2021). For example, one study found that the positive

spillover effect of organic waste sorting on households' waste reduction vanishes after a few months (Alacevich et al., 2021). Hence, future investigations will benefit from a longitudinal research approach to explicate the temporal nature of behavioral spillovers.

Another limitation is that quite a few of the pro-environmental measures in the current studies captured behavioral intentions rather than behaviors. Thus, multiple proxy measures of subsequent engagement were administered to capture behavioral spillover effects more comprehensively. Complementing the intention-based and self-report measures of subsequent engagement, measures of supporting pro-environmental policies and writing a pro-environmental message were administered in Study 1, and a measure of donating to an environmental charity was included in Studies 1, 2, and 3. Given the diverse range of findings for different subsequent pro-environmental engagements, it would be valuable for future spillover research to make a theoretical case for examining spillover effects on specific types of subsequent engagement (e.g., more costly or difficult behaviors). For example, some research showed that performing an easier pro-environmental behavior can spill over to more challenging pro-environmental behavior (Lauren et al., 2016). Finally, it remains a possibility that having a pro-environmental intention may provide the "license" to not engage in the actual pro-environmental behavior; as such, the would-be negative spillovers remained unobserved. More generally, it would be ideal for future research to study people's actual engagement in subsequent behaviors.

Relevant to the discussion for the types of subsequent engagement, one consideration is the role of personal/collective goals in pro-environmental behavioral spillovers. Although Study 3's study design did not provide conclusive evidence given the limited effectiveness of the perceived progress and goal type manipulations, Studies 1 and 2 suggested that perceiving sufficient progress toward a collective goal may discourage subsequent behaviors and that the

reverse could be for an individual goal. A single person's actions alone make little difference in stopping or mitigating climate change; only collectives can make a difference. This raises the possibility for future investigations to examine if a spillover occurs when collective climate action (Fritsche & Masson, 2021; Hamann & Reese, 2020) is considered as a subsequent engagement measure in a collective goal context.

Chapter 12: Conclusion

How might engaging in one behavior spill over to negatively affect the likelihood of performing a subsequent goal-congruent behavior? For whom might these spillovers be more likely to occur? The present research set out to answer these questions by testing the mediating role of perceived goal progress and the moderating role of promotion focus in negative behavioral spillovers. Unexpectedly, the results of three studies did not consistently support these predictions. Like the existing literature, the present findings supported mixed evidence of both positive and negative spillovers, and these diverging effects also occurred among promotion-focused individuals. By examining the personal versus collective nature of the goal, Study 3 was not able to reconcile the inconsistent findings. More research is required to examine the boundary conditions and the potential roles of perceived goal progress and regulatory focus in spillovers.

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Tables

Table 1

Means, Standard Deviations, Reliabilities, and Correlations in Study 1 for the Full Sample (N = 161)

Variable	*M*	*SD*	α	1	2	3	4	5	6	7	8
Regulatory Focus											
1. Promotion Focus	-4.59	1.04	.64								
2. Prevention Focus[a]	-4.47	1.14	.74	.78**							
Engagement in Prior Goal-Congruent Behaviors											
3. Prior PE Engagement	2.83	0.48	.77	-.09	-.02						
Perceived Goal Progress											
4. Perceived Goal Progress	3.16	1.14	.90	-.06	.01	.33**					
Engagement in Subsequent Goal-Congruent Behaviors											
5. PEB Intentions	2.88	0.59	.54	-.12	-.05	.39**	.11				
6. PE Policy Support	4.83	0.91	.83	-.06	-.10	.39**	-.02	.27**			
7. Environmental Donation	8.04	3.11	-	-.16*	-.10	.36**	-.04	.28**	.36**		
8. Environmental Persuasion Message[b]	0.14	0.35	-	-.20*	-.16*	.16*	-.03	.02	.20*	.13	
Covariate											
9. Climate Change Skepticism	1.10	0.30	-	.11	.13	-.17*	-.05	.10	-.17*	-.10	-.02

Notes. PE denotes pro-environmental, and PEB denotes pro-environmental behavior. * indicates $p < .05$. ** indicates $p < .01$.

[a] Prevention focus was included as a covariate in the analyses.

[b] Willingness to write an environmental persuasion message was coded as 0 (did not write a message) and 1 (wrote a message).

Table 2

Total, Direct, and Indirect Effects for Models with Perceived Goal Progress Mediating the Association Between Prior Pro-environmental Engagement and Subsequent Pro-environmental Engagement Outcome Measures in Study 1

	Subsequent PE Engagement Outcomes			
	PEB Intentions	PE Policy Support	Environmental Donation	Environmental Persuasion Message[a]
Total Effect of Prior PE Engagement	0.52*** (0.09)	0.70*** (0.14)	2.34*** (0.49)	-
Direct Effect of Prior PE Engagement	0.53*** (0.10)	0.81*** (0.15)	2.71*** (0.51)	1.16* (0.52)
Indirect Effect of Perceived Goal Progress	-0.007 (0.03) [-0.07, 0.06]	-0.10 (0.06) [-0.26, -0.004]	-0.37 (0.20) [-0.88, -0.06]	-0.19 (0.19) [-0.64, 0.12]

Notes. PE denotes pro-environmental, and PEB denotes pro-environmental behavioral. * $p < .05$; ** $p < .01$; *** $p < .001$. Statistics outside parentheses are unstandardized coefficients; statistics in parentheses are standard errors; statistics inside brackets are bootstrapped confidence intervals.

[a] As willingness to write an environmental persuasion message was coded as a dichotomous variable, the statistics reported are taken from a logistic regression analysis and are expressed in a log-odds metric. The total effect model is not available with a dichotomous dependent variable.

Table 3

Moderated Mediation Results for the full sample (N = 161) in Study 1

		Subsequent PE Engagement Outcomes			
Dependent Variables	Perceived Goal Progress	PEB Intentions	PE Policy Support	Environmental Donation	Environmental Persuasion Message
Constant	-2.19**	1.13*	2.26**	1.15	-6.03*
	(0.77)	(0.45)	(0.7)	(2.43)	(2.62)
Prior PE Engagement	0.79***	0.54***	0.84***	2.66***	1.18*
	(0.18)	(0.1)	(0.15)	(0.52)	(0.54)
Perceived Goal Progress		-0.01	-0.12*	-0.48*	-0.28
		(0.04)	(0.06)	(0.21)	(0.24)
Promotion Focus		-0.09	0.08	-0.45	-0.61
		(0.07)	(0.10)	(0.35)	(0.40)
Perceived Goal Progress × Promotion Focus		-0.07*	-0.09	-0.06	-0.09
		(0.04)	(0.05)	(0.19)	(0.23)
Prevention Focus	0.02	0.03	-0.12	0.08	-0.03
	(0.08)	(0.06)	(0.09)	(0.32)	(0.35)
Climate Change Skepticism	0.02	0.33*	-0.31	-0.28	0.44
	(0.29)	(0.14)	(0.22)	(0.78)	(0.84)
R^2	0.11	0.21	0.21	0.18	0.09[a]
F	6.34***	6.99***	6.74***	5.51***	-
Indirect Effect of Prior PE Engagement via Perceived Goal Progress		-0.008 (0.03) [-0.07, 0.06]	-0.10 (0.06) [-0.24, -0.0005]	-0.38 (0.21) [-0.90, -0.05]	-0.22 (0.25) [-0.77, 0.22]
Index of Moderated Mediation		-0.06 (0.03) [-0.13, -0.006]	-0.07 (0.06) [-0.20, 0.03]	-0.05 (0.14) [-0.33, 0.24]	-0.07 (0.25) [-0.60, 0.42]

Notes. PE denotes pro-environmental, and PEB denotes pro-environmental behavioral. * $p < .05$; ** $p < .01$; *** $p < .001$.

Statistics outside parentheses are unstandardized coefficients; statistics in parentheses are standard errors; statistics inside brackets are bootstrapped confidence intervals. The indirect effect reported is at the mean promotion focus score.

[a] McFadden's pseudo-R squared.

Table 4

Means, Standard Deviations, Reliabilities, and Correlations in Study 2

Variable	*M*	*SD*	α	1	2	3	4	5	6
Engagement in Prior Goal-Congruent Behaviors									
1. Prior PE Engagement (0 = Control, 1 = PEB)	-	-	-						
Regulatory Focus									
2. Promotion Focus	-4.17	1.34	.80	.08					
3. Prevention Focus[a]	-3.92	1.41	.82	.09*	.83**				
Perceived Goal Progress									
4. Perceived Goal Progress	3.44	1.41	.91	.26**	.08	08			
Subsequent Engagement in Goal-Congruent Behaviors									
5. PEB Intentions	3.30	0.65	.83	.03	-.01	-.02	.35**		
6. Environmental Donation	3.92	3.07	-	.01	-.16**	-.09	.00	.16**	
Covariate									
7. Climate Change Skepticism	1.19	0.46	-	-.05	.07	.02	-.14**	-.35**	-.21**

Notes. PE denotes pro-environmental, and PEB denotes pro-environmental behavioral. * indicates $p < .05$. ** indicates $p < .01$.

[a] Prevention focus was included as a covariate in the main analyses.

Table 5

Total, Direct, and Indirect Effects for Models with Perceived Goal Progress Mediating the Association Between Prior Pro-environmental Engagement and Subsequent Pro-environmental Engagement Outcome Measures in Study 2

	Subsequent Pro-environmental Engagement Outcomes	
	PEB Intentions	Environmental Donation
Total Effect of Prior Pro-environmental Engagement	0.02 (0.06)	0.002 (0.27)
Direct Effect of Prior Pro-environmental Engagement	-0.09 (0.05)	0.05 (0.28)
Indirect Effect of Perceived Goal Progress	0.11 (0.03) [0.07, 0.17]	-0.05 (0.07) [-0.20, 0.10]

Notes. PEB denotes pro-environmental behavioral. * $p < .05$; ** $p < .01$; *** $p < .001$.

Statistics outside parentheses are unstandardized coefficients; statistics in parentheses are standard errors; statistics inside brackets are bootstrapped confidence intervals.

Table 6

Moderated Mediation Results in Study 2

			Subsequent PE Engagement Outcomes	
Dependent Variables		Perceived Goal Progress	PEB Intentions	Environmental Donation
Constant		0.36	3.72***	6.39***
		(0.26)	(0.15)	(0.77)
Prior PE Engagement		0.71***	-0.09	0.09
		(0.12)	(0.05)	(0.28)
Perceived Goal Progress			0.15***	-0.02
			(0.02)	(0.10)
Promotion Focus			0.02	-0.60***
			(0.04)	(0.18)
Perceived Goal Progress × Promotion Focus			0.004	0.14*
			(0.01)	(0.07)
Prevention Focus		0.06	-0.03	0.28
		(0.04)	(0.03)	(0.17)
Climate Change Skepticism		-0.39**	-0.44***	-1.22***
		(0.13)	(0.06)	(0.30)
	R^2	0.09	0.23	0.08
	F	15.37***	22.97***	6.92***
Indirect Effect of Prior PE Engagement via Perceived Goal Progress			0.11 (0.03) [0.06, 0.16]	-0.02 (0.07) [-0.16, 0.12]
Index of Moderated Mediation			0.003 (0.01) [-0.02, 0.03]	0.10 (0.06) [0.005, 0.23]

Notes. PE denotes pro-environmental, and PEB denotes pro-environmental behavioral. * $p < .05$; ** $p < .01$; *** $p < .001$. Statistics outside parentheses are unstandardized coefficients; statistics in parentheses are standard errors; statistics inside brackets are bootstrapped confidence intervals. The indirect effect reported is at the mean promotion focus score.

Table 7

Means, Standard Deviations, Reliabilities, and Correlations in Study 3

Variable	*M*	*SD*	α	1	2	3	4	5	6
Perceived Goal Progress from Engagement in Prior Goal-Congruent Behaviors									
1. Perceived Goal Progress from Prior PE Engagement (0 = Low, 1 = High)	-	-	-						
Goal Type									
2. Goal Type (0 = Personal, 1 = Collective)	-	-	-	.00					
Regulatory Focus									
3. Promotion Focus	-4.21	1.27	.81	.02	.06				
4. Prevention Focus[a]	-3.91	1.28	.82	-.01	.00	.83**			
Engagement in Subsequent Goal-Congruent Behaviors									
5. PEB Intentions	2.88	0.86	.65	.00	-.04	.08	.12**		
6. Environmental Donation	3.60	2.82	-	.01	.04	-.13**	-.09	.22**	
Covariate									
7. Climate Change Skepticism	1.16	0.44	-	-.10*	.02	-.12**	-.12**	-.22**	-.16**

Notes. PEB denotes pro-environmental behavioral. * indicates $p < .05$. ** indicates $p < .01$.

[a] Prevention focus was included as a covariate in the main analyses.

Table 8

Moderated Moderation Results in Study 3

	Subsequent PE Engagement Outcomes	
Dependent Variables	PEB Intentions	Environmental Donation
Constant	3.89***	5.10***
	(0.23)	(0.78)
Perceived Goal Progress from Prior PE Engagement	-0.05	0.18
	(0.11)	(0.36)
Promotion Focus	-0.04	-0.36
	(0.08)	(0.26)
Perceived Goal Progress from Prior PE Engagement × Promotion Focus	-0.13	-0.17
	(0.09)	(0.29)
Goal Type	-0.09	0.52
	(0.11)	(0.36)
Perceived Goal Progress from Prior PE Engagement × Goal Type	0.07	-0.43
	(0.15)	(0.50)
Promotion Focus × Goal Type	0.02	-0.19
	(0.09)	(0.28)
Perceived Goal Progress from Prior PE Engagement × Promotion Focus × Goal Type	0.15	0.48
	(0.12)	(0.40)
Prevention Focus	0.12*	0.09
	(0.05)	(0.18)
Climate Change Skepticism	-0.41***	-1.18***
	(0.09)	(0.28)
R^2	0.07	0.06
F	4.36***	3.25***

Notes. PE denotes pro-environmental, and PEB denotes pro-environmental behavioral. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$. Statistics outside parentheses are unstandardized coefficients; statistics in parentheses are standard errors; statistics inside brackets are bootstrapped confidence intervals.

Figures

Figure 1

Theorized Moderated Mediation Model in Studies 1 and 2

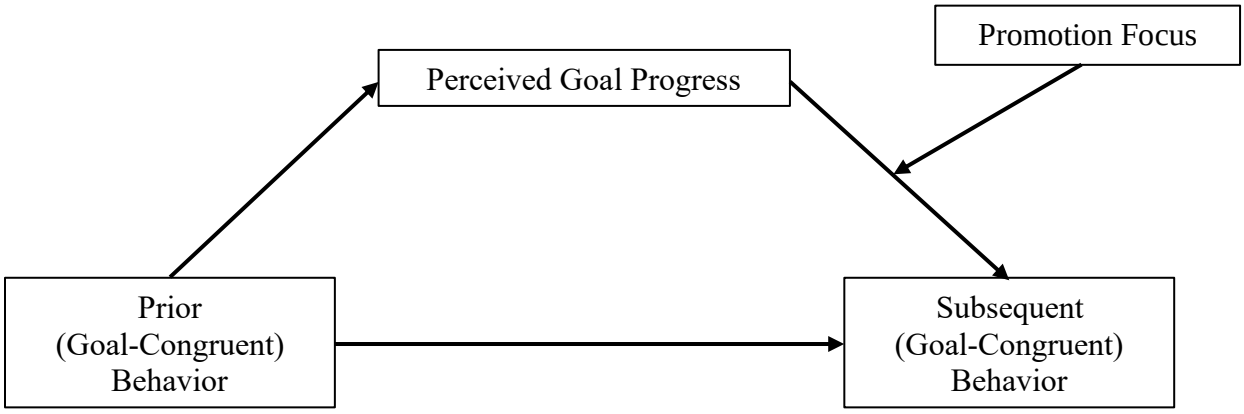


Figure 2

Theorized Moderated Moderation Model in Study 3

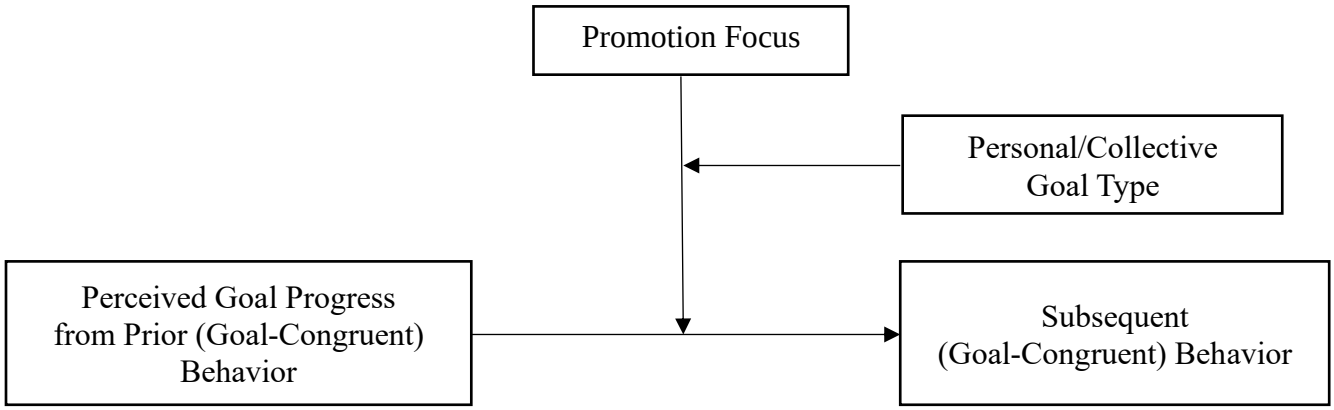
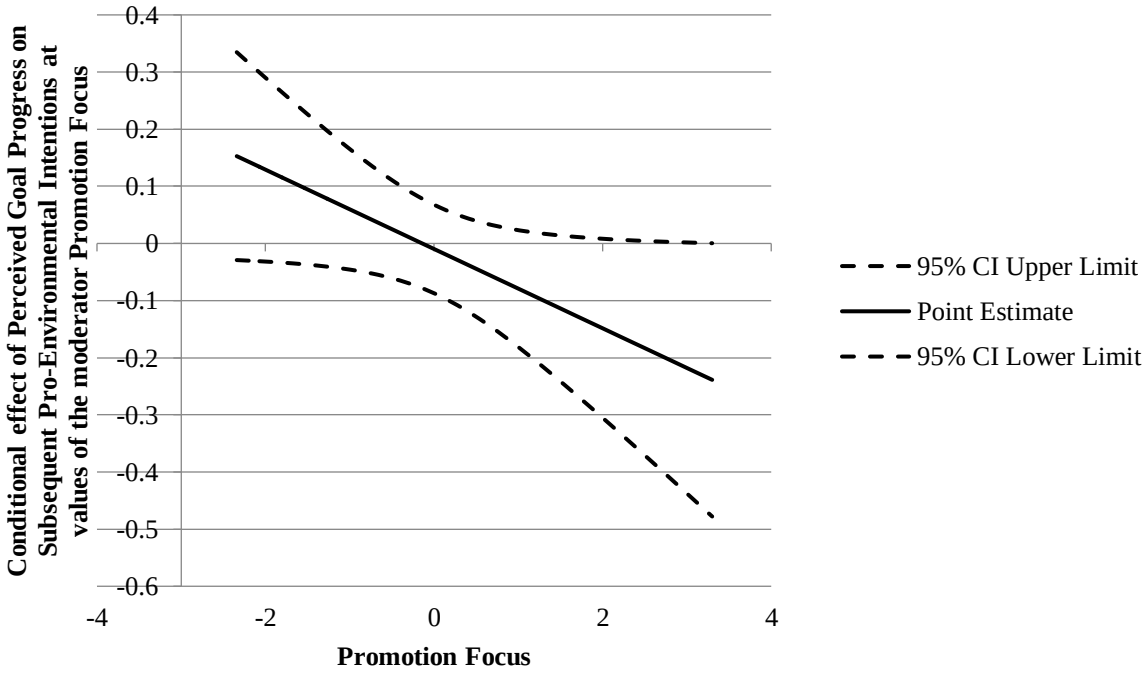


Figure 3a

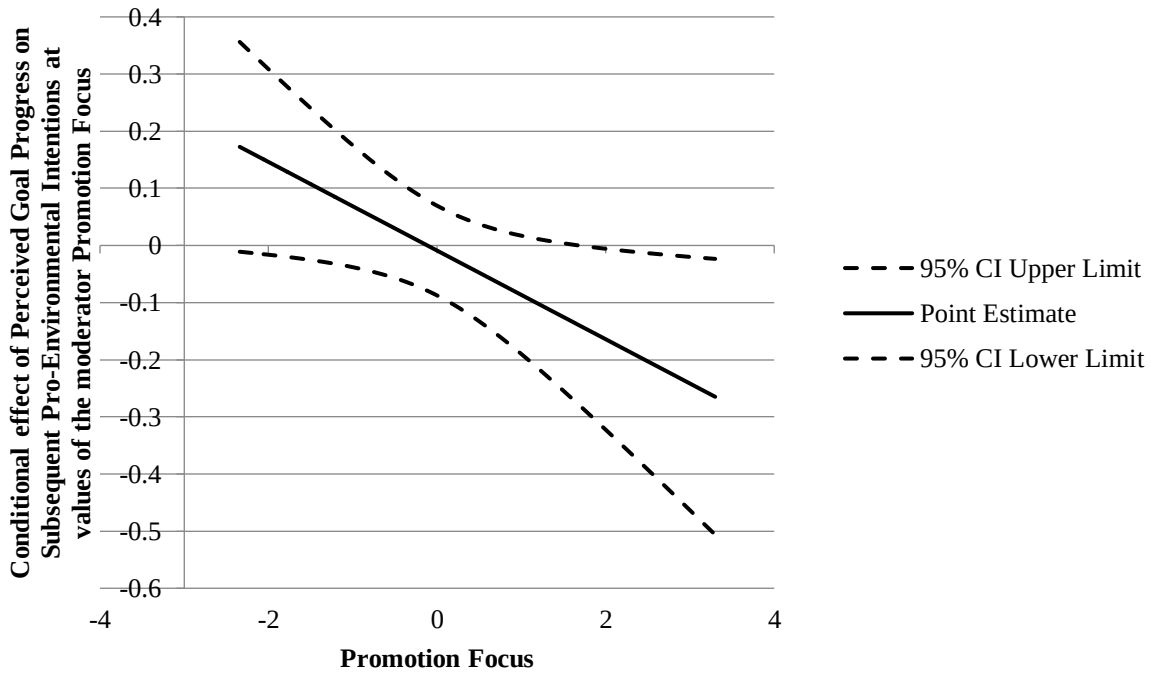
Subsequent Pro-environmental Behavioral Intentions as a Function of Perceived Goal Progress and Promotion Focus, including Climate Change Skepticism as a Covariate in Study 1



Notes. No Johnson-Neyman region of significance was identified.

Figure 3b

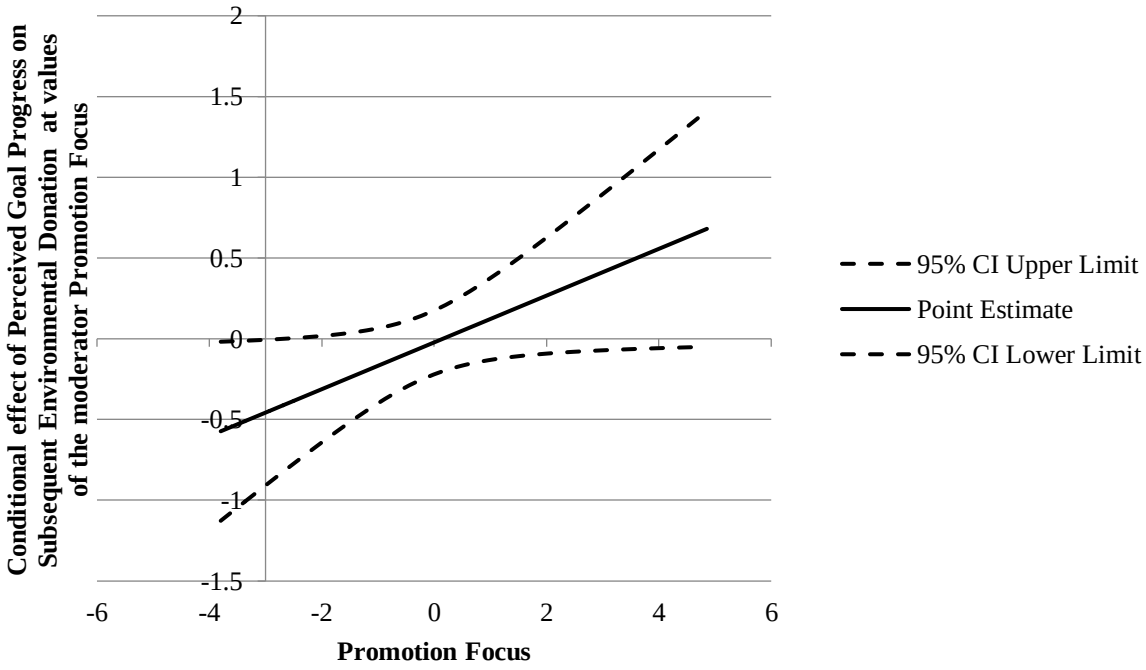
Subsequent Pro-environmental Behavioral Intentions as a Function of Perceived Goal Progress and Promotion Focus, excluding Climate Change Skepticism as a Covariate in Study 1



Notes. The Johnson-Neyman region of significance ranges from promotion focus scores of 1.68 to 3.30.

Figure 4a

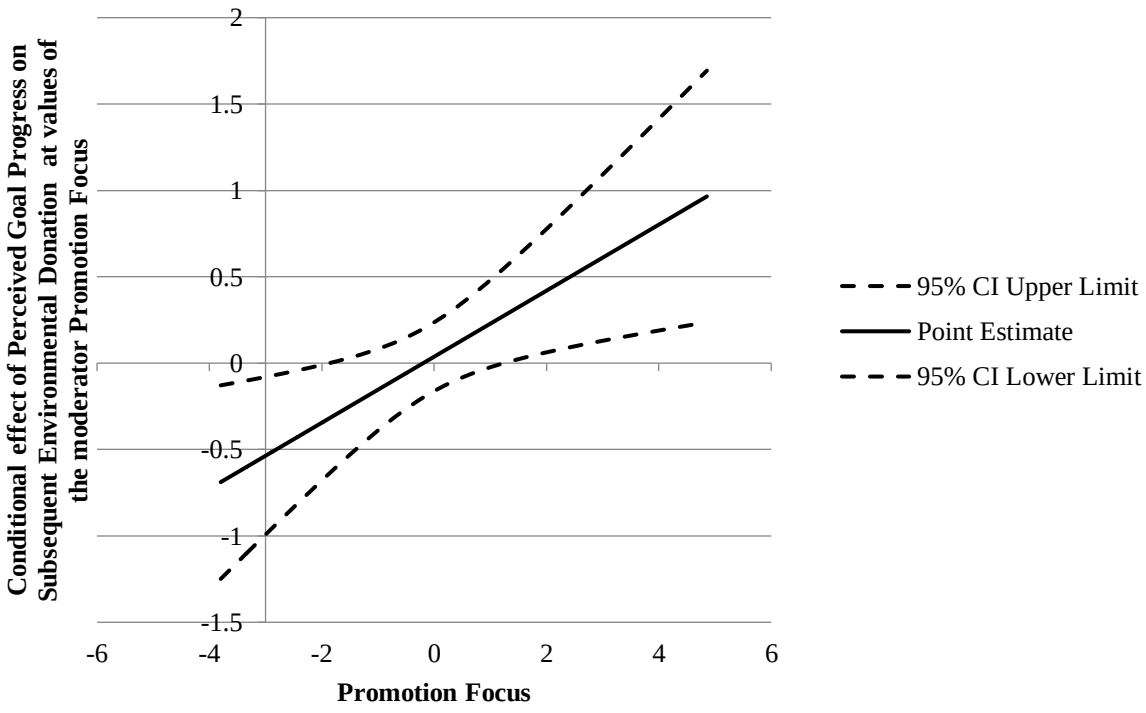
Subsequent Environmental Donation as a Function of Perceived Goal Progress and Promotion Focus, including Climate Change Skepticism as a Covariate in Study 2



Notes. The Johnson-Neyman region of significance ranges from promotion focus scores of -3.80 to -2.69.

Figure 4b

Subsequent Environmental Donation as a Function of Perceived Goal Progress and Promotion Focus, excluding Climate Change Skepticism as a Covariate in Study 2



Notes. The Johnson-Neyman regions of significance range from promotion focus scores of -3.80 to -1.87 and of 1.24 to 4.86.

Appendix

Study 1 Materials

Regulatory Focus

Regulatory Focus Strength Measure
(Taken from Higgins et al., 1997)

Introduction to Ideal and Ought Selves

You will now be asked to list:

1. Attributes that describe how you hope to be (the attributes of the person you would ideally like to be; the attributes of the person you wish or desire to be).
2. Attributes that describe how you ought to be (the attributes of the person you should be; the attributes of the person you believe it is your duty or responsibility to be).

Task Description

You will be asked to provide these attributes one at a time.

In addition to listing the attributes, you will also be asked to determine:

1. The extent to which you would ideally like to possess each attribute that you hope to be.
2. The extent to which you feel you ought to possess each attribute that you ought to be.
3. The extent to which you actually possess each of the attributes.

Do not list any of the attributes more than once in this session.
Please limit the description of each attribute to one word.
Please answer each "extent" question as quickly and accurately as you can.

Sample Ideal Attribute Block

- Please list an attribute of the type of person you hope to be.
- For the last attribute, rate the extent to which you would ideally like to possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)
- For the last attribute, rate the extent to which you believe you actually possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)

Sample Ought Attribute Block

- Please list an attribute of the type of person you ought to be.
- For the last attribute, rate the extent to which you would ought to possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)
- For the last attribute, rate the extent to which you believe you actually possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)

Reference:
Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology, 72*(3), 515– 525. https://doi.org/10.1037/0022-3514.72.3.515

Engagement in Prior Goal-Congruent (Pro-environmental) Behaviors

Recurring Pro-environmental Behavior Scale
(Adapted from Brick et al., 2017)

Instructions:
The following behaviors contribute to the goal of addressing climate change.
Please indicate how often you engage in these behaviors.
(1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *always*; N/A = *not applicable)*

1. When you visit the grocery store, how often do you use reusable bags?
2. How often do you walk, bicycle, carpool, or take public transportation instead of driving a vehicle by yourself?
3. How often do you compost your household food garbage?
4. How often do you eat meat? (R)
5. How often do you eat dairy products such as milk, cheese, eggs, or yogurt? (R)
6. How often do you eat organic food?
7. How often do you turn your personal electronics off or in low-power mode when not in use?
8. When you buy light bulbs, how often do you buy high efficiency compact fluorescent (CFL) or LED bulbs?
9. How often do you act to conserve water, when showering, cleaning clothes, dishes, watering plants, or other uses?
10. How often do you use aerosol products? (R)
11. When you are in PUBLIC, how often do you sort trash into the recycling?
12. When you are in PRIVATE, how often do you sort trash into the recycling?
13. How often do you discuss environmental topics, either in person or with online posts (Facebook, Twitter, etc.)?
14. When you buy clothing, how often is it from environmentally friendly brands?
15. How often do you carry a reusable water bottle?
16. How often do you engage in political action or activism related to protecting the environment?
17. How often do you educate yourself about the environment?

Reference:
Brick, C., Sherman, D. K., & Kim, H. S. (2017). “Green to be seen” and “brown to keep down”: Visibility moderates the effect of identity on pro-environmental behavior. *Journal of Environmental Psychology, 51*, 226–238. https://doi.org/10.1016/j.jenvp.2017.04.004

Perceived (Pro-environmental) Goal Progress

(Adapted from Schwabe et al., 2018)

Instructions:
You indicated that you have previously engaged in some pro-environmental behaviors.
Think about these pro-environmental behaviors that you did and rate the extent you agree with the following statements:
(1 = *strongly disagree* to 7 = *strongly agree*)

1. I feel I have made progress toward the goal of addressing climate change.
2. I have made considerable progress toward the goal of addressing climate change.
3. I have made sufficient progress toward the goal of addressing climate change.
4. I have come closer to the goal of addressing climate change.
5. I can now focus on goals other than addressing climate change.
6. I have achieved my goal of addressing climate change for the moment.

Reference:
Schwabe, M., Dose, D. B., & Walsh, G. (2018). Every saint has a past, and every sinner has a future: Influences of regulatory focus on consumers' moral self-regulation. *Journal of Consumer Psychology, 28*(2), 234-252. https://doi.org/10.1002/jcpy.1025

Filler Measures

Regulatory-Focused Emotions

(Adapted from Leone et al., 2005)

Instructions:
Here is a list of emotions. Please rate the extent to which you are experiencing these emotions right now.
(1= *Not at all* to 7= *Extremely*)

Satisfaction-related Emotions

1. Satisfied
2. Proud
3. Happy
4. Worthy

Relaxation-related Emotions

1. Calm
2. Quiet
3. Relaxed
4. Relieved

Dissatisfaction-related Emotions

1. Dissatisfied
2. Ashamed

3. Sad
4. Unworthy

Agitation-related Emotions

1. Nervous
2. Agitated
3. Anxious
4. Anguished

Reference:

Leone, L., Perugini, M., & Bagozzi, R. (2005). Emotions and decision making: Regulatory focus moderates the influence of anticipated emotions on action evaluations. *Cognition & Emotion, 19*(8), 1175–1198. https://doi.org/10.1080/02699930500203203

Perceived Outcome Efficacy

(Adapted from Gebrehiwot & van der Veen, 2015; Gregersen et al., 2021)

Instructions:
Please rate the extent to which you believe that…
(1 = *not at all* to 7 = *very much*)

1. These pro-environmental behaviors that I have engaged in are effective to address climate change.
2. These pro-environmental behaviors that I have engaged in can help reduce climate change.

References:

Gebrehiwot, T., & Van Der Veen, A. (2015). Farmers prone to drought risk: Why some farmers undertake farm-level risk-reduction measures while others not? *Environmental Management, 55*(3), 588-602.
Gregersen, T., Doran, R., Böhm, G., & Poortinga, W. (2021). Outcome expectancies moderate the association between worry about climate change and personal energy-saving behaviors. *PLoS ONE, 16*(5), e0252105. https://doi.org/10.1371/journal.pone.0252105

<u>Engagement in Subsequent Goal-Congruent (Pro-environmental) Behaviors</u>

Intentions for Pro-environmental Behaviors

Instructions:
Please indicate how likely you will perform the following behaviors over the next three months.
(*1 = not at all likely to 5 = very likely; N/A = not applicable)*

(Taken from Zaval et al., 2015)

1. Take showers that are 5 minutes or less.
2. Use public transportation or carpool.

3. Unplug appliances and chargers (e.g., TV, cell phone, computer) at night.
4. Buy green products instead of regular products (e.g., dishwashing detergent), even though they cost more.
5. Attend rallies, public events or town hall meetings to voice my support for solving environmental problems.
6. Write letters, email, phone, or otherwise contact elected official to urge them to take action on environmental issues (e.g., habitat loss, air pollution).

[Repeated Prior Engagement items]
(Adapted from Brick et al., 2017)

1. Use reusable bags when you visit the grocery store.
2. Walk, bicycle, carpool, or take public transportation instead of driving a vehicle by yourself.
3. Compost your household food garbage.
4. Eat meat. (R)
5. Eat dairy products such as milk, cheese, eggs, or yogurt. (R)
6. Eat organic food.
7. Turn your personal electronics off or in low-power mode when not in use.
8. Buy high efficiency compact fluorescent (CFL) or LED bulbs.
9. Act to conserve water, when showering, cleaning clothes, dishes, watering plants, or other uses.
10. Use aerosol products. (R)
11. Sort trash into the recycling when you are in PUBLIC.
12. Sort trash into the recycling when you are in PRIVATE.
13. Discuss environmental topics, either in person or with online posts (Facebook, Twitter, etc.).
14. Buy clothing from environmentally friendly brands.
15. Carry a reusable water bottle.
16. Engage in political action or activism related to protecting the environment.
17. Educate yourself about the environment.

References:
Brick, C., Sherman, D. K., & Kim, H. S. (2017). “Green to be seen” and “brown to keep down”: Visibility moderates the effect of identity on pro-environmental behavior. *Journal of Environmental Psychology*, *51*, 226–238. https://doi.org/10.1016/j.jenvp.2017.04.004
Zaval, L., Markowitz, E. M., & Weber, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one’s legacy. *Psychological Science*, *26*(2), 231-236. https://doi.org/10.1177/0956797614561266

Support for Pro-environmental Policies
(Adapted from Harring et al., 2017)

Instructions:
To what extent do you support the following environmental policies?
(1 = *strongly against* to 7 = *strongly for*)

1. Increased CO2 tax on petrol.
2. Work more actively to ban environmentally hazardous products.
3. Reduced tax on fuels that do not affect the world's climate.
4. Reduce the tax on foods with little environmental impact.
5. Increased information about the effects of transportation on the climate.
6. Focus more on environmental labelling of products.
7. Focus more on information about how different foods affect the climate.
8. Ban sale of appliances that are not energy efficient.
9. Increased tax on vehicles with large engines (large cylinder volume).
10. Increase the tax on household electricity.
11. Impose a meat tax to reduce the climatic effect of our food consumption.

Reference:
Harring, N., Jagers, S. C., & Matti, S. (2017). Public support for pro-environmental policy measures: Examining the impact of personal values and ideology. *Sustainability*, *9*(5), 627-693. https://doi.org/10.3390/su9050679

Charity Donation

(Adapted from Tam, 2015, 2019; Zaval et al., 2015)

As an extra "thank you" for participating in our research today, there is a chance that completing the study survey can win a $10 bonus. One study participant will be chosen to receive this bonus. We also would like to give you an opportunity to donate some or all of the bonus to a charitable organization, if you win this bonus.

You may split the $10 between yourself and the charity however you want to, using the form on the next page. Any money you allocate to the charity will be directly donated on your behalf by the research team.

The charity you may donate to today will be shown on the next page.

The organization you have an opportunity to donate to is called Trees for the Future, whose motto is "Plant trees. Change Lives." Since 1989, Trees for the Future has helped communities in 19 countries around the world plant millions of trees. Their work aims to improve the well-being of children and families for generations to come, by cleaning the air, reducing risks from landslides, and reducing deforestation.

Please note that the total amount you enter below must add up to exactly $10.
Note that you will receive your research participation credit regardless of whether you win the bonus or not.

_____ Donate to Trees for the Future
_____ Keep for myself

References:
Tam, K.-P. (2015). Mind attribution to nature and proenvironmental behavior. *Ecopsychology, 7*(2), 87–95. https://doi.org/10.1089/eco.2014.0054
Tam, K.-P. (2019). Anthropomorphism of nature, environmental guilt, and pro-environmental behavior. *Sustainability, 11*(19), 5430. https://doi.org/10.3390/su11195430
Zaval, L., Markowitz, E. M., & Weber, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one's legacy. *Psychological Science, 26*(2), 231–236. https://doi.org/10.1177/0956797614561266

Environmental Persuasion Message
(Adapted from Dong et al., 2021)

As part of a future large-scale intervention aimed at encouraging daily pro-environmental habits, people will receive persuasion messages about environmental protection.
Thus, we would like to ask if you would like to write a brief pro-environmental message for this intervention. This will take a few minutes.

You can choose to write a persuasion message about environmental protection OR directly proceed to the next section of the survey.

_____ No, I want to proceed to the next section
_____ Yes, I want to write an environmental persuasion message

Reference:
Dong, M., Palomo-Vélez, G., & Wu, S. (2021). Reducing the gap between pro-environmental disposition and behavior: The role of feeling power. *Journal of Applied Social Psychology, 51*(3), 262-272. https://doi.org/10.1111/jasp.12733

Climate Change Skepticism

Instructions:
Select the statement that best reflects your views about climate change.

a. I believe climate change is occurring, and human activities are having significant effects on climate change.
b. I believe climate change is occurring, and human activities are not having significant effects on climate change.
c. I do not believe climate change is occurring.

Study 2 Materials

Regulatory Focus

Regulatory Focus Strength Measure
(Taken from Higgins et al., 1997)

Introduction to Ideal and Ought Selves

You will now be asked to list:

1. Attributes that describe how you hope to be (the attributes of the person you would ideally like to be; the attributes of the person you wish or desire to be).
2. Attributes that describe how you ought to be (the attributes of the person you should be; the attributes of the person you believe it is your duty or responsibility to be).

Task Description

You will be asked to provide these attributes one at a time.

In addition to listing the attributes, you will also be asked to determine:

1. The extent to which you would ideally like to possess each attribute that you hope to be.
2. The extent to which you feel you ought to possess each attribute that you ought to be.
3. The extent to which you actually possess each of the attributes.

Do not list any of the attributes more than once in this session.
Please limit the description of each attribute to one word.
Please answer each "extent" question as quickly and accurately as you can.

Sample Ideal Attribute Block

- Please list an attribute of the type of person you hope to be.
- For the last attribute, rate the extent to which you would ideally like to possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)
- For the last attribute, rate the extent to which you believe you actually possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)

Sample Ought Attribute Block

- Please list an attribute of the type of person you ought to be.
- For the last attribute, rate the extent to which you would ought to possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)
- For the last attribute, rate the extent to which you believe you actually possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)

Reference:

Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology*, *72*(3), 515– 525. https://doi.org/10.1037/0022-3514.72.3.515

Manipulation of Engagement in Prior Goal-Congruent (Pro-environmental) Behaviors

(Adapted from Jordan et al., 2011; Weibel et al., 2014)

[Prior engagement condition]
Please use 3-4 minutes to recall and describe a situation in which you behaved in favor of the environment in the past week.
Try to write down as many details as you can, so another person who reads your description can put him- or herself in your place.

[Control condition]
Please use 3-4 minutes to recall and describe a behavior you engaged in from your typical Tuesday routine.
Try to write down as many details as you can, so another person who reads your description can put him- or herself in your place.

References:
Jordan, J., Mullen, E., & Murnighan, J. K. (2011). Striving for the moral self: The effects of recalling past moral actions on future moral behavior. *Personality and Social Psychology Bulletin, 37*(5), 701–713. https://doi.org/10.1177/0146167211400208
Weibel, C., Messner, C., & Brügger, A. (2014). Completed egoism and intended altruism boost healthy food choices. *Appetite, 77*, 38–45. https://doi.org/10.1016/j.appet.2014.02.010

Perceived Goal Progress

(Adapted from Schwabe et al., 2018)

Instructions:
You have recalled a behavior you have previously engaged in.
Think about this behavior and rate the extent you agree with the following statements:
(1 = *strongly disagree* to 7 = *strongly agree*)

1. I feel I have made progress toward my goal of addressing climate change.
2. I have made considerable progress toward my goal of addressing climate change.
3. I have made sufficient progress toward my goal of addressing climate change.
4. I have come closer to my goal of addressing climate change.
5. I can now focus on goals other than addressing climate change.
6. I have achieved my goal of addressing climate change for the moment.

Reference:
Schwabe, M., Dose, D. B., & Walsh, G. (2018). Every saint has a past, and every sinner has a future: Influences of regulatory focus on consumers' moral self-regulation. *Journal of Consumer Psychology, 28*(2), 234-252. https://doi.org/10.1002/jcpy.1025

Filler Measures

Regulatory-Focused Emotions

(Adapted from Leone et al., 2005)

Instructions:
Here is a list of emotions. Please rate the extent to which you are experiencing these emotions right now.
(1 = *not at all* to 7 = *extremely*)

Satisfaction-related Emotions

1. Satisfied
2. Proud
3. Happy
4. Worthy

Relaxation-related Emotions

1. Calm
2. Quiet
3. Relaxed
4. Relieved

Dissatisfaction-related Emotions

1. Dissatisfied
2. Ashamed
3. Sad
4. Unworthy

Agitation-related Emotions

1. Nervous
2. Agitated
3. Anxious
4. Anguished

Reference:

Leone, L., Perugini, M., & Bagozzi, R. (2005). Emotions and decision making: Regulatory focus moderates the influence of anticipated emotions on action evaluations. *Cognition & Emotion*, *19*(8), 1175–1198. https://doi.org/10.1080/02699930500203203

Perceived Outcome Efficacy

(Adapted from Gebrehiwot & van der Veen, 2015; Gregersen et al., 2021)

Instructions:
Please rate the extent to which you believe that…
(1= *Not at all* to 7= *Very much*)

1. The behavior that I have engaged in is effective to address climate change.
2. The behavior that I have engaged in can help reduce climate change.

References:
Gebrehiwot, T., & Van Der Veen, A. (2015). Farmers prone to drought risk: Why some farmers undertake farm-level risk-reduction measures while others not? *Environmental Management, 55*(3), 588-602.
Gregersen, T., Doran, R., Böhm, G., & Poortinga, W. (2021). Outcome expectancies moderate the association between worry about climate change and personal energy-saving behaviors. *PLoS ONE, 16*(5), e0252105. https://doi.org/10.1371/journal.pone.0252105

Engagement in Subsequent Goal-Congruent (Pro-environmental) Behaviors

Intention for Pro-environmental Behaviors

(Adapted from Brick et al., 2017)

Instructions:
Please indicate how likely you will perform the following behaviors over the next three months.
(*1 = not at all likely to 5 = very likely; N/A = not applicable)*

1. Use reusable bags when I visit the grocery store.
2. Walk, bicycle, carpool, or take public transportation instead of driving a vehicle by yourself.
3. Compost my household food garbage.
4. Eat meat. (R)
5. Eat dairy products such as milk, cheese, eggs, or yogurt. (R)
6. Eat organic food.
7. Turn my personal electronics off or in low-power mode when not in use.
8. Buy high efficiency compact fluorescent (CFL) or LED bulbs.
9. Act to conserve water, when showering, cleaning clothes, dishes, watering plants, or other uses.
10. Use aerosol products. (R)
11. Sort trash into the recycling when I am in PUBLIC.
12. Sort trash into the recycling when I am in PRIVATE.
13. Discuss environmental topics, either in person or with online posts (Facebook, Twitter, etc.).
14. Buy clothing from environmentally friendly brands.
15. Carry a reusable water bottle.
16. Engage in political action or activism related to protecting the environment.

17. Educate myself about the environment.
18. Drive slower than 60mph on the highway.
19. Eat local food (produced within 100 miles).

Reference:
Brick, C., Sherman, D. K., & Kim, H. S. (2017). "Green to be seen" and "brown to keep down": Visibility moderates the effect of identity on pro-environmental behavior. *Journal of Environmental Psychology, 51*, 226–238. https://doi.org/10.1016/j.jenvp.2017.04.004

Charity Donation

(Adapted from Tam, 2015, 2019; Zaval et al., 2015)

As an extra "thank you" for participating in our research today, there is a chance that completing the study survey can win a US$10 bonus. One study participant will be chosen to receive this bonus. We also would like to give you an opportunity to donate some or all of the bonus to a charitable organization, if you win this bonus.

You may split the US$10 between yourself and the charity however you want to, using the form on the next page. Any money you allocate to the charity will be directly donated on your behalf by the research team.

The charity you may donate to today will be shown on the next page.

The organization you have an opportunity to donate to is called Trees for the Future, whose motto is "Plant trees. Change Lives." Since 1989, Trees for the Future has helped communities in 19 countries around the world plant millions of trees. Their work aims to improve the well-being of children and families for generations to come, by cleaning the air, reducing risks from landslides, and reducing deforestation.

Please note that the total amount you enter below must add up to exactly US$10.
Note that you will receive your research participation compensation regardless of whether you win the bonus or not.

_____ Donate to Trees for the Future
_____ Keep for myself

References:
Tam, K.-P. (2015). Mind attribution to nature and proenvironmental behavior. *Ecopsychology, 7*(2), 87–95. https://doi.org/10.1089/eco.2014.0054
Tam, K.-P. (2019). Anthropomorphism of nature, environmental guilt, and pro-environmental behavior. *Sustainability, 11*(19), 5430. https://doi.org/10.3390/su11195430
Zaval, L., Markowitz, E. M., & Weber, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one's legacy. *Psychological Science, 26*(2), 231–236. https://doi.org/10.1177/0956797614561266

Climate Change Skepticism

Instructions:
Select the statement that best reflects your views about climate change.

a. I believe climate change is occurring, and human activities are having significant effects on climate change.
b. I believe climate change is occurring, and human activities are not having significant effects on climate change.
c. I do not believe climate change is occurring.

Study 3 Materials

Regulatory Focus

Regulatory Focus Strength Measure
(Taken from Higgins et al., 1997)

Introduction to Ideal and Ought Selves

You will now be asked to list:

1. Attributes that describe how you hope to be (the attributes of the person you would ideally like to be; the attributes of the person you wish or desire to be).
2. Attributes that describe how you ought to be (the attributes of the person you should be; the attributes of the person you believe it is your duty or responsibility to be).

Task Description

You will be asked to provide these attributes one at a time.

In addition to listing the attributes, you will also be asked to determine:

1. The extent to which you would ideally like to possess each attribute that you hope to be.
2. The extent to which you feel you ought to possess each attribute that you ought to be.
3. The extent to which you actually possess each of the attributes.

Do not list any of the attributes more than once in this session.
Please limit the description of each attribute to one word.
Please answer each "extent" question as quickly and accurately as you can.

Sample Ideal Attribute Block

- Please list an attribute of the type of person you hope to be.
- For the last attribute, rate the extent to which you would ideally like to possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)
- For the last attribute, rate the extent to which you believe you actually possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)

Sample Ought Attribute Block

- Please list an attribute of the type of person you ought to be.
- For the last attribute, rate the extent to which you would ought to possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)
- For the last attribute, rate the extent to which you believe you actually possess the attribute.
  (1 = *slightly*, 2 = *moderately*, 3 = *a great deal*, 4 = *extremely*)

Reference:

Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology*, *72*(3), 515– 525. https://doi.org/10.1037/0022-3514.72.3.515

Manipulation of Perceived Progress from Engagement in Prior Goal-Congruent (Pro-environmental) Behaviors

[Low Perceived Progress toward a Personal Goal Condition]
Your actions play an important role to address climate change. Each person in the society should set and work toward their own personal goal to fight climate change.
Engaging in the following pro-environmental behaviors can help you achieve your goal of addressing climate change.

In the below list, there are 12 behaviors. Please select all the pro-environmental behaviors that you have engaged in the last month.

If you did not engage in any of these behaviors, please select "I did not engage in any of these behaviors recently".

[High Perceived Progress toward a Personal Goal Condition]
Your actions play an important role to address climate change. Each person in the society should set and work toward their own personal goal to fight climate change.
Engaging in the following pro-environmental behaviors can help you achieve your goal of addressing climate change.

In the below list, there are 4 behaviors. Please select all the pro-environmental behaviors that you have engaged in the last month.

If you did not engage in any of these behaviors, please select "I did not engage in any of these behaviors recently".

[Low Perceived Progress toward a Collective Goal Condition]
Everyone's actions play an important role to address climate change. People in the society should work together toward a collective goal to fight climate change.
Engaging in the following pro-environmental behaviors can help the society achieve the goal of addressing climate change.

In the below list, there are 12 behaviors. Please select all the pro-environmental behaviors that you have engaged in the last month.

If you did not engage in any of these behaviors, please select "I did not engage in any of these behaviors recently".

[High Perceived Progress toward a Collective Goal Condition]
Everyone's actions play an important role to address climate change. People in the society should work together toward a collective goal to fight climate change.
Engaging in the following pro-environmental behaviors can help the society achieve the goal of addressing climate change.

In the below list, there are 4 behaviors. Please select all the pro-environmental behaviors that you have engaged in the last month.

If you did not engage in any of these behaviors, please select "I did not engage in any of these behaviors recently".

List of Pro-environmental Behavior Options

1. Recycle*
2. Not litter*
3. Use reusable products (e.g., shopping bags, containers)*
4. Switch off lights, air-conditioner, or other electronics when not in use*
5. Eat meatless (vegetarian or vegan) meals for environmental reasons
6. Buy an electric car
7. Volunteer time to projects that help the environment (e.g., hosting a cleanup)
8. Educate others about protecting the environment
9. Buy clothes from environmentally friendly brands
10. Collect excess water from the shower for other uses (e.g., water plants, flushing the toilet)
11. Choose to shop at an organic grocery shop
12. Launch a petition for an environmental cause
13. I did not engage in any of these behaviors recently

* Presented in the high perceived goal progress condition

Perceived (Pro-environmental) Goal Progress Manipulation Check

(Adapted from Schwabe et al., 2018)

Instructions:
Think about the number of pro-environmental behaviors you engaged in from the list of $4^{*}/12^{+}$ behaviors and rate the extent you agree with the following statements.

Take for example, you indicated you engaged 2 of the $4^{*}/12^{+}$ pro-environmental behaviors. You would think about how you engaged in 2 of the $4^{*}/12^{+}$ behaviors when rating these statements. (1 = *strongly disagree* to 7 = *strongly agree*)

1. I feel I have made progress toward the goal of addressing climate change.
2. I have made sufficient progress toward the goal of addressing climate change.
3. I can now focus on goals other than addressing climate change.

* Presented in the high perceived goal progress condition
$^{+}$ Presented in the low perceived goal progress condition

Reference:
Schwabe, M., Dose, D. B., & Walsh, G. (2018). Every saint has a past, and every sinner has a future: Influences of regulatory focus on consumers' moral self-regulation. *Journal of Consumer Psychology, 28*(2), 234-252. https://doi.org/10.1002/jcpy.1025

Manipulation of Goal Type

[Personal goal condition]
You indicated your engagement in a list of pro-environmental behaviors. These pro-environmental behaviors can help you achieve your goal of addressing climate change.

Use one of the pro-environmental behaviors or any other pro-environmental behavior you have engaged in to explain how this behavior can contribute toward achieving your personal goal of addressing climate change (2-3 sentences).

For example, using reusable products can help you achieve your goal of addressing climate change by reducing your own waste and developing a habit to reuse different items.

[Collective goal condition]
You indicated your engagement in a list of pro-environmental behaviors. These pro-environmental behaviors can help the society achieve the goal of addressing climate change.

Use one of the pro-environmental behaviors or any other pro-environmental behavior you have engaged in to explain how this behavior can contribute toward achieving the collective goal of addressing climate change (2-3 sentences).

For example, using reusable products can help the society achieve the goal of addressing climate change by contributing your part to reduce waste and inspiring others in the society to reduce their waste.

Goal Type Manipulation Check

The questions you answered about your engagement in pro-environmental behaviors were described to contribute toward a goal.

How were these pro-environmental behaviors described? Please choose one answer below.

a. These behaviors were described as contributing toward my personal goal of addressing climate change.
b. These behaviors were described as contributing toward the society's collective goal of addressing climate change.

Filler Measures

Regulatory-Focused Emotions
(Adapted from Leone et al., 2005)

Instructions:
Here is a list of emotions. Please rate the extent to which you are experiencing these emotions right now.
(1 = *not at all* to 7 = *extremely*)

Satisfaction-related Emotions

1. Satisfied
2. Proud
3. Happy
4. Worthy

Relaxation-related Emotions

1. Calm
2. Quiet
3. Relaxed
4. Relieved

Dissatisfaction-related Emotions

1. Dissatisfied
2. Ashamed
3. Sad
4. Unworthy

Agitation-related Emotions

1. Nervous
2. Agitated
3. Anxious
4. Anguished

Reference:

Leone, L., Perugini, M., & Bagozzi, R. (2005). Emotions and decision making: Regulatory focus moderates the influence of anticipated emotions on action evaluations. *Cognition & Emotion, 19*(8), 1175–1198. https://doi.org/10.1080/02699930500203203

Perceived Outcome Efficacy

(Adapted from Gebrehiwot & van der Veen, 2015; Gregersen et al., 2021)

Instructions:

Please rate the extent to which you believe that…

(1 = *not at all* to 7 = *very much*)

1. The behavior(s) that I have engaged in is (are) effective to address climate change.
2. The behavior(s) that I have engaged in can help reduce climate change.

References:

Gebrehiwot, T., & Van Der Veen, A. (2015). Farmers prone to drought risk: Why some farmers undertake farm-level risk-reduction measures while others not? *Environmental Management, 55*(3), 588-602. https://doi.org/10.1007/s00267-014-0415-7

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Engagement in Subsequent Goal-Congruent (Pro-environmental) Behaviors

Intention for Pro-environmental Behaviors

(Taken from Zaval et al., 2015)

Instructions:
Please indicate how likely you will perform the following behaviors over the next three months. (*1 = not at all likely to 5 = very likely; N/A = not applicable)*

1. Take showers that are 5 minutes or less.
2. Use public transportation or carpool.
3. Unplug appliances and chargers (e.g., TV, cell phone, computer) at night.
4. Buy green products instead of regular products (e.g., dishwashing detergent), even though they cost more.
5. Attend rallies, public events or town hall meetings to voice my support for solving environmental problems.
6. Write letters, email, phone, or otherwise contact elected official to urge them to take action on environmental issues (e.g., habitat loss, air pollution).

References:
Zaval, L., Markowitz, E. M., & Weber, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one's legacy. *Psychological Science*, *26*(2), 231 -236. https://doi.org/10.1177/0956797614561266

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_____ Keep for myself

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Tam, K.-P. (2019). Anthropomorphism of nature, environmental guilt, and pro-environmental behavior. *Sustainability, 11*(19), 5430. https://doi.org/10.3390/su11195430
Zaval, L., Markowitz, E. M., & Weber, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one's legacy. *Psychological Science, 26*(2), 231–236. https://doi.org/10.1177/0956797614561266

Climate Change Skepticism

Instructions:
Select the statement that best reflects your views about climate change.

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b. I believe climate change is occurring, and human activities are not having significant effects on climate change.
c. I do not believe climate change is occurring.