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Drivers of Prosocial Behavior and Pro-Environmental Choice

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor
of Philosophy

in

Management

by

Elizabeth A. Keenan

Committee in charge:

Professor Ayelet Gneezy, Chair
Professor On Amir
Professor Wendy Liu
Professor Richard D. Norris
Professor Elke U. Weber

2015

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Chair

University of California, San Diego

2015

DEDICATION

I dedicate this dissertation to my parents for their unwavering encouragement to never stop pursuing my passions. Their love, guidance, and support have been unconditional, and I am humbled by and grateful for all they have done for me. I learned from them that another door always opens if we keep pushing forward. And with that, every open door is a new opportunity.

TABLE OF CONTENTS

Signature Page.....	iii
Dedication.....	iv
Table of Contents.....	v
List of Figures.....	vii
List of Tables.....	viii
Acknowledgments.....	ix
Vita.....	xvi
Abstract of the Dissertation.....	xvii
Introduction.....	1
References for the Introduction.....	8
Chapter 1. Understanding and avoiding overhead aversion in charitable giving.....	10
Abstract.....	11
Introduction.....	12
Materials and Methods.....	16
General Discussion.....	32
Appendix.....	40
Acknowledgments.....	45
References.....	46
Chapter 2. When doing good, you should not do well: The case of nonprofit executive compensation.....	53
Abstract.....	54
Introduction.....	55
Materials and Methods.....	61
General Discussion.....	71
Appendix.....	78
References.....	85
Chapter 3. Driving Pro-Environmental Choice.....	90
Abstract.....	91
Introduction.....	92
Materials and Methods.....	100
General Discussion.....	119
Appendix.....	129
Acknowledgments.....	135
References.....	136
Chapter 4. How warm days increase belief in global warming.....	145
Abstract.....	145

Main Results.....	145
Conclusions.....	148
Methods.....	148
References.....	148
Acknowledgments.....	149
Supplementary Information.....	150

LIST OF FIGURES

Figure 1.1. Mean donation amount by condition in Experiment 1.....	35
Figure 1.2. Mediation model for Experiment 1.....	36
Figure 1.3. Proportion of participants that chose charity: water.....	37
Figure 1.4. The total number of people who donated by condition.....	38
Figure 1.5. Total amount raised by condition.....	39
Figure 2.1. Mean donation likelihood by condition.....	76
Figure 2.2. Mean salary offer (in thousands) by condition.....	77
Figure 3.1. Graphical representation of the experiments.....	124
Figure 3.2. Hypothetical green toilet paper choice.....	125
Figure 3.3. Real green toilet paper choice.....	126
Figure 3.4. Green gift card choice.....	127
Figure 3.5. Green gift card choice and NEP.....	128
Figure S3.1. Experiment 1 manipulation check results.....	132
Figure S3.2. Experiment 2 manipulation check results.....	132
Figure S3.3. Experiment 2 results including those who chose \$0.25.....	134
Figure 4.1. Climate change labelling and local warming.....	146
Figure 4.2. Information, recency and local warming.....	146
Figure 4.3. Temperature priming and local warming.....	147
Figure 4.3. Perceived PDW and local warming.....	147

LIST OF TABLES

Table 1.1. Donations by condition and amount.....	34
Table S1.1. Probit regression results.....	43
Table 2.1. Item text from Experiment 3.....	73
Table 2.2. Factor loadings.....	74
Table 2.3. Regression models from Experiment 3.....	75
Table S2.1. Top five expenses listed.....	78
Table S2.2. Percent correct recall by condition.....	80
Table 3.1. Actual changes in green choice.....	122
Table 3.2. Relative changes in green choice.....	123
Table S4.1. Temperature and public perception of global climate change.....	150
Table S4.2. Demographic characteristics of the study samples.....	152
Table S4.3. Linear regressions for <i>belief</i> for GW/CC in Study 1.....	153
Table S4.4. Linear regressions for <i>concern</i> for GW/CC in Study 1.....	154
Table S4.5. Linear regressions of <i>yesterday's</i> temperature on <i>belief</i>	155
Table S4.6. Linear regressions of <i>yesterday's</i> temperature on <i>concern</i>	156

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Chapter 1, in part, is currently being prepared for submission for publication of the material. Keenan, Elizabeth A., Ayelet Gneezy, and Uri Gneezy. The dissertation author was the primary investigator and author of this paper.

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ABSTRACT OF THE DISSERTATION

Drivers of Prosocial Behavior and Pro-Environmental Choice

by

Elizabeth A. Keenan

Doctor of Philosophy in Management

University of California, San Diego, 2015

Professor Ayelet Gneezy, Chair

The world is facing an overwhelming number of social and environmental challenges that necessitate immediate, collaborative action. Despite numerous efforts, campaigns, and calls for action, tractable change in the public's response is sluggish. Therefore, we need a better understanding of the barriers to and motivators for action (e.g., prosocial behavior, resource conservation). This dissertation is a first step to addressing this as it explores individuals' prosocial choices and behaviors, as well as certain factors underlying them within the domains of charitable giving, pro-environmental choice, and climate change judgments.

The first two chapters provide an account of individuals' aversion to overhead in charitable giving. Chapter 1 describes how higher overhead spending decreases giving and that overhead aversion is largely explained by a decrease in the perceived impact of one's donation. A large field experiment demonstrates that covering overhead costs with outside funds significantly increases giving compared to traditional fundraising techniques. Chapter 2 focuses on nonprofit executive (CEO) pay, a particularly aversive type of overhead. As the salary of a nonprofit CEO increases, the likelihood that individuals will donate decreases. Moreover, individuals are willing to "undercut" a qualified CEO by offering him/her significantly less money for a job if the organization is described as a nonprofit versus a for profit.

Chapters 3 and 4 explore underlying factors that increase consumers' choice of green products and shed light on the psychology involved in climate change judgments. Chapter 3 finds that green choice is largely and consistently explained by real-time accessibility of eco-friendly concepts—exposing individuals to green concepts prior to making a decision increases the likelihood they choose green products. Chapter 4 delves into the local warming effect, a phenomenon in which perceived abnormalities in current outdoor temperature influence climate change judgments. Results suggest the local warming effect arises due to attribute substitution, whereby individuals use accessible but irrelevant information over harder to process but more diagnostic information in making their judgments.

This body of work improves our understanding of individuals' motivators and barriers to action in areas of critical global concern—charitable behavior, resource conservation, and climate change action.

INTRODUCTION

The world is facing an overwhelming number of challenges ranging from human rights and ethical conflicts, to hunger and poverty reduction, to environmental resource conservation and global climate change. With the world's population expected to reach nine billion by the year 2044 (US Census Bureau 2011), these challenges necessitate immediate, collaborative action. Although every human, whether individually or as part of a larger entity, plays a role in contributing to our problems, we all have the potential to contribute to our solutions. Despite numerous efforts, campaigns, and calls for action, tractable change in the public's response is sluggish. This insufficient involvement has motivated behavioral researchers to find tools to influence human behaviors that improve human welfare and secure the future of our planet. The path to achieve these improvements requires several steps, the first of which is gaining a clearer understanding of the barriers to and motivators for desirable actions such as recycling, prosocial behavior, resource conservation, and more. This dissertation addresses this first step by exploring individuals' prosocial choices and behaviors, as well as some of the factors underlying them.

Background

In recent years we have witnessed a rapid increase in the number of businesses demonstrating interest in positive social impact and responsibility (Campbell, 2007; Porter & Kramer, 2011). This trend is borne from within businesses, but also comes about as a reaction to the public's expectation that companies should support social or environmental issues, because, according to the public, business is responsible for a

number of our global challenges (Bénabou & Tirole, 2010; Campbell, 2007; Mohr, Webb, & Harris, 2001; Porter & Kramer, 2011). As a result, many businesses have some form what is often called corporate social responsibility built into their business models and many engage in prosocial activities that link social causes with their products or services. Thus, the idea that businesses must create shared value (i.e., when both business and society profit) by putting societal needs nearer to the core of what they do has been gaining traction (Porter & Kramer 2011).

Importantly, the success of corporate social responsibility necessitates consumers' demand and cooperation. Consumers must be socially responsible and responsive to companies' efforts by demanding and purchasing socially responsible products and services (Vitell, 2014). Despite consumers' attitudes in support of social responsibility, there exists a significant attitude-behavior gap whereby consumers espouse pro-social attitudes but do not take these attitudes into account when making purchasing decisions (Carrigan & Attalla, 2001; Roberts, 1996; Simon, 1995). Given the importance of social responsibility in our society, we need to better understand how to market in this changing world and in particular how to engage customers in social impact in a real and lasting way.

Dissertation research motivations and chapter overviews

In this dissertation I investigate how to influence prosocial changes in consumers' attitudes and behaviors. To do this I focus on understanding barriers and motivators to prosocial behavior within the classic domain of charitable giving as well as in the areas of

pro-environmental choice and climate change judgments. This dissertation is comprised of four chapters split into two sections.

Section 1: Overhead aversion and nonprofit CEO pay in charitable giving

Charities play an important role in achieving positive social impact, whether independently or in collaboration with businesses. In particular, charities help fill voids left by market or governmental failures (Bénabou & Tirole, 2010; Weisbrod 1975; Worth 2013). Total giving reached \$335.17 billion dollars in 2013, 72% of which came from individuals. Despite this large number, average giving struggles to exceed 2% of GDP (Giving USA, 2014) and this limits what charities are able to achieve (Pallotta, 2008). A large body of research explores ways to improve charitable giving (see Bekkers & Wiepking, 2011 for a review), however, little attention has been appropriated to the role that donors' beliefs and ideals surrounding nonprofit organizations play in their decisions to donate. One such example is consumers' negative associations with non-programmatic costs (i.e., overhead) such as administrative and fundraising expenditures, including executive salaries. These beliefs can affect attitudes and behaviors and ultimately undermine nonprofits' ability to do the good they are dedicated to achieving. The first section of my dissertation research seeks to provide a comprehensive account of individuals' aversion to overhead in charitable giving. This work includes a proposed theoretical framework that captures factors underlying this aversion, empirical work examining this framework, and a large-scale field experiment that tests one way to increase giving while holding overhead costs intact. This line of investigation continues

with a close examination of nonprofit executive (CEO) pay, a particularly aversive type of overhead spending.

Chapter 1 explores individuals' aversion to overhead spending and its effect on charitable giving. Although overhead is necessary for an organization to exist, pressure exerted by individuals, funding organizations, and even governments has forced charities to underfund (and sometimes underreport) their administrative costs. As a result, nonprofits are unable to allocate sufficient funds to support infrastructure and thus are unable to function efficiently. While the debate concerning charity overhead receives a large amount of media attention, few studies have looked at the extent to which individuals' behaviors are influenced by overhead cost information, and no research has investigated the factors underlying this relationship. The results reported in this chapter show that individuals are averse to overhead and that this aversion actually affects their donation decisions, such that higher overhead spending decreases giving. The data further suggest that consumers' overhead aversion is largely explained by a decrease in the perceived impact of one's donation, which decreases the positive emotions traditionally associated with prosocial behavior and ultimately reduces giving. Importantly, the negative effect of overhead spending information is not caused by the mere existence of overhead, but instead is driven by individuals' concerns about whether *their* specific contribution will be used to cover overhead. Building on this finding, the final study explores one solution for overhead aversion by offering potential donors an "overhead-free" donation opportunity in a large field experiment. Results from the field experiment suggest that communicating to potential donors that prior donations have been used to

cover overhead costs significantly increases giving compared to traditional fundraising techniques.

Chapter 2 investigates CEO compensation in the nonprofit sector. The primary objective of this chapter is to better understand what underlies individuals' attitudes toward nonprofit executive compensation, and to explore some of the negative effects of these attitudes on individuals' willingness to donate to charity. To do so, I build on past research and also refer to popular media (e.g., books, blogs, newspaper articles), which allows me to explore the relationship between nonprofit executive pay and individuals' attitudes and behaviors. Importantly, in my experiments I compare individuals' perceptions, judgments, and behaviors related to executive pay in the nonprofit versus the for-profit sector. This comparison offers a benchmark for understanding the extent to which individuals' attitudes toward compensation in the nonprofit sector diverge from what is tacitly accepted in the for profit sector. I find that individuals are motivated to offer nonprofit CEOs significantly less than for-profit CEOs. Moreover, CEO salaries do indeed influence decisions to donate, such that an increase in nonprofit CEO pay leads to a decrease in individuals' willingness to donate to a charity. Finally, evidence suggests that moral considerations coupled with concerns about the allocation of donations in nonprofits predict individuals' reactions to CEO pay.

Section 2: Green choice and public perceptions of climate change

The second part of my dissertation focuses on individuals' choices and judgments with respect to the environment and climate change. These two areas fall within the broad arena of social challenges, yet they regularly rank below competing public concerns (e.g.,

poor and needy, economy; Pew, 2015), and on the whole they tend to receive low proportions of charitable giving relative to other causes (Giving USA, 2014). Given this, it is not surprising that influencing sustainable behavior has been an ongoing challenge for at least the past 50 years. Research in this domain highlights the complexity and lack of cohesive understanding of consumers' green choices and behaviors. The final two chapters in my dissertation offer new perspectives for considering the factors that increase consumers' choice of green products and also shed light on the underlying psychology involved in climate change judgments, which ultimately have bearing on consumers' climate-friendly behaviors and choices.

Chapter 3 investigates drivers of environmentally friendly behavior by considering green product preference and choice. Pro-environmental attitudes remain insufficiently reflected in consumers' choices and behaviors. To better understand what drives consumers' choice of green products I consider three accounts that have been proposed to play a role in driving green choice—moral, identity, and accessibility—and test their respective role in guiding behavior, thereby creating a more cohesive theory of green choice. Using hypothetical and consequential choice experiments I find that green choice is largely and consistently explained by real-time accessibility of eco-friendly concepts—exposing individuals to green concepts prior to making a decision increases the choice proportion for green products. Moral and identity accounts also play a role but to lesser and varying degrees. In addition to the theoretical contribution of this work, these findings suggest a strategic two-stage framework that may be helpful in motivating pro-environmental choice: fostering eco-minded attitudes through education *and* subsequently triggering those constructs in real-time.

Chapter 4 delves into the local warming effect, a phenomenon in which perceived abnormalities in current outdoor temperature influence climate change judgments. A growing body of research demonstrates that global warming judgments can be influenced by perceived deviations from “usual” outdoor air temperature. Studies show that those who perceive today’s temperature as being warmer than usual are more likely to believe in and be concerned about global warming (termed the “local warming effect”). This research extends existing work by examining several hypotheses of why this happens and considers mechanisms underlying this phenomenon. The results of five studies suggest the local warming effect arises due to attribute substitution, whereby individuals use accessible but irrelevant information over harder to process but more diagnostic information in making their judgments. Moreover, results show the effect is not due to labeling (e.g., referring to global warming vs. climate change in questions) or to a lack of understanding the differences between daily weather patterns and long-term climate change. These findings have strong implications for public policy and raise important questions about the role of the local warming bias in the face of attempts to mitigate climate change.

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Chapter 1.

UNDERSTANDING AND AVOIDING OVERHEAD AVERSION IN CHARITABLE
GIVING

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ABSTRACT

In this research we explore individuals' aversion to overhead spending and its effect on charitable giving. Although overhead is necessary for an organization to exist, pressure exerted by individuals, funding organizations, and even governments has forced charities to underfund (and sometimes underreport) their administrative costs. While concerns about charity overhead spending receive ample media attention, only a handful of studies have looked at the extent to which individuals' behavior is influenced by overhead spending information, and no research has investigated the factors underlying this relationship. We provide some of the first empirical evidence of individuals' overhead aversion, and show that it affects donation decisions such that higher overhead spending decreases giving (Experiments 1 and 2). Our data further suggest that the relationship between overhead and donations is mediated by the perceived impact of one's own donation and the positive emotions traditionally associated with giving (Experiment 1). Importantly, we show that the negative effect of overhead spending information is not caused by the existence of overhead in general, but instead is driven by individuals' concerns about having *their* specific contribution cover overhead (Experiment 2). Building on these findings, we explore one solution for overhead aversion by offering potential donors an "overhead-free" donation opportunity in a large field experiment involving 40,000 potential donors. Our results demonstrate that communicating to potential donors that prior donations have been used to cover overhead costs significantly increases giving (Experiment 3) compared to traditional fundraising techniques.

INTRODUCTION

“Not everything that counts can be counted. Not everything that can be counted counts.”

– Albert Einstein

The nonprofit sector offers consumers the opportunity to engage in positive change in the world by donating money to help address some of our society’s greatest challenges, from education and the environment to poverty and disease. Although donors give money for a number of reasons, wanting to make a difference has been identified as one of the primary motivations for giving (e.g., Cryder, Loewenstein, & Scheines, 2013; Cryder, Loewenstein, & Seltman, 2013; Duncan 2004; Grant, 2007; Grant et al., 2007). We propose that this very drive to make a difference might, ironically, undermine the ability of charities to effectively serve their causes. Specifically, we suggest that donors’ rising concerns (Contribute/Harris Interactive, 2007; Grey Matter Research 2008, 2012; Hope Consulting, 2010) about charity overhead spending—the proportion of spending on non-programmatic costs, such as administrative and fundraising expenses—are having an unintended negative impact on the ability of charities to raise money and ultimately fulfill their missions.

Overhead spending has emerged as a key efficiency indicator for nonprofit organizations (Barrett 2011, Steinberg & Morris, 2010). Charity evaluators, such as Charity Navigator and Charity Watch, assign ratings to charities based in large part on their relative spending on overhead, however, it is not clear whether overhead is the best metric for judging the effectiveness of a charity (Caviola, Faulmüller, Everett, Savulescu, & Kahane, 2014). Overhead spending provides information regarding the amount of

money that is allocated to the cause, but it does not explain how cost-effective the charity is with that money. In fact, some case studies have been unable to find a correlation between overhead ratios and cost-effectiveness (e.g., Wing & Hager, 2004a). Unfortunately for donors, there is limited information available regarding cost-effectiveness, leaving overhead spending as one of the few measures they can rely on. Recently, there have been attempts to convince donors to place less weight on overhead information. While overhead spending continues to be included in charity rating calculations, the executives of three leading US charity evaluators argue in *An Open Letter to the Donors of America* that, “The percent of charity expenses that go to administrative and fundraising costs—commonly referred to as “overhead”—is a poor measure of a charity’s performance.”

Despite this letter and other similar efforts, evidence suggests that overhead-related information guides donation decisions, such that higher overhead spending decreases giving. For instance, research demonstrates that individuals strongly prefer charities with low overhead regardless of cost-effectiveness, in part because overhead ratios are easier to evaluate (Baron & Szymanska, 2011; Caviola et al., 2014). An examination of actual charitable giving data reveals a negative correlation between the amount organizations spend on administrative and fundraising costs and donation amounts, suggesting individuals are sensitive to how charities spend their funds (Tinkelman & Mankaney, 2007). Furthermore, recent evidence from crowdfunding campaigns shows that as the monetary cost of giving increases (i.e., the amount one needs to give in order for an entire dollar to go directly to the cause) the likelihood of a project being funded decreases (Meer, 2014).

As a result of individuals' aversion to overhead expenditures, charities are increasingly under pressure to spend less on overhead and more on direct program costs, giving rise to what has been coined the "nonprofit starvation cycle" (Gregory & Howard, 2009). Unfortunately, reducing overhead spending is likely to have a negative impact on charities' ability to initiate fundraising campaigns, invest in long-term planning, and sufficiently support overall infrastructure, all of which undermine efforts to serve causes effectively (Gregory & Howard, 2009; Lecy & Searing, 2014; Wing & Hager, 2004a). The pressure placed on charities by individuals, funding organizations, and government to lower fundraising and administrative costs has produced additional negative consequences, such as underreporting of overhead costs by charities, and donors' tendency to only fund programs with low(er) overhead costs regardless of the programs' impact (Hager & Flack 2004; Pollak, 2004; Wing & Hager 2004b).

While charity overhead receives a great deal of media attention (e.g., Barrett 2011; Hundley & Taggart 2013), only a handful of studies have looked at the extent to which individuals' behavior is influenced by overhead cost information, and no research has investigated the factors underlying this relationship. The current paper has three goals: 1) test for overhead aversion (i.e., whether an increase in overhead costs leads to a decrease in donations), 2) gain insight into the potential mechanisms underlying this effect, and 3) use a large-scale field experiment to investigate one solution that may allow organizations to increase contributions without lowering their overhead costs.

Giving and Overhead

Individuals give for a variety of reasons, including incentives such as tax breaks (Clotfelter, 1985; Steinberg, 1990) or fringe benefits (Buraschi & Cornelli, 2002),

wanting to signal a positive image to themselves (Bem, 1972; Gneezy, Gneezy, Riener, & Nelson, 2012) or to others (Ariely, Bracha, & Meier, 2009; Bénabou & Tirole, 2006; Griskevicius, Tybur, & Van den Bergh 2010; Grossman, 2010), and following perceived descriptive social norms (Berkowitz, 1972; Cialdini, Kallgren, & Reno, 1991; Croson, Handy, & Shang, 2009).

In this work we focus on two fundamental factors that have been previously identified as drivers of giving—to do good and to feel good. Individuals are motivated to do good, which they can achieve by helping those in need (Batson & Shaw, 1991; Cheung & Chan, 2000; Lee & Farrell, 2003; Small & Loewenstein, 2003; Wagner & Wheeler, 1969) and striving to make a difference or have an impact (Batson et al., 1988; Cryder, Loewenstein, & Scheines, 2013; Duncan, 2004; Grant et al., 2007). Individuals are also motivated to feel good (Baumeister & Leary, 1995; Denier, 2000; Ryan & Deci, 2000). Giving improves subjective well-being (Anik, Aknin, Norton, & Dunn, 2009) and makes people feel happy (Dunn, Aknin, & Norton, 2008; Dunn, Aknin, & Norton, 2014), thereby building positive emotions often referred to as a “warm glow” (Andreoni, 1989, 1990).

Given the apparent aversion donors have for overhead, we propose that if a portion of a donor’s gift is used to cover overhead it will interfere with her sense of doing good and feeling good. In particular, individuals may be more likely to feel they have made a positive impact when they know they have helped the cause directly rather than contributed to the salary of a charity’s staff member. This reasoning is consistent with the theory of impact philanthropy, which proposes that some donors—the impact philanthropists—are motivated by the opportunity to personally make a difference

(Duncan, 2004). According to this model, the impact philanthropist would prefer to target a specific charitable cause rather than overhead because she perceives that the former is more impactful. Moreover, if her donation is used to cover overhead, not only will she feel less impactful, she may also feel less happy about her donation (Cryder, Loewenstein, & Seltman, 2013). Ultimately, the negative effect of overhead on a donors' perceived impact and happiness could lead to a decrease in donations.

MATERIALS AND METHODS

Overview of Experiments

Using two laboratory experiments and a field experiment we offer an account of overhead aversion in charitable giving. Experiment 1 demonstrates that as a charity's overhead spending increases, donations decrease. Our data further show that this decrease in giving is mediated by donors' decreased sense of impact (i.e., making a positive difference), which reduces the positive emotions (i.e., happiness) typically associated with prosocial behavior and, ultimately, donations. Experiment 2 replicates the main effect observed in Experiment 1—showing that donations decrease as overhead increases—but *only* when donors own contributions cover overhead, providing additional support for our proposition that overhead aversion is driven by individuals' need to feel that their personal donation has a positive impact on the cause. Finally, Experiment 3, a field experiment, tests one solution for increasing donations while holding overhead spending intact—offering potential donors' an “overhead-free” donation opportunity. Results show that informing donors that initial large donations have been used to cover

overhead costs significantly increases giving compared to traditional fundraising techniques.

Experiment 1

In Experiment 1 we sought empirical support for our assertion that an increase in the overhead costs associated with a donation decreases giving. We also wanted to gain insight into what drives overhead aversion by examining mechanisms underlying the relationship between overhead and giving, namely donors' perceived impact and reported happiness.

Method

We recruited 602 participants (30.23% female; mean age = 29.06) from an online pool via Amazon Mechanical Turk (Buhrmester, Kwang, and Gosling 2011) and paid them \$0.25 for their participation in the study. We told participants that we were interested in understanding donation decisions and presented each with a description of a hypothetical charity named "CleanWater International" (see the Appendix for a copy of the experimental text). This description included information about the charity's work and about the approximate percentage of donations spent directly on the cause (i.e., "providing clean drinking water to families in Uganda") as well as the percentage of donations used to cover overhead (i.e., "the organization's administrative and fundraising costs").

Participants were randomly assigned to one of five conditions in which we randomly varied the level of overhead described. The first three conditions included a

low (5%), moderate (25%), and high (55%) level of overhead¹. The remaining two conditions were controls. The first control (nonspecific overhead) provided participants with the same charity description, except it did not offer a specific percentage of donations that the charity spent on overhead. Instead, it simply described that money donated to the charity is spent on both the cause and on overhead. Since we were examining the extent to which overhead impacts giving, we also wanted to consider if just the mere mention of overhead might cause a decrease in giving. Therefore, the second control condition provided participants with the charity description minus any mention of how the charity spends its donations (overhead not mentioned).

After reading about the charity, participants were asked how much they would like to donate to CleanWater International on a sliding scale ranging from \$0 to \$25. In order to make the decision consequential we told participants that we would randomly select three individuals to receive the \$25 minus the amount they chose to donate. In order to measure perceived impact and happiness participants were then asked, in random order: “To what extent do you believe your donation will make a positive difference?” and “How happy do you feel about your donation?” Answers were given on 7-pt scales from 1 = little to no difference/not at all (happy) to 7 = a very big difference/very much (happy).

Results

¹ A separate pre-test with a different set of 150 participants from the same pool read the same charity descriptions and provided their impression (1 = It is too low; 7 = It is too high), of the percentage of donations spent on its administrative and fundraising costs. Results confirmed that 5% was considered to be significantly lower ($M_5 = 3.82$) compared to 25% ($M_{25} = 4.74$) and 55% ($M_{55} = 5.54$), $p < .01$, and that 55% was considered to be significantly higher than 25%, $p < .01$.

Donation amount. An ANOVA revealed a main effect of overhead level on donation amount, $F(4, 597) = 4.54, p < .01$. In line with our prediction, as overhead increased, donations decreased (Figure 1.1). Using pairwise comparisons, we found that participants in the 5% overhead condition donated significantly more ($M_5 = 10.61$) than participants in both the 25% overhead condition ($M_{25} = 8.63; t(597) = 2.10, p = .04$) and 55% overhead condition ($M_{55} = 7.15; t(597) = 3.67, p < .01$). There was no difference in donation amount between the 25% and 55% overhead conditions. If we consider average donations among only those who chose to donate (i.e., participants who donated anything greater than \$0), the overall results are the same ($M_5 = 12.36, M_{25} = 10.05, M_{55} = 9.29$).

Comparisons including the control conditions revealed that when overhead was mentioned but not specified (nonspecific overhead), participants donated significantly more ($M_{ns} = 9.86$) than in the 55% overhead condition, $t(597) = 2.88, p < .01$. However, when there was no mention of overhead (overhead not mentioned), participants donated significantly less ($M_{no} = 7.83$) than in the 5% overhead condition, $t(597) = 2.93, p < .01$ and significantly less than the nonspecific overhead control condition, $t(597) = 2.15, p = .03$. Thus, when overhead level was not specified, participants responded as if the overhead level was low or moderate. Alternatively, when overhead level was not mentioned at all, participants responded as if the overhead level was high. While we had no a priori predictions for the differences between control conditions, these results suggest that when overhead is not mentioned, individuals may take into account their lay intuitions regarding overhead levels, highlighting that they believe overhead is high. While we are unable to address these differences fully with our data, it is plausible that

donors gave more in the nonspecific compared to the overhead not mentioned control because the former offered more details (Cryder, Loewenstein, & Scheines, 2013).

Impact and Happiness. Similar to the donation results, we see a negative effect of overhead level on participants' reported sense of impact and happiness. An ANOVA revealed a significant main effect of overhead level on participants' belief that their donation would make a positive difference, $F(4, 597) = 6.91, p < .01$. As the overhead level increased, participants were less likely to believe their donation would make a difference. Pairwise comparisons showed that participants in the 55% overhead condition were significantly less likely to believe that their contribution made a positive difference ($M_{55} = 3.74$) than participants in the 5% ($M_5 = 4.72; t(597) = 4.55, p < .01$) and 25% overhead conditions ($M_{25} = 4.45; t(597) = 3.31, p < .01$).

Our results also show a significant main effect of overhead level on the extent to which participants reported feeling happy about their donation, $F(4, 597) = 2.97, p = .02$. As the overhead level increased, reported happiness decreased. Pairwise comparisons showed that participants in the 55% overhead condition were significantly less likely report feeling happy ($M_{55} = 4.81$) than participants in the 5% ($M_5 = 5.41; t(597) = 3.04, p < .01$). They were also less likely to report feeling happy compared to the 25% overhead condition ($M_{25} = 5.18$), though this difference was not significant, $t(597) = 1.90, p = .06$.

Comparisons involving the controls revealed that participants in the 55% overhead condition were significantly less likely to believe they made a positive difference relative to participants in the nonspecific overhead condition ($M_{ns} = 4.37; t(597) = 2.96, p < .01$). Additionally, participants in the 55% overhead condition reported being significantly less happy than participants in the nonspecific overhead condition

($M_{ns} = 5.33$; $t(597) = 2.65$, $p < .01$). Participants in the overhead not mentioned condition were significantly less likely to believe they made a positive difference ($M_{no} = 3.93$) relative to participants in the 5% ($t(597) = 3.66$, $p < .01$), 25% ($t(597) = 2.43$, $p = .02$) and nonspecific overhead conditions ($t(597) = 2.07$, $p = .04$). Similar to donation amount, when overhead level was not specified, participants responded to the impact and happiness questions as if the overhead level was low or moderate, and when overhead level was not mentioned at all, donors responded to the impact question as if the overhead level was high.

Mediation. We tested the role of impact and happiness as mediators of the effect of overhead on donation amount using the conditions in which overhead was specified to be either 5%, 25% or 55%. Using the PROCESS SPSS application provided by Hayes (2013), we evaluated perceived impact and happiness sequentially as mediators and found that the 95% bias-corrected confidence interval for the size of the indirect effect excluded zero (indirect effect = $-.01$, SE = $.0028$; 95% CI [-0.0151 , -0.0039]). As illustrated in Figure 1.2, perceived impact and happiness mediate the relationship between overhead level and donation amount such that the higher the overhead level, the lower the perceived impact and happiness one experiences, which negatively impacts donations.

Discussion

As we predicted, the results of Experiment 1 demonstrate that as overhead levels increase, donations decrease. Our data further show that the negative relationship between overhead level and donation amount is mediated by the perceived impact one feels her donation has towards benefitting the cause, which subsequently affects the

extent to which she feels good with respect to her donation and, ultimately, the amount she chooses to donate. While these results support our supposition that overhead negatively affects donors' behavior, they do not rule out another explanation—that high overhead might indicate that an organization is inefficient, or even corrupt. In other words, potential donors may use a charity's overhead as a signal of the likelihood that the charity will deliver on its promises.

One way to distinguish between these two explanations is to hold overhead levels constant and control whether a donor's contribution is used in its entirety towards the cause (i.e., overhead is paid for by someone else) or used to cover costs associated with overhead and cause-specific programming, as is traditionally the case. If donors use overhead levels to infer information about the charity (i.e., whether it delivers on its promises), we would expect that even if donors' money is directed entirely to the cause, we would still see a decrease in donations as overhead levels increase. If, however, donors' aversion to overhead is driven by a decrease in the perceived (personal) impact donors experience with respect to their donations, then as long as donations are going entirely to the cause, we should not see a decrease in donations as overhead levels increase.

Experiment 2

In Experiment 2 we explore whether overhead aversion is due to the negative signal provided by high overhead or whether this aversion is in fact due to the perceived impact one feels with regard to how their personal donation is used.

Method

We recruited 449 undergraduates from a public university in southern California (35.19% female; mean age = 21.56) to complete a study for class credit. Using a between-participants design (see the Appendix for a copy of the experimental text), we randomly assigned the participants to one of five conditions. All participants were presented with two charities: *Kids Korps USA*, described as “a non-profit organization that engages young people in volunteerism and teaches them about leadership and civic responsibility,” and *charity: water*, described as “a non-profit organization that brings clean and safe drinking water to people in developing nations.”

In all five conditions, we asked participants to decide which of the two charities should receive a \$100 donation. Participants were informed that we would randomly choose the decision of one participant and implement it (i.e., make his/her specific payment), making decisions consequential. Participants were also told that there was no overhead associated with donations made to Kids Korps. In contrast, we manipulated two aspects of the overhead associated with donations to *charity: water*. First, we varied the overhead level associated with participants’ donations to *charity: water* from no overhead (i.e., we sent \$100 to *charity: water* if participants chose it) to 5% (low) or 50% (high) overhead associated with the donation (i.e., we sent \$95 or \$50 to *charity: water* if participants chose it, respectively). Second, we varied whether or not overhead costs were already covered by another donor (i.e., “overhead-free”). Specifically, we informed half of the participants in the overhead conditions that “someone else already covered this cost for your contribution, so for every dollar you’ll donate the entire \$1 will go to

“charity: water.” Our dependent measure was the proportion of donations given to charity: water².

Results

Consistent with the results of Experiment 1, in the conditions in which overhead was not covered by someone else, donations decreased as overhead increased (Figure 1.3). The majority of participants in the “no overhead” condition (73.33%) chose to donate to charity: water. The proportion of participants that donated to charity: water in the “5% overhead” condition decreased to 66.67%, though this was not a significant decrease based on a test of proportion ($z = 0.98$; $p = .33$). When overhead costs were 50%, only 49.43% of participants chose to donate to charity: water, which was significantly lower than the proportions observed in the no overhead ($z = 3.27$; $p < .01$) and 5% overhead ($z = 2.32$; $p = .02$) conditions. Probit regressions confirm the above results (see Table S1.1 in the Appendix). Estimated marginal effects show that participants in the 50% overhead condition were 24% (17%) less likely to choose charity: water compared to those in the no overhead (“5% overhead”) condition.

When someone else covered overhead, the percentage of participants donating to charity: water was insensitive to whether overhead was 5% or 50%, which is in line with the personal impact explanation. At 50% overhead-free, 71.43% of participants donated to charity: water, which was not different than donations in the no overhead condition, $z = 0.29$; $p = .77$ and was significantly higher than those in the 50% uncovered overhead condition, $z = 3.00$; $p < .01$. See Table S1.1 in the Appendix for probit regression results

² Importantly, this study does not involve deception (i.e., we actually changed the overhead associated with the donation as described).

that also include demographic (gender, age, donation frequency, and familiarity with the charity) controls.

Discussion

As in Experiment 1, the results of Experiment 2 demonstrate that individuals are indeed sensitive to overhead levels. As overhead increased the proportion of individuals choosing to donate decreased significantly. Yet, this effect disappeared when someone else covered the (same) overhead costs, suggesting that participants' aversion to overhead is driven by individuals' need to feel that their personal donation has a positive impact on the cause. Thus, our results suggest individuals are not averse to the existence of overhead, but instead are averse to their own money being used to cover overhead.

The conclusions drawn from Experiment 2 suggest a potential solution that may allow organizations to increase contributions without lowering their overhead costs: offering individuals an "overhead-free" donation opportunity. As Experiment 2 showed, when overhead costs were held constant but paid by someone else, donations significantly increased such that donors behaved as if there was no overhead at all. While this result suggests a new strategy for securing donations, it requires securing funding from donors who are willing to have their donations entirely used for overhead.

One source for this type of funding may come from generous private donors who give lump sums to charities to help launch new fundraising campaigns. Traditionally, charities have used these financial gifts to solicit additional donations in two primary ways: announcing the initial donation as "seed money," or using it in a "matching model" in which the charity uses the initial funds to match every new dollar donated; both techniques are effective in increasing donor contributions (Vesterlund, forthcoming).

Publicly announcing seed money increases the number of people who donate and the amount they give (Rondeau & List, 2008). Furthermore, seed money that covers a greater percentage of the total campaign goal results in a significant increase in contributions compared to seed money that covers a smaller percentage of the campaign goal (List & Lucking-Reiley, 2002). Consistent with theoretical predictions regarding the potential of seed money in fundraising (Andreoni, 1998), this increase in contributions has been attributed to social comparison (Croson & Shang, 2008; Frey & Meier, 2004; Potters, Sefton, & Vesterlund, 2007) and to “goal gradient helping”, whereby the closer a fundraising campaign comes to meeting its goal, the more likely people are to donate (Cryder, Loewenstein, & Seltman, 2013; Vesterlund, 2003).

A parallel line of research shows that, like seed money, announcing a matching grant can increase the fraction of people who choose to donate and the amount they give both in the laboratory (Eckel & Grossman, 2003; Eckel & Grossman, 2004; Eckel, Grossman, & Johnston, 2005) and in the field (Karlan & List, 2007; Meier, 2007), though the matching level (\$1:\$1, \$2:\$1 or \$3:\$1) does not affect giving. Based on the results of Experiment 2, we propose a third alternative—using the initial donation to cover a charity’s overhead costs (i.e., administrative and fundraising costs), thereby allowing all subsequent donations to be overhead free, and go directly to the cause.

Field Experiment

In our final experiment, a field study, we test whether designating early large gifts to cover overhead costs increases donors’ willingness to contribute to a charity. From an economic perspective, designating initial large gifts as “seed money” or using them to

cover overhead costs is the same. Charities are interested in maximizing the total funds raised and are agnostic about whether overhead costs are covered by initial donations or are shared by all donors. Consumers, however, seem to have clear, strong preferences—they want *their* donations to be put to “good” use—which they believe is through contributions to programming. While Experiment 2 provided some initial support for the “overhead-free” approach, our experiment was conducted with undergraduate students in a laboratory setting. Ultimately, we wanted to test the effect of an “overhead-free” donation opportunity on actual donations. To that end, we conducted a large field experiment.

Method

For our field experiment, we worked with a foundation that specializes in education³. The foundation purchased the right to send a one-time donation request letter to 40,000 potential US donors who donated to similar causes in the preceding five years. Participation was limited to US addresses; however, the charity does not have information regarding these donors’ demographics. All letters were mailed on the same day during the spring of 2013, and included a non-stamped return envelope as well as a single-page solicitation. Participants were randomly assigned to one of four conditions: Control, Seed, Match, and Overhead ($n = 10,000$ per condition).

We informed participants in the Control condition about the foundation’s new initiative to promote educational projects in different locations in the United States, and that the program cost per location was \$20,000. Participants were not given a specific

³ As is common in running experiments with organizations, we signed a non-disclosure agreement that limits the amount of information we can give regarding the procedure.

geographical location for the project, and were told that the Foundation is interested in sponsoring as many projects as possible given the amount of money raised.

Participants were asked to give \$20, \$50, or \$100. The pledge form included the following statement: “Our goal in this campaign is to raise money for the projects. Implementing each project costs \$20,000. Your tax-deductible gift makes a difference. Enclosed is...” Participants were asked to check a box to indicate their donation amount.

The letter in the Seed condition further informed participants that the foundation had already secured \$10,000 for the project from a private donor (see the Appendix for a copy of the experimental text). The added text read, “*A private donor who believes in the importance of the project has given this campaign seed money in the amount of \$10,000. Your tax-deductible gift makes a difference. Enclosed is...*”

We told participants in the Match condition that a donor had offered a matching grant of up to \$10,000, and that the matching rate would be \$1:\$1. The added text read, “*A private donor who believes in the importance of the project has given this campaign a matching grant in the amount of \$10,000. The matching grant will match every dollar given by donors like you with a dollar, up to a total of \$20,000...*”

Finally, we told participants in the Overhead condition that a donor had given a \$10,000 grant to cover all the overhead costs associated with raising the funds needed for the project. The added text read, “*A private donor who believes in the importance of the project has given this campaign a grant in the amount of \$10,000 to cover all the overhead costs associated with raising the needed donations...*”

Results

Donation Rate. Overall, 336 individuals (3.36%) in the Control condition donated (Figure 1.4). This number increased to 475 (4.75%) in the Seed condition and the difference is significant using a test of proportion ($z = 4.98$; $p < .001$). In the Match condition, 441 individuals (4.41%) chose to donate, which is significantly higher than donation rates in the Control condition ($z = 3.84$; $p < .001$), but not statistically different from donation rates in the Seed condition ($z = 1.15$; $p = .25$). The greatest number of people donated in the Overhead condition (855; 8.55%), which was significantly higher than the number of donors in any of the other three conditions ($z = 15.51$; 10.78; 11.89 for the difference from Control, Seed, and Match, respectively; all $p < .001$).

The pattern among conditions in the number of individuals donating at the different monetary levels was similar to the pattern observed in the number of overall donors in each condition. Most individuals donated \$20 (see Table 1.1), and the \$20 donations also accounted for most of the money collected (74% in Control, 60% in Seed, 61% in Match, and 63% in Overhead). In the Overhead condition, 726 (7.26%) individuals donated \$20, which was significantly greater than the proportion of individuals who donated \$20 in the Control (297; 2.97%), Seed (396; 3.96%), or Match (373; 3.73%) conditions ($z = 13.77$; 10.14; 10.95, respectively; all $p < .001$). While the proportion of individuals that donated \$20 in the Seed and Match conditions was not significantly different ($z = 0.85$; $p = .40$), they were both significantly greater than Control ($z = 3.83$; 2.99 for the difference from Control, respectively; all $p < .01$). This pattern persisted with \$50 donations: 86 (0.86%) individuals in the Overhead condition donated \$50, which was significantly greater than in the Control (36; 0.36%), Seed (52; 0.52%), and Match (41; 0.41%) conditions ($z = 4.54$; 2.90; 4.01, respectively; all $p <$

.01). The difference in the proportion of individuals choosing to donate \$50 in the latter three conditions was not significant (all $p > .05$). Finally, 43 (0.43%) participants donated \$100 in the Overhead condition, which was significantly greater than the number of participants who donated \$100 in the Control (3; 0.03%; $z = 5.90$; $p < .001$), Seed (27; 0.27%) and Match (27; 0.27%) conditions (both $z = 1.92$; both $p = .05$). Similar to the pattern for \$20 donations, the proportion of individuals that donated \$100 in the Seed and Match conditions were not significantly different from each other, but both were significantly higher than Control (all $z = 4.39$; all $p < .001$).

Amount Donated. The total amounts of money raised in each condition reflect the giving patterns described above. Overall, the campaign raised \$8,040 through the Control condition ($M = \$0.80$, $SD = 4.82$) per solicitation; Figure 1.5). The amount raised in the Seed condition was 64% higher than the Control condition—\$13,220 ($M = \1.32, $SD = 7.36$ per solicitation). An intention-to-treat analysis revealed this difference was significant ($t(19998) = 5.89$, $p < .001$). The amount collected in the Match condition was \$12,210—52% more than in the Control condition ($t(19998) = 4.85$, $p < .001$; $M = \$1.22$, $SD = 7.12$ per solicitation). This amount was not significantly different from the amount collected in the Seed condition ($t(19998) = .99$, $p = .32$). Finally, the foundation raised \$23,120 ($M = \2.31, $SD = 9.39$ per solicitation) in the Overhead condition—a significant increase relative to the Control (188%; $t(19998) = 14.29$, $p < .001$), Seed (75%; $t(19998) = 8.30$, $p < .001$), and Match (89%; $t(19998) = 9.26$, $p < .001$) conditions.

Interestingly, conditional on giving, the average amounts given in the Seed, Match and Overhead conditions (27.83, 27.69, 27.04, respectively) were significantly greater than Control (23.93; all $p < .01$) but not different from each other. Hence, the

difference between Control and the other three conditions comes from both the extensive margin (i.e., the number of people who choose to donate) as well as the intensive margin (i.e., the amount given by donors). However, the difference between the Seed, Match and Overhead conditions comes from the extensive margin only. We did not predict this result, which could be an important aspect to study in future research.

Discussion

The results of the field experiment build on the findings of Experiment 2 and demonstrate that offering potential donors' an "overhead-free" donation opportunity, by communicating to potential donors that prior donations have been used to cover overhead costs, significantly increases giving compared to traditional fundraising techniques.

Field experiments are a major tool for finding a "treatment effect" (i.e., changes between conditions) rather than the actual size of the effect. For example, converging evidence shows that adding a match offer to a donation solicitation increases giving, but the levels are different between experiments, and sometimes even within an experiment. In one study (Karlan & List, 2007), the authors report an overall difference of 19% (compared to the 52% increase we report in this paper), but find that adding a matching grant affected only some groups of donors. On the other hand, research testing the effect of seed money (List & Lucking-Reiley, 2002) finds that an increase in seed money from 10% to 67% increases giving six-fold (compared to the increase of 64% in our experiment). Despite these different effect sizes, which are driven by factors such as the different characteristics of the groups of potential donors/participants used in experiments, the treatment effect is similar.

GENERAL DISCUSSION

The result of our field and laboratory experiments support the importance of perceived personal impact in individuals' decisions to donate. Notably, the notion of perceived personal impact relates to the theory of warm glow, which suggests that impure altruism guides an individual's decision to give (Andreoni, 1990)—donors care not only about helping the cause, but also about how doing so makes them feel (Imas, 2014) and the way it reflects on their self-identity (Akerlof & Kranton, 2000; Ariely, Bracha, & Meier, 2009; Bénabou & Tirole, 2006; Gneezy, Gneezy, Riener, & Nelson, 2012). In the context of our demonstration of overhead aversion, impure altruism would predict that the warm glow a donor experiences when helping the recipient of the donation is higher than the warm glow she receives from helping to cover the charity's overhead costs.

An open question that we cannot address with the current data relates to the overall effect of using the “overhead free” method for donations. Would the implementation of the overhead free donation strategy increase overall giving to charities or simply shift giving among charities? Furthermore, this method could bolster the growing unpopularity of overhead costs among donors, causing a race to the bottom among nonprofit organizations soliciting gifts to cover overhead costs.

Despite the continued active debate as to whether overhead is a good measure of a charity's effectiveness, our results strongly demonstrate that donors tend to be averse to overhead. Thus, in our approach we bypass individuals' reluctance to donate due to overhead-related concerns by offering “overhead-free” donations. A prominent example of this approach at the organizational level is “charity: water,” a non-profit that has split

into two separate organizations: “charity: water,” which accepts donations that go entirely to program expenses, and “The Well,” which fundraises for “charity: water” and has its costs paid for by larger wealthy donors.

It is important to note that we are not suggesting halting efforts to explain that (similar to the for-profit sector) overhead costs provide organizations in the non-profit sector the infrastructure required to effectively reach their goals and fulfill their mission. However, we believe such efforts entail a prolonged uphill battle that may ultimately prove futile. In the meantime, we propose an approach that simultaneously addresses individuals’ concerns and increases overall giving. Overhead-free solicitations allow organizations to focus their efforts on convincing a handful of prominent and experienced donors that their money is best spent on overhead. We expect such focused efforts would be more effective compared with the alternative—trying to change the perceptions of the general public.

Table 1.1. Donations by condition and amount

	Control	Seed	Match	Overhead
\$20	297	396	373	726
\$50	36	52	41	86
\$100	3	27	27	43

Note. The number of people who chose to donate by condition and amount donated in the field experiment.

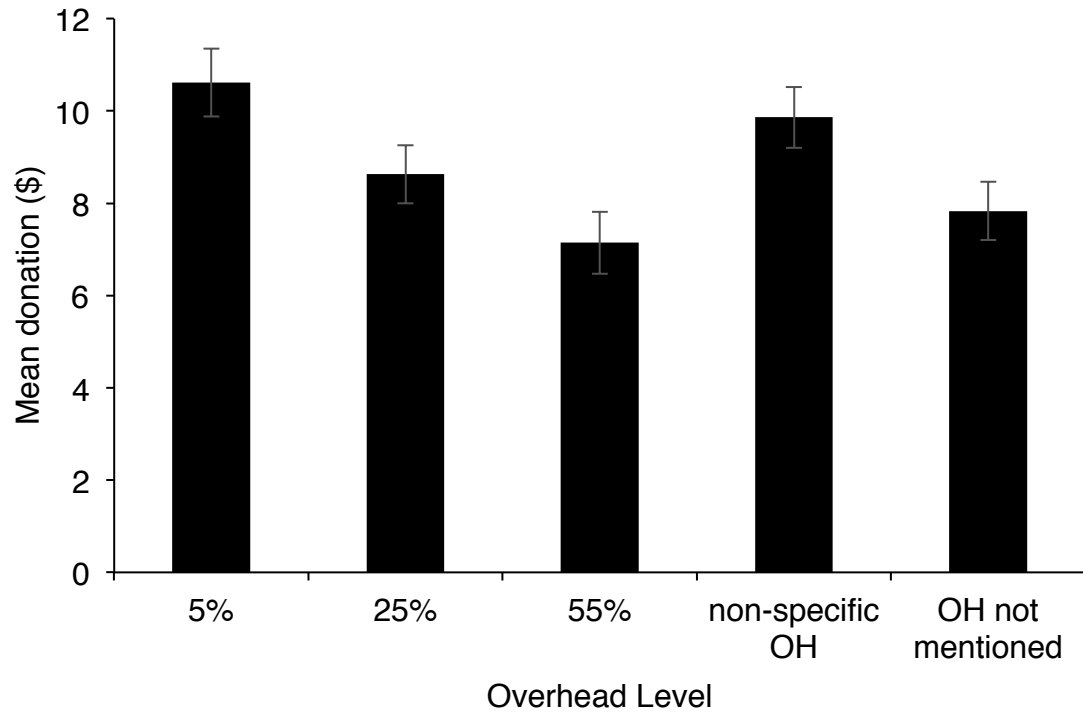


Figure 1.1. Mean donation amount by condition in Experiment 1. Bars are ± 1 s.e.m.

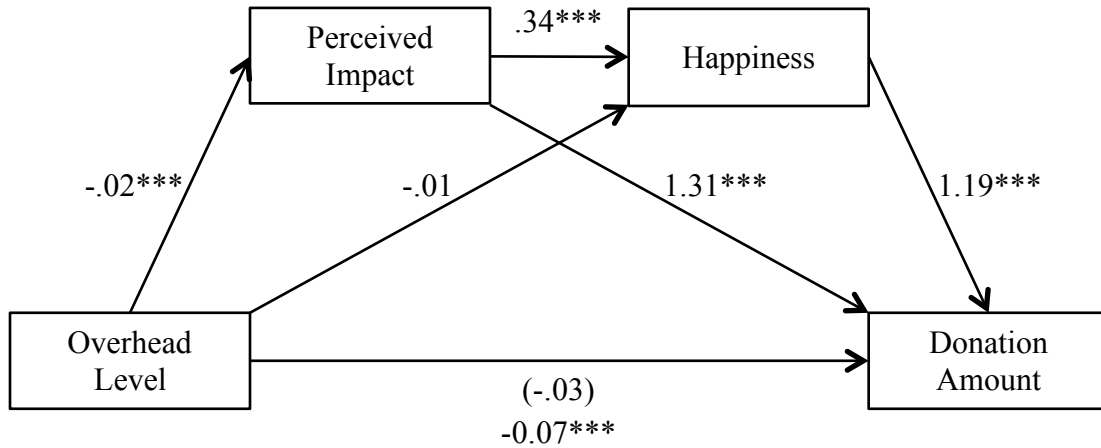


Figure 1.2. Mediation model for Experiment 1. The path coefficients are unstandardized betas. The value in parentheses is the effect of the relationship between the independent and dependent variables after controlling for the mediators. $***p < .001$

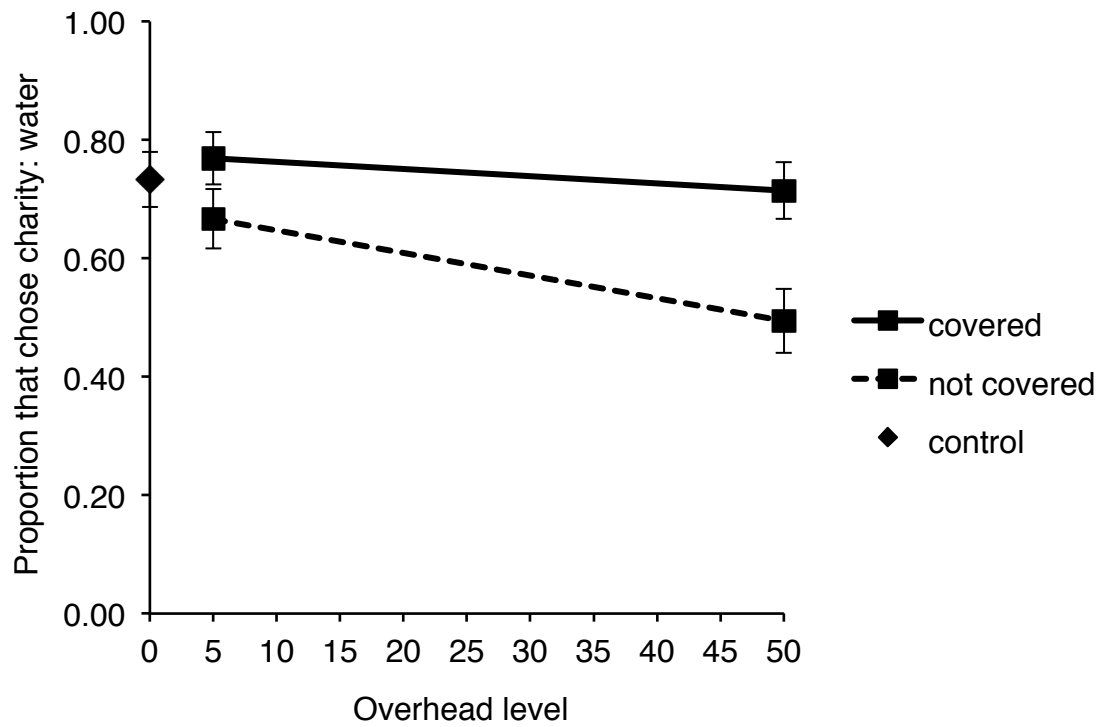


Figure 1.3. Proportion of participants that chose charity: water by overhead level and by whether or not someone else covered the overhead in Experiment 2. Bars are ± 1 s.e.m.

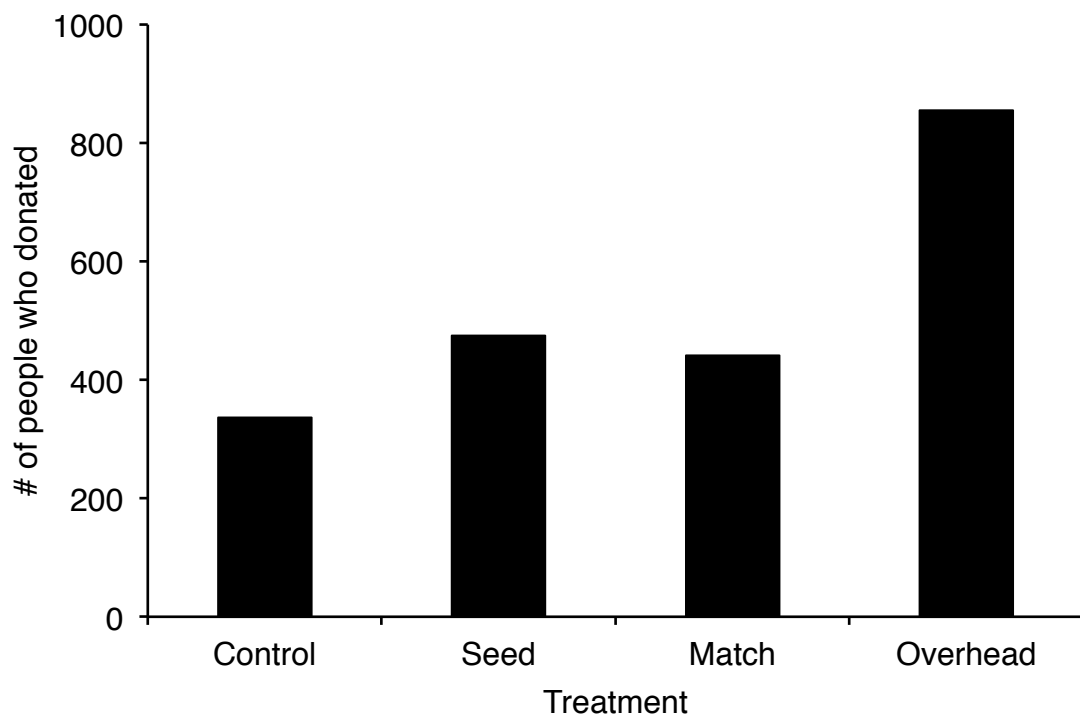


Figure 1.4. The total number of people who donated by condition in the field experiment.

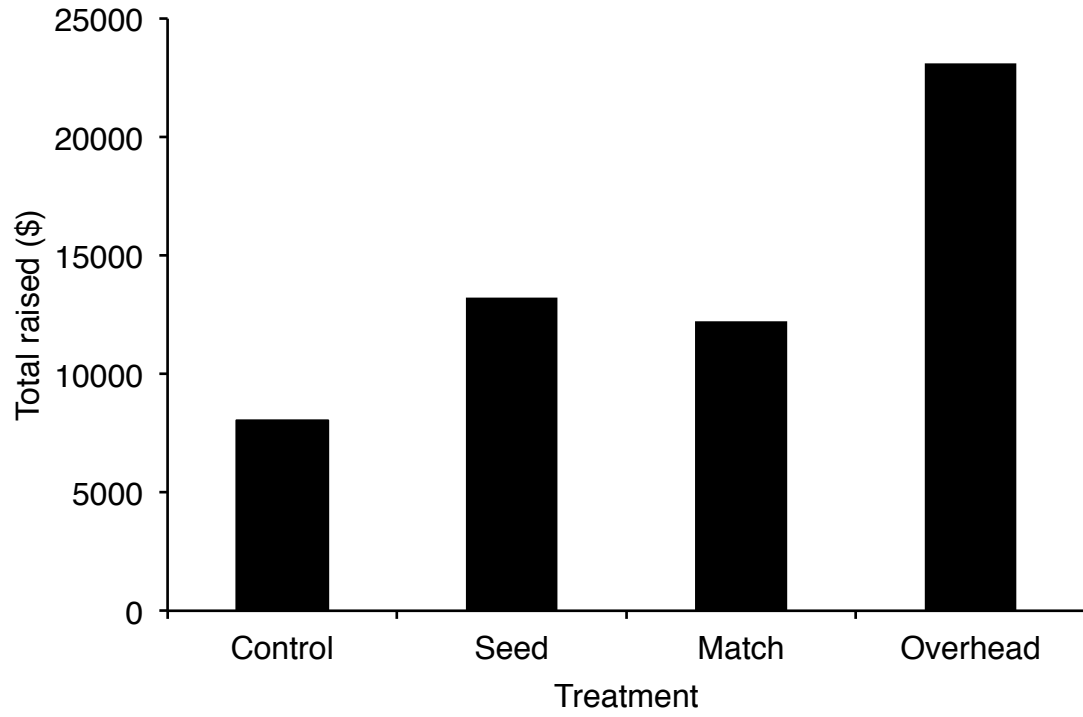


Figure 1.5. Total amount raised by condition in the field experiment.

APPENDIX

Experiment 1: Experimental TextMain Text and DV

We are interested in understanding donation decisions. Please read the following information about a charity and answer the questions that follow.

[Participants were randomly assigned to one of the following 5 conditions.]

5%, 25% or 55% overhead

CleanWater International is a charity focused on ensuring families in Uganda have access to clean drinking water. This charity is rated as a top charity in the clean water sector, based on financial health, accountability, transparency and the number of people it helps each year. Approximately 95/75/45% of the money donated to CleanWater International goes directly to providing clean drinking water to families in Uganda, while the remaining 5/25/55% is used to cover the organization's administrative and fundraising costs associated with providing clean drinking water to these families.

Nonspecific overhead control

CleanWater International is a charity focused on ensuring families in Uganda have access to clean drinking water. This charity is rated as a top charity in the clean water sector, based on financial health, accountability, transparency and the number of people it helps each year. Money donated to CleanWater International goes directly to providing clean drinking water to families in Uganda and to cover the organization's administrative and fundraising costs associated with providing clean drinking water to these families.

No mention of overhead control

CleanWater International is a charity focused on ensuring families in Uganda have access to clean drinking water. This charity is rated as a top charity in the clean water sector, based on financial health, accountability, transparency and the number of people it helps each year.

[DV]

Please tell us how much (between \$0 and \$25) you would like to donate to this charity.

Important: We will randomly select 3 individuals to win \$25 minus the amount they chose to donate, which will be donated. This will be paid using Amazon Mechanical Turk's bonus function.

How much would you like to donate? (sliding scale from \$0 to \$25)

Additional Questions

How happy do you feel about the [donation/decision] you made? (7-point scale; 1=not at all to 7=very much) *[if donated/if did not donate]*

To what extent do you believe [your donation will/a donation would] make a positive difference in the effort to provide clean drinking water to families in Uganda? (7-point scale; 1=little to no difference to 7=a very big difference) *[if donated/if did not donate]*

On average, how often do you donate money to non-profits? (6-point scale; 1=never to 6=6 or more times a year)

What is your gender? (multiple choice; male, female)

What is your age? (open-ended response)

What is your total combined annual household income range in U.S. dollars? (9-point scale; 1=\$0-\$25,000 to 9=\$200,001+)

Experiment 2: Experimental Text

Main Text and DV

In today's study we will ask you to give \$100 to one of two non-profits. At the end of the study, we will randomly choose the decision of one participant and implement it (i.e., make his/her specific payment). Your choice is whether to give the \$100 to "Kids Korps" or to "charity: water."

Kids Korps. Kids Korps is a non-profit organization that engages young people in volunteerism and teaches them about leadership and civic responsibility. There is no overhead (i.e., spending on administrative and fundraising costs) associated with this donation, so for every dollar you'll donate the entire \$1 will go to "Kids Korps."

[Participants were randomly assigned to one of the following 5 charity: water conditions.]

5% or 50% overhead

charity: water. charity: water is a non-profit organization that brings clean and safe drinking water to people in developing nations. There is 5% [50%] overhead (i.e., spending on administrative and fundraising costs) associated with this donation, so for every dollar you'll donate 95 [50] cents will go to "charity: water" and 5 [50] cents will be used to cover our costs.

5% or 50% overhead, covered

charity: water. charity: water is a non-profit organization that brings clean and safe drinking water to people in developing nations. There is 5% [50%] overhead (i.e.,

spending on administrative and fundraising costs) associated with this donation, but someone else already covered this cost for your contribution, so for every dollar you'll donate the entire \$1 will go to "charity: water."

no overhead control

charity: water. charity: water is a non-profit organization that brings clean and safe drinking water to people in developing nations. There is no overhead (i.e., spending on administrative and fundraising costs) associated with this donation, so for every dollar you'll donate the entire \$1 will go to "charity: water."

[DV]

Please tell us which organization you would like to give \$100 to:

Kids Korps

charity: water

Additional Questions

On average, how often do you donate money to non-profits? (6-point scale; 1=never to 6=6 or more times a year)

How familiar are you with Kids Korps? (7-point scale; 1=not at all to 7=very)

How familiar are you with charity: water? (7-point scale; 1=not at all to 7=very)

What is your gender? (multiple choice; male, female)

What is your age? (open-ended response)

Field Experiment

Pledge Form Text

The pledge form included the following statement:

"Our goal in this campaign is to raise money for the projects. Implementing each project costs \$20,000. Your tax-deductible gift makes a difference. Enclosed is..."

[Participants were asked to check a box to indicate their donation amount.]

The added text in the condition conditions:

Seed: "*A private donor who believes in the importance of the project has given this campaign seed money in the amount of \$10,000.* Your tax-deductible gift makes a difference. Enclosed is..."

Match: “A private donor who believes in the importance of the project has given this campaign a matching grant in the amount of \$10,000. The matching grant will match every dollar given by donors like you with a dollar, up to a total of \$20,000...”

Overhead: “A private donor who believes in the importance of the project has given this campaign a grant in the amount of \$10,000 to cover all the overhead costs associated with raising the needed donations...”

Additional Analyses

Table S1.1. Probit regression results – Experiment 2

Probability (choosing CW)	(1)	(2)	(3)	(4)
5% overhead	-.07 (.07)	-.08 (.07)	-.08 (.07)	-.08 (.07)
5% covered overhead	.04 (.07)	.04 (.07)	.04 (.07)	.04 (.07)
50% overhead	-.24** (.08)	-.23** (.08)	-.24** (.08)	-.25** (.08)
50% covered overhead	-.02 (.07)	-.02 (.07)	-.02 (.07)	-.01 (.07)
Female		.17*** (0.04)	.16*** (0.04)	.16** (0.05)
Age			-.01 (0.01)	-.01 (0.01)
Familiarity with CW				.04* (0.02)
Donation frequency				-.04** (0.02)
Observations	449	449	443	434

*** $P < .001$; ** $P < .01$; * $P < .05$

Note. Probit Regressions on the probability of choosing to donate \$100 to charity: water. Probability (choosing CW) is the predicted probability of choosing charity: water (CW) in each of the four conditions compared to choosing CW when there is no overhead. The baseline condition is the no overhead condition. Female is a

dummy for women, age is a continuous variable, and familiarity with CW and donation frequency are ordinal variables. All marginal effects are evaluated at the change of a dummy variable from 0 to 1. Column (1) presents the condition effects without controls, column (2) includes a female dummy, column (3) includes age, and column (4) includes familiarity with CW and donation frequency. Standard errors are in parentheses.

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Chapter 2.

WHEN DOING GOOD, YOU SHOULD NOT DO WELL: THE CASE OF
NONPROFIT EXECUTIVE COMPENSATION

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ABSTRACT

Nonprofit executive compensation is a hot button issue that draws vast amounts of negative media attention. Little empirical work has examined the direct impact of perceived excessive nonprofit executive compensation on donations and other donor related decisions. Negative associations with salaries in the nonprofit sector could reduce donations and ultimately hurt the effectiveness of nonprofits. Given this, the primary objectives of this work are to (1) explore the effect of high nonprofit CEO pay on individuals' willingness to donate to charity, (2) assess how individuals choose to compensate nonprofit executives versus for profit executives, and (3) better understand what underlies individuals' attitudes toward nonprofit executive compensation. Findings show that individuals are less willing to donate to a charity with high CEO pay and will offer a qualified CEO significantly less money for a job if the organization is described as a nonprofit versus a for profit. Finally evidence suggests that moral considerations coupled with concerns about the allocation of donations in nonprofits play a role in individuals' reactions to CEO pay.

INTRODUCTION

“People give to these charities out of the goodness of their hearts and the CEOs take those types of salaries out of the greed in their hearts. I will not donate another nickel to these charities.”

-Reader comment regarding the CEO’s salary at the Susan G. Komen Foundation

Posted online, June 14, 2013

Salaries of nonprofit CEOs draw tremendous public scrutiny. Nancy Brinker, CEO of the Susan G. Komen Foundation, drew the ire of the public and the media for earning a salary of \$684,000 (Myers & Reynolds, 2013). Similarly, John Seffrin’s salary of over \$750,000 as CEO of the American Cancer Society was vilified in the media (Forbes, 2013; Green, 2012). While these are extreme cases, executive compensation throughout the charitable sector is a hot button issue that draws vast amounts of negative media attention and condemnation from the public (Charity Navigator, 2014; Fukushima, 2014; Hundley & Taggart, 2013; White, 2013; Wilhelm, 2009). Concerns about how much is too much extend beyond isolated reactions from the public and media—the IRS has introduced new regulations aimed at managing excessive nonprofit compensation (Guidestar, 2008; IRS, 2007) and lawmakers in a number of states have initiated legislation to cap executive salaries at nonprofit organizations (Ball, 2013; Forbes, 2013; Wilhelm, 2009).

Despite sentiments that CEOs in the nonprofit sector are overpaid, it is important to note that the numbers of cases of nonprofit executives being “overpaid” are in the minority (Charity Navigator, 2014). The salaries of nonprofit executives are, on average,

substantially lower than their counterparts who hold similar positions in the for profit sector (Handy & Katz, 1998; Steinberg, 1990). For example, the median pay for CEOs at S&P 500 companies in 2012 was \$9.7 million (Krantz & Hansen, 2013) while median pay for nonprofit executives in mid- to large-sized U.S. charities was \$120,396 (Charity Navigator, 2014).

In this chapter we investigate CEO compensation in the nonprofit sector. The primary objective is to better understand what underlies individuals' attitudes toward nonprofit executive compensation. To this end, we explore some of the negative effects of these attitudes on the willingness of individuals to donate to charity as well as how individuals choose to compensate nonprofit executives versus for profit executives. Importantly, this work uses comparisons of individuals' perceptions, judgments and behavior of executive compensation in the nonprofit versus the for-profit sector, which provides a benchmark for understanding the extent to which individuals' attitudes toward compensation in the nonprofit sector diverge from what's tacitly accepted in the for profit sector.

Background

Perceptions that a nonprofit CEO is paid too much can undermine the public's confidence in an organization and may negatively impact the donations it receives (Balsam & Harris, 2014; Carman, 2011). For example, United Way of Central Carolinas experienced a 30% drop in annual donations following a media scandal surrounding the size of their CEO's compensation package (Carman, 2011). More broadly, data suggests there is a negative relationship between media attention and donations, such that direct

donations to nonprofit organizations decrease after their executive salaries are disclosed in the media (Balsam & Harris, 2014). Additionally, evidence based on employee compensation as a whole (rather than just executive compensation) demonstrates that above-median compensation is associated with decreased donations, though the negative effect is mitigated if organizations demonstrate sound financial performance (Yan & Sloan, 2014). The negative relationship between nonprofit CEO pay and donations is consistent with a growing body of work demonstrating that donors are averse to nonprofit overhead spending (i.e., spending on non-programmatic expenses such as administrative and fundraising costs; Baron & Szymanska, 2011; Caviola et al., 2014; Gneezy, Keenan, & Gneezy, 2014; Meer, 2014; Tinkelman & Mankaney, 2007). Taken in sum, this research finds that donations decrease as overhead in an organization increases (Gneezy, Keenan, & Gneezy, 2014; Tinkelman & Mankaney, 2007). Notably, employee compensation is one of the primary expenses individuals think of when asked to list what types of overhead expenses they associate with nonprofit spending.¹

Those who believe nonprofit CEOs are overpaid often argue that the nonprofit sector is not a place for executives to “line their own pockets,” but instead a place to help those in need. This sentiment suggests people believe that if someone works at a nonprofit, his or her primary motivation should be social good rather than money. Unfortunately, wanting to pay CEOs less money may be in conflict with the cost of talent, which is needed for the management of a nonprofit and ultimately for the nonprofit to have a positive impact on society. Thus, while well intentioned, limiting

¹ See the Appendix for results of a pre-test that explored individuals’ understanding of the types of expenses that are considered “overhead.” One of the most popular expenses categories reported in the pretest was salaries/benefits.

salaries of nonprofit executives could hurt the causes that nonprofits are trying to help, as paying appropriate salaries to leaders of nonprofits is critical to the long-term success of the organization, just as it is in the for profit sector (Frumkin & Keating, 2010).

Determinants of nonprofit CEO pay

The IRS requires that nonprofit executive pay be “fair and reasonable” (Guidestar, 2011) or, more specifically, expects CEOs to be paid “the amount that would ordinarily be paid for like services by like enterprises (whether taxable or tax exempt) under like circumstances” (U.S. Government Printing Office, 2014). Nonprofit compensation deemed as excessive by the IRS can lead to fines for the offending organization and even revocation of its tax-exempt status (Guidestar, 2011; IRS, 2014). Though *fair* and *reasonable* are not clearly defined, the IRS recommends procedures that can help justify compensation, which include using an independent “compensation committee”, considering packages in comparable organizations, and documenting the entire process (National Council of Nonprofits, 2015). Even with these guidelines, organizations are left to balance compensation decisions between what is appropriate for a position given the size of an organization and what is appropriate in the eyes of the public and the IRS. Of the nearly 4,000 charities reviewed in Charity Navigator’s most recent CEO Compensation Report (2014), 95% are noted as have a formal process for setting CEO compensation levels. Thus, nonprofits are explicitly considering what levels of compensation are appropriate, though the criteria used to make this determination are not entirely clear.

Just as in the for profit realm, executive salaries in nonprofits depend largely on organizational size and type, however, compensation is not necessarily related to

performance such as improved fundraising or better administrative efficiency (Frumkin & Keating 2010). An important, defining feature of a nonprofit is that residual revenue cannot be distributed to individuals (there are no stockholders) but instead should go back into the organization and its mission (Frumkin & Keating 2010; Hansmann, 1980; Oster, 1998). From donors' perspectives, paying salaries, and in particular high executive salaries, can be at odds with this standard of non-distribution in nonprofits (Balsam & Harris, 2014).

The non-distribution constraint presents a paradox: it limits capital available for salaries, but at the same time may attract workers uniquely suited to fulfilling the organization's mission. On first principals, it is expected that by not being able to pay high wages, nonprofits will struggle to attract high-quality workers. Yet, donative labor theory suggest that nonprofits can attract the type of individuals who are less driven by extrinsic (i.e., monetary compensation) rewards and instead are passionate about an organization's values and mission (Frank, 1996; Preston, 1989; Steinberg, 1990). These individuals may be altruistically motivated and see their time or work as a donation (Preston, 1989; Rose-Ackerman, 1996) and/or choose to work in nonprofit because of the personal satisfaction they receive (Ben-Ner et al., 2011; Leete 2000, 2001; Preston, 1990; Steinberg, 1990). Moreover, by offering lower compensation nonprofits could actually end up targeting those who are more motivated by the public good and perhaps are even be better managers as a result (Eckel & Steinberg 1994).

Evidence suggests that the underlying motivations to work for nonprofits indeed differ from those in for profits. Managers of nonprofits are more committed to the purpose of fulfilling a social rather than business need, and demonstrate greater non-

monetary orientation (Handy & Katz, 1998; Mirvis & Hackett, 1983; Young, 1983) than those working in the for profit sector. Employees of nonprofits get satisfaction from their work independent of their wages (Steinberg, 1990), and also report higher job satisfaction compared with for profit workers (Benz, 2005). Despite these benefits, while individuals attracted to work in the nonprofit sector may be willing to tolerate lower pay, it is not yet known at what point the difference in pay is too great, driving high quality, altruistic workers toward for profit organizations.

Judgments of CEO compensation

Differences in the missions of for and nonprofit organizations appear to shape the public's attitude towards salaries in these sectors. In the for profit world, consumers tend to be more concerned about product quality and prices than they are concerned with the CEO or employees' salaries (Oster, 1998). However, in the nonprofit world the "product" purchased through a donation is harder to evaluate, drawing attention to high salaries which may be considered fraudulent or wasteful (Hansmann, 1980; Oster, 1998).

While there have been descriptive and correlational studies of nonprofit executive pay (e.g., Balsam & Harris, 2014; Frumkin & Keating, 2010; Yan & Sloan, 2014), little empirical work has examined the direct impact of perceived excessive nonprofit executive compensation on donations and other donor-related decisions. In this chapter we explore the extent to which nonprofit CEO salaries affect donors' decisions and consider some of the underlying factors that are involved in these decisions.

MATERIALS AND METHODS

Overview of Experiments

Using three online studies, we measure the effect that nonprofit CEO pay has on individuals' willingness to donate, assess how individuals choose to compensate nonprofit executives versus for profit executives, and measure the role that certain donor beliefs about nonprofit CEO compensation play in individuals' impressions of nonprofit salaries. In Experiment 1, we find that CEO salaries do indeed influence decisions to donate such that high CEO pay makes individuals significantly less willing to donate to a charity than low CEO pay. In Experiment 2, we show individuals will offer a qualified CEO significantly less money for a job if the organization is framed as a nonprofit versus a for profit. And finally, in Experiment 3, preliminary evidence suggests moral considerations coupled with concerns about the allocation of donations in nonprofits predict individuals' adverse reactions to CEO pay.

Experiment 1

In Experiment 1, we test whether high CEO pay impacts individuals' willingness to donate to a charity, and if so to what extent.

Method

We recruited 303 participants (36.27% female; mean age = 31.35) from an online pool via Amazon Mechanical Turk (Buhrmester, Kwang, and Gosling 2011) and paid them \$0.25 for participation in the experiment. We randomly assigned participants to read one of three short passages that described Global Health Charity, a hypothetical

nonprofit organization. The descriptions included information about Global Health, its mission, and the CEO's salary, which was either low (\$63,000), mid (\$126,000), or high (\$252,000). Mid salary was selected based on the median nonprofit CEO pay in 2011 as reported by Charity Navigator (2013). Low and high salary levels were determined by doubling the median pay for high and cutting the median pay in half for low.

After reading about the charity, participants were asked to indicate how likely they were to donate to this charity (7-point scale; 1=very unlikely, 7=very likely). They were then asked to give one reason for their decision using a free response text box. This was followed by a manipulation check and demographic information (gender, age, race/ethnicity, donation behavior – frequency and where they donate, type of employment, and income; see Appendix for experimental materials).

Results

Manipulation check. Eight participants (2.64% of the total sample) failed the manipulation check question and were dropped from the remaining analyses. There was no difference between conditions in the number of individuals that failed the check, and the overall results remain the same if we include all participants in the analyses.

Donation likelihood. A one-way ANOVA revealed a main effect of salary level on donation likelihood, $F(2, 292) = 6.36, p < .01$. In line with our prediction, as salary level increased, reported likelihood of donating decreased (Figure 1). Pairwise comparisons revealed that participants in the low salary condition were significantly more likely to donate ($M_{\text{low}} = 4.41$) than participants in the high salary condition ($M_{\text{high}} = 3.70; t(292) = 3.56, p < .01$) and marginally more likely to donate than participants in the

mid salary condition ($M_{\text{mid}} = 4.03$; $t(292) = 1.90$, $p = .06$). The difference in donation likelihood between the mid and high salary conditions was non-significant, $p = .11$.

Additional measures. Gender, age, race/ethnicity, previous donation frequency, employment, and income did not differ between conditions. However, previous donation frequency was positively related to donation likelihood, $p < .01$. Participants who reported donating more often were more likely to donate to Global Health Charity, but this did not influence the impact of salary on donation likelihood when added as a covariate, $F(2, 291) = 7.56$, $p < .01$.

Discussion

In line with our predictions and previous research suggesting there is a negative relationship between nonprofit CEO pay and donations, Experiment 1 shows that as the salary of a nonprofit CEO increases, likelihood of donating decreases.

Experiment 2

A primary motivation for paying higher salaries to executives is to attract and retain talented individuals who will sustain or increase the success of the organization. The objective of Experiment 2 was to test whether individuals would be willing to “undercut” a potential, well-qualified candidate for a nonprofit executive position. Using an identical hiring decision scenario, we measured the effect of organization type (nonprofit organization vs. for profit company) on the salary individuals would offer a qualified candidate. Given the negative relationship between nonprofit CEO pay as well as the differences in the publics’ attitudes toward pay in the nonprofit vs. for profit sectors (see Hansmann, 1980; Oster, 1998), we predicted that those in the nonprofit

condition would offer the potential candidate significantly less compared to those in the for profit condition.

Method

We recruited 198 participants (34.85% female; mean age = 32.02) from Amazon Mechanical Turk.² Participants were paid \$0.25 for their participation in the experiment. We randomly assigned participants to read one of two short descriptions of Pario Charity [Inc.], a hypothetical nonprofit organization [for profit company] looking to hire a CEO.³ The descriptions included information about the potential candidate's salary at their current job, \$250,000. To avoid a potential interaction effect of gender and organization type, we used a gender-neutral name, Casey Benson.

After reading the descriptions, participants were presented with a brief summary of the hiring scenario and were asked what salary they would recommend to offer to the candidate on a scale ranging \$225,000 above and below the candidate's pay at their present job (i.e., salary choices ranged from \$25,000 to \$475,000), followed by a manipulation check. To test whether participants imagined the CEO differently under each organization type, we asked them to indicate whether they pictured Casey Benson as a male, female or neither, as well as what type of car they thought he/she drives, the type of clothes he/she wears to work, and about his/her level of education. Finally, participants provided their demographic information (gender, age, donation behavior – frequency,

² We followed a protocol to prevent repeat participants from any previously related studies.

³ Every attempt was made to equate the descriptions, including equalizing the “wealth” of the nonprofit organization [for profit company], with the only difference being the organization [company] type. We ran multiple pretests of the descriptions in order to verify participants could correctly recall the type of organization [company] described (see the Appendix for a table of pretest results).

education level, current student status, type of employment, and income; see Appendix for experimental materials).

Results

Manipulation check. Twenty-five participants (12.63% of the total sample) failed the manipulation check question and were dropped from the remaining analyses. There was no difference between conditions in the number of individuals that failed the check, and the overall results remain the same if we include all participants in the analyses.

Salary offer. We considered the effect of organization type on salary offered using three related measures: salary offered, likelihood of offering a lower/higher/same salary, and the change in magnitude of the offer (compared to the candidate's current salary).

Salary Offered – A one-way ANOVA revealed that participants in the for profit condition offered Casey a significantly higher salary ($M_{fp} = 296.59$) than participants in the nonprofit condition ($M_{np} = 251.07$; $F(1,171) = 19.41$, $p < .01$). Participants in the for profit condition were willing to offer Casey an average increase of \$46,590 above her current salary, while those in the nonprofit condition were willing to offer an average increase of \$1,070 (Figure 2).

Likelihood of offering a lower/higher/same salary – A test of proportions revealed that a significantly greater percentage of participants in the nonprofit condition (26.14%) offered Casey a lower-than-current salary than did participants in the for profit condition (8.24%; $z = 3.11$; $p < .01$). Likewise, a significantly lower percentage of participants in the nonprofit condition (70.45%) offered a higher salary than participants in the for profit condition (90.59%; $z = 3.33$; $p < .01$). The difference in the proportion of participants

offering the same salary between conditions was non-significant (3.41% in nonprofit vs. 1.18% in for profit; $z = 0.98$; $p = .33$).

Magnitude of the offer – A one-way ANOVA including only participants that offered Casey Benson *more* than his/her current salary (80.35% of participants) revealed that offers in the for profit condition were significantly higher ($M_{fp} = 312.06$) than offers in the nonprofit condition ($M_{np} = 288.47$; $F(1,137) = 15.89$, $p < .01$). When only participants that offered Casey Benson *less* than (his/her) current salary were included (17.34% of participants) the difference was non-significant, ($M_{fp} = 133$ vs. $M_{np} = 150.39$, $p = .50$).

CEO perceptions by condition. Collapsed across conditions, 65.32% of participants thought the CEO, Casey Benson, was male. However, a test of proportions revealed that a significantly greater percentage of those in the for profit condition (72.94%) imagined that Casey Benson was male compared to those in the nonprofit condition (57.95%; $z = 2.07$; $p = .04$). There was no difference between conditions in participants' perceptions of what type of car Casey Benson drives (coded as luxury or not), what Casey wears to work (business casual vs. business formal), or Casey's education level, all $p > .05$.

Additional measures. Gender, age, previous donation frequency, education level, student status, employment and income⁴ did not differ between conditions. The effect of condition on salary offer remained controlling for previous donation behavior, income level, whether participants work at a nonprofit, and even the perceptions of the CEO's

⁴ When those who failed the manipulation check are included, those in the for profit condition reported earning on average more ($M_{fp} = 2.81$ on a scale of 1 = \$0-25K to 9 = \$200+K) than those in the nonprofit condition ($M_{np} = 2.39$; $F(1,196) = 4.93$, $p = .03$).

gender, both in the entire sample and in the sample minus those who failed the manipulation check. Neither employment type (whether they work at a nonprofit or not) or income level predicted the salary offered.

Discussion

Experiment 2 demonstrates that individuals offer a qualified CEO significantly less money for a job if the organization is described as a nonprofit versus a for profit. Research suggests that offering lower wages in the nonprofit sector is potentially beneficial, because it is likely to attract candidates who are intrinsically motivated (Frank, 1996; Preston, 1989; Steinberg, 1990) and better qualified for the position (Eckel & Steinberg 1994). The challenge with this view, however, is that it is unclear what constitutes the *right* low wage, as opposed to a wage that is too low, which would deter even those who are intrinsically motivated and committed, and as a result undermine the nonprofit's ability to hire the best person for the job.

Experiment 3

Experiments 1 and 2 establish that individuals' donation decisions are negatively affected by high salaries paid to nonprofit CEOs, and that they will offer less to a qualified candidate if the organization is framed as a nonprofit versus for profit. In Experiment 3, we explore some of the underlying factors that drive these effects. Building on existing theories and empirical evidence, each of which we describe in more detail below, we have identified three potential factors: 1) warm glow considerations, 2) allocation priorities, and 3) moral considerations.

Warm Glow. Research has proposed that personal satisfaction or other types of “warm glow” benefits play a role in working for nonprofits (Handy & Katz, 1998; Mirvis & Hackett, 1983; Young, 1983). Specifically, it has been proposed that individuals are attracted to nonprofit work in part due to these types of intrinsic motivations and benefits (Ben-Ner et al., 2011; Leete 2000, 2001; Frank, 1996; Preston, 1989; Rose-Ackerman, 1996; Steinberg, 1990). Indeed, nonprofit CEOs are more satisfied than for profit CEOs (e.g., Benz, 2005). When considered from a potential donors’ perspective, it is plausible that the belief that these warm glow benefits exist may play a role in their reactions to nonprofit executive pay. In particular they may believe that a portion of a nonprofit CEO’s compensation comes in the form of a warm glow benefit.

Allocation priorities. It has been theorized that the public is wary about nonprofit CEO salaries in part because high salaries seem to violate the “non-distribution constraint” (Balsam & Harris 2014). The primary argument is that if a nonprofit pays a high (or any) salary to a CEO it takes money away from the cause it is supposed to serve.⁵ In fact, it has been suggested that individuals are partly motivated to give because there are no stockholders to take the money away (Hansmann, 1980).

Moral considerations. Finally, a general sentiment reflected in donors’ reactions to excessive nonprofit CEO compensation is that it is simply wrong. Research shows that those who benefit while engaging in prosocial behavior are judged negatively (Critcher & Dunning, 2011; Lin-Healy & Small, 2012; Newman & Cain, 2014). It follows that CEOs who are being paid money (benefiting) while working for a nonprofit are also judged

⁵ This same sentiment, that any money paid to a nonprofit worker is money not going to the cause, is reflected in many of the open-ended responses we collected when running pretests related to Experiment 2.

negatively. Not only are donors concerned that paying a CEO takes money from the cause but that it is immoral for someone to benefit from someone else's misfortune. Importantly, the benefits implied here are different than the intrinsic, emotional "warm glow" benefits described above, which have actually been linked with an increase in judged moral character (Barasch, et al. 2014).

We start by testing the extent to which each of the above three factors plays a role in individuals' negative reaction to CEO pay.

Method

We recruited 102 participants (43.14% female; mean age = 31.39) from Amazon Mechanical Turk.⁶ Participants were paid \$0.25 for their participation in the experiment. Participants read a hypothetical news article with factual information about the salary of the CEO of Save the Children, an international children's charity, that was derived from online sources including Save the Children's website.

After reading the news article, participants were asked to indicate their impression of the executive director's salary using a 7-point scale (1=It is definitely too low, 4 = It is just about right, 7=It is definitely too high). They were then asked to indicate the extent to which they agreed with eleven statements related to the three factors of interest (5 warm glow, 3 allocation priorities, and 3 moral considerations; Table 1). Answers were given on 7-point scale from 1 = not at all to 7 = very much. Finally, participants provided their demographic information (gender, age, donation behavior – frequency, education level, current student status, type of employment, and income; see Appendix for a copy of the experimental materials).

⁶We followed a protocol to prevent repeat participants from any previously related studies.

Results

Factor Analysis. A factor analysis with promax rotation revealed two primary factors (Table 2), as opposed to three as we predicted. The first factor, with an eigenvalue of 6.70, explained 60.84% of the variance and captured all the items related to both allocation priorities and moral considerations (allocation-moral). The second factor, with an eigenvalue of 1.11 explained an additional 10.12% of the variance and captured all the items related to warm glow (warm glow). Next, we tested whether these two factors predicted participants' impression of the CEO's salary covered in the news article.

Impression of CEO salary. The mean response of participants to the CEO's salary was 5.74 out of 7. Of the 102 participants, 81.37% gave a rating *higher* than 4 (i.e., the neutral point), indicating the felt the salary was too high. Using a multiple linear regression we tested the unique influence that allocation-moral (6 items; $\alpha = .92$) and warm glow (5 items; $\alpha = .87$) had on individuals' impression of the CEO's salary. In simple linear regression models, we found that both allocation-moral and warm glow significantly predicted participants' impressions of the CEO's salary (Table 3, Models 1-2). When both factors were entered simultaneously into a regression model, only allocation-moral was significant ($t(101) = 5.40, p < .01$), whereas warm glow was not, $t(101) = .03, p = .98$; Table 3, Model 3.

Discussion

The results of Experiment 3 reveal two distinct factors—allocation-moral considerations and warm glow. And, while we find that independently each factor predicts individuals' reaction to CEO salary, when included in a model together only the allocation-moral factor predicts participants' response. Until we replicate these findings

and further test the role that the two factors play, we choose to treat our results with caution. Yet, taken at face value, these results suggest that allocation-moral considerations are the most significant predictor of individuals' adverse reactions to nonprofit executive pay.

GENERAL DISCUSSION

Taken together, the results from three experiments demonstrate that individuals' perceptions of and attitudes toward nonprofit CEO compensation can adversely affect their decisions. As is suggested in the media and the literature, we find a negative relationship between nonprofit CEO pay and donations such that as the salary of a nonprofit CEO increases, the likelihood of donating decreases. Moreover, individuals are willing to "undercut" a qualified CEO by offering them significantly less money for a job if the organization is described as a nonprofit versus for profit. And, finally, while preliminary, our results suggest that allocation-moral considerations seem to play a significant role in individuals' reactions to nonprofit executive pay.

The negative reaction of the public toward earning a salary (benefiting) while working for charity is not unique to executive pay. There are a number of examples of individuals reacting negatively to self-interest or perceived benefit in the charitable domain. For instance, individuals judge behavior that is self-interested but charitable as less moral than an equivalent self-interested behavior that is not also charitable (i.e., tainted altruism; Newman & Cain, 2014), and people receive less credit for being prosocial if they have a personal connection to a cause they are helping (Lin-Healy &

Small, 2012). Individuals even appear to protect against their own self-benefit and avoid signaling selfish motivations by choosing painful versus pleasurable contribution experiences (i.e., the martyrdom effect; Olivola & Shafir, 2012).

Unlike for profits, nonprofit organizations are not focused on increasing profits through the sale of products and services, but rather are endeavoring to improve the world. This responsibility of nonprofits creates a culture in which society punish those who do not fit the ideal expectation. Ultimately, the standards to which we hold nonprofits could undermine the good they are trying to achieve.

Table 2.1. Item text from Experiment 3.

Item	Text	Related Factor
1	A charity's CEO can be paid less because he or she gets satisfaction from working for the charity.	Warm Glow
2	A charity's CEO does not need a high salary because he or she benefits in other ways such as feeling good about working for the charity.	Warm Glow
3	A charity's CEO gets more enjoyment from working for the charity than from making money.	Warm Glow
4	A charity's CEO should willingly agree to earn less than he or she could elsewhere on behalf of the charity's mission.	Warm Glow
5	A CEO that chooses to work for a charity should care more about the cause than about making money.	Warm Glow
6	Money spent on the salary of a charity's CEO takes away from the cause the charity is trying to help.	Allocation
7	Paying a charity's CEO is a wasteful use of donations.	Allocation
8	The CEO's salary is a lavish expense for a charity.	Allocation
9	It is wrong for a charity's CEO to earn a large salary.	Moral
10	It is unethical for donations to be used to pay a CEO.	Moral
11	It is immoral for a charity's CEO to benefit from others' misfortune.	Moral

Table 2.2. Factor loadings (Principal Axis Factoring with Promax Rotation) for Experiment 3

Item	Factor 1	Factor 2
10	1.043	-0.353
7	0.879	0.03
8	0.708	0.11
11	0.64	0.146
6	0.592	0.303
9	0.473	0.39
3	-0.289	0.789
5	0.069	0.764
1	0.106	0.713
4	0.127	0.654
2	0.334	0.591

Note. Loadings above 0.4 are in bold letters.

Table 2.3. Regression models from Experiment 3 predicting impression of the CEO's salary

	Model 1	Model 2	Model 3
Warm Glow Factor	0.46*** (0.08)		0.004 (0.11)
Allocation-Moral Factor		0.52*** (0.06)	0.52*** (0.10)

Note. Standard errors are in brackets below unstandardized coefficients. (* $p < .05$, ** $p < .01$, *** $p < .001$)

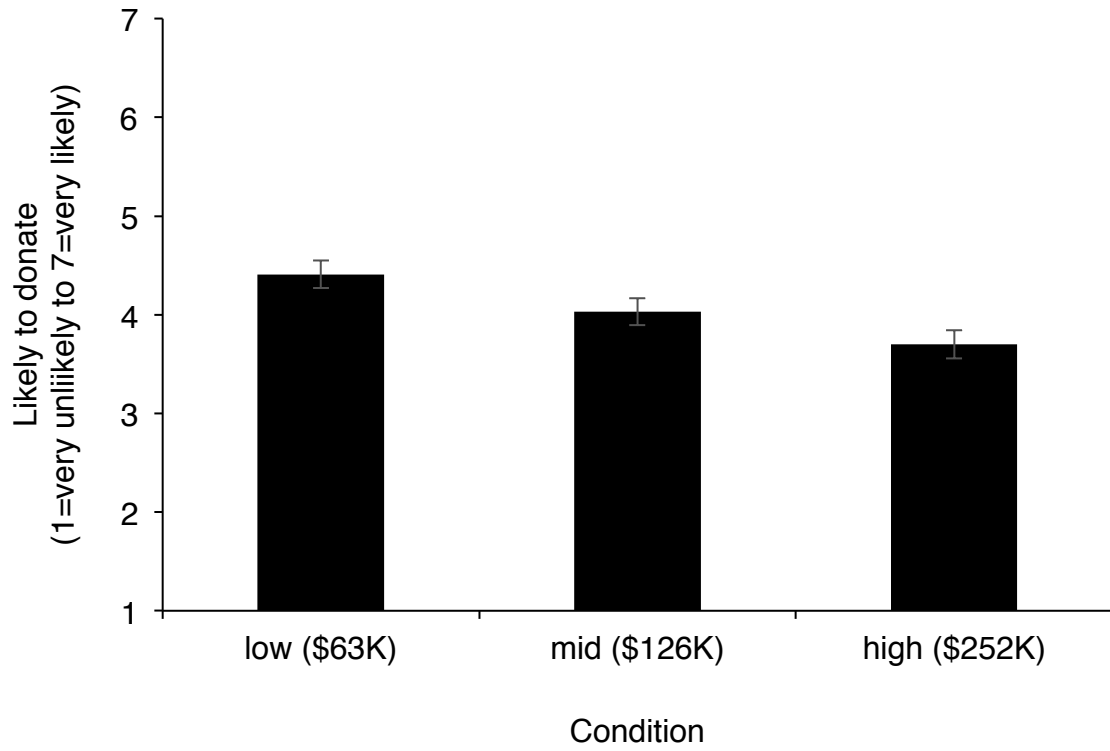


Figure 2.1. Mean donation likelihood by condition in Experiment 1. Bars are ± 1 s.e.m.

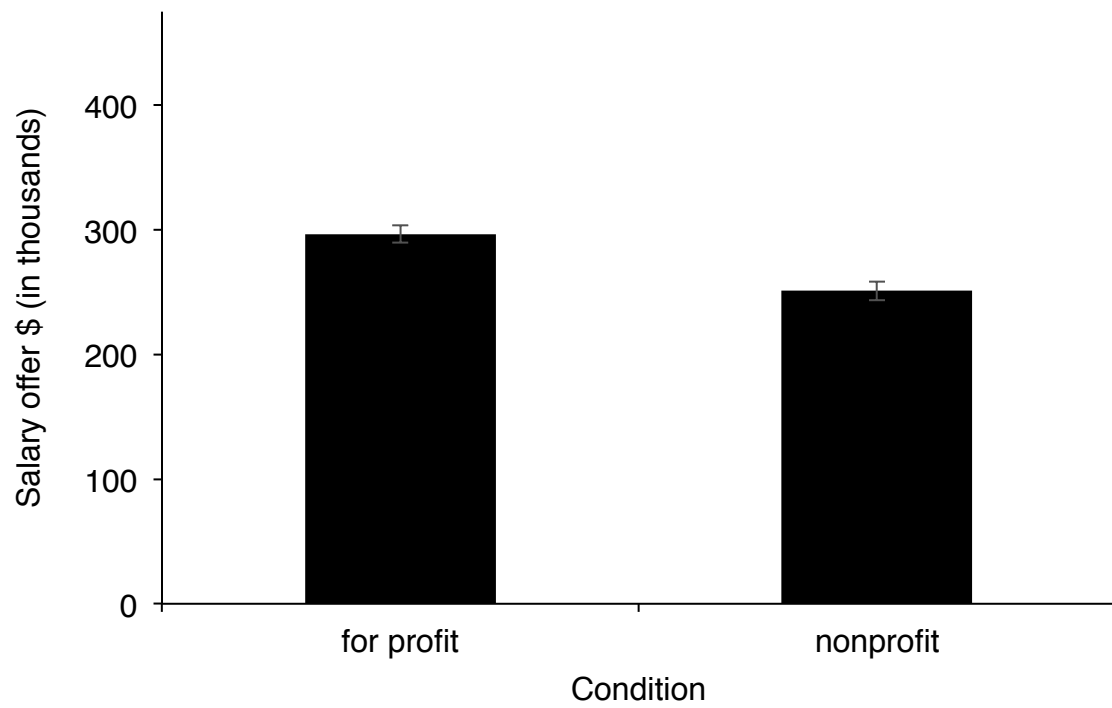


Figure 2.2. Mean salary offer (in thousands) by condition in Experiment 2. Bars are ± 1 s.e.m.

APPENDIX

Overhead Pretest Results

Participants (N = 102) were presented with the following prompt:

Fight Hunger is a national hunger-relief charity with a mission to provide meals to America's hungry through a network of food banks. This charity is rated as a top charity in the hunger sector, based on financial health, accountability, transparency, and the number of people it helps each year. Some of the money donated to Fight Hunger is spent on mission specific activities and some is used to cover the organization's overhead costs.

Using the spaces below, please list between 5-10 types of overhead expenses you believe this charity has (e.g., office space rent).

Table S2.1. Top five expenses listed

	Expense	Count
1	office space rent	102
2	salaries/benefits	89
3	utilities	71
4	marketing/advertising	64
5	supplies/materials	48

Note. Participants listed at least five different types of overhead expenses. The top five answers from each respondent were then coded into different categories. Since office space rent was given as an example, it was expected that rent would be one of the top expenses listed. The next highest and unprompted response was salaries/benefits.

Experiment 1: Experimental MaterialsMain Text and DV

Please read the following passage and answer the questions that follow.

[Participants were randomly assigned to one of three conditions.]

\$63,000, \$126,000 or \$252,000

Global Health Charity is a nonprofit organization whose mission is to make new drug discoveries for diseases that affect people around the world. To achieve its goal, the

organization works with regulatory agencies, local governments, and in-country manufacturers. Global Health Charity's spending is dedicated to discovering, developing, and delivering drugs in major disease areas, including diarrheal disease, malaria, and hookworm, which tend to disproportionately affect individuals in developing countries. Global Health Charity employs a number of individuals, including the CEO, who is paid an annual salary of \$63,000/126,000/252,000. Currently, Global Health Charity's efforts extend to over 70 countries.

[DV]

How likely are you to donate to this charity? (7-point scale; 1=Very Unlikely, 4=Undecided, 7=Very Likely)

Manipulation Check

What type of an organization is Global Health? (multiple choice; nonprofit/charitable organization, for profit company, neither)

Additional Questions

What is your gender? (multiple choice; male, female)

What is your age? (open-ended response)

What is your race/ethnicity? (multiple choice; White or Caucasian, Black or African American, Hispanic or Latino, Asian, American Indian or Alaskan Native, Native Hawaiian or Pacific Islander, Other)

On average, how often do you make monetary donations? (6-point scale; 1=never to 6=6 or more times a year)

Please mark all of the following causes for which you have donated money to in the last year.

Medical/Health (e.g., The American Heart Association)

Animal (e.g., The Humane Society)

Environmental (e.g., The Sierra Club)

Human Welfare (e.g., helping homeless)

Religious (e.g., church)

Other, please specify: _____

Political (e.g., The International Peace Institute)

Where are you employed?

PRIVATE-FOR-PROFIT company or business, for wages, salary or commissions
 PRIVATE-NOT-FOR-PROFIT tax-exempt, or charitable organization
 GOVERNMENT employee (city, county, state, federal, etc.)
 SELF-EMPLOYED in own business, professional practice, or farm
 Working WITHOUT PAY in family business or farm
 UNEMPLOYED
 RETIRED

What is your annual income range in U.S. dollars? (9-point scale; 1=\$0-\$25,000 to 9=\$200,001+)

Experiment 2: Scenario Pretest Results

We conducted multiple pretests using different iterations of the nonprofit organization [company] description in order to minimize the number of participants that fail the manipulation check question used in Experiment 2. We needed to strike a balance between the two types of organizations in the description. The table below presents the percentage of participants that correctly recalled the nonprofit organization [company] type in four different pretests.

Table S2.2. Percent correct recall by condition.

Pretest	Nonprofit	For Profit
1	88%	73%
2	86%	80%
3	89%	76%
4	88%	84%

Experiment 2: Experimental Materials

Main Text and DV

Please read the following passage about Pario Charity and answer the questions that follow.

[Participants were randomly assigned to one of two conditions.]

Nonprofit or For Profit

Pario Charity [Inc.] is a nonprofit [for profit] drug development organization [company] whose mission is to address the drug needs of the world. Pario Charity [Inc.] is focused on discovering, developing and delivering drugs in major disease areas, such as malaria, which tend to affect mostly poor people living in developing countries. The organization [company] works with regulators to help speed up the testing of drugs and forms partnerships with various governments and manufacturers in other countries in order to

make the drugs. These drugs are then delivered to developing countries at minimal pricing.

Over the last few years, Pario Charity [Inc.] has been successful in fundraising [earning profit] and excess funds have been invested in new drug efforts.

Pario Charity [Inc.] is currently looking to hire a new CEO that will help extend its reach, lead new drug development efforts, and help more people [increase profits]. One of the best candidates identified by the charity is Casey Benson, the current CEO of a large and highly profitable pharmaceutical company. Casey has a proven track record of growing pharmaceutical companies successfully.

Pario Charity's [Inc.'s] hiring team is confident that under Casey's leadership, the organization [company] will expand its operations and substantially increase its impact on major diseases around the world. Casey's current salary, at the pharmaceutical company, is \$250,000.

Pario Charity [Inc.] can offer Casey any salary it deems necessary.

[DV]

Pario Charity Overview

- Pario Charity is a nonprofit drug development organization.
- Pario Charity is currently looking to hire a new CEO.
- One of the best candidates identified by the charity is Casey Benson, the current CEO of a large and highly profitable pharmaceutical company.
- Casey's current salary, at the pharmaceutical company, is \$250,000.

If you were part of the hiring team, what salary would you recommend that Pario Charity offer Casey?

Please make your decision by sliding the scale below. **Important:** The range represents thousands of dollars from \$25,000 to \$475,000.

Salary offer: (sliding scale from 25K to 475K, anchored at 250K)

Manipulation Check

What type of organization/company was looking to hire Casey Benson as the new CEO in the passage you read at the start of this survey? (multiple choice; nonprofit/charitable organization, for profit company, I don't know)

Questions about Casey Benson

When you read the scenario, how did you picture Casey Benson? (Note: There is no right or wrong answer. Please just give your first impression.) (multiple choice; as a male, as a female, neither)

What type of car do you imagine Casey Benson drives? (open-ended response; Make, Model)

What type of clothing do you imagine Casey Benson wears to work? (open-ended response; Business casual, Business formal)

What is the highest level of education you believe Casey Benson has completed?

Some schooling, but no diploma or degree

High school diploma or GED

Some college

College degree

Some graduate school

Graduate degree

Additional Questions

What is your gender? (multiple choice; male, female)

What is your age? (open-ended response)

On average, how often do you donate money to non-profits/charities? (6-point scale; 1=never to 6=6 or more times a year)

What is the highest level of education you have completed?

Some schooling, but no diploma or degree

High school diploma or GED

Some college

College degree

Some graduate school

Graduate degree

Are you currently a student? (multiple choice; no, yes)

Where are you primarily employed?

PRIVATE-FOR-PROFIT company, business or individual, for wages, salary or commissions

PRIVATE-NOT-FOR-PROFIT, tax-exempt, or charitable organization

GOVERNMENT employee (city, county, state, federal, etc.)

SELF-EMPLOYED in own business, professional practice, or farm

Working WITHOUT PAY in family business or farm

Unemployed

I am retired, but my primary place of employment was: _____

Other: _____

What is your combined household annual income range in U.S. dollars? (9-point scale; 1=\$0-\$25,000 to 9=\$200,001+)

Experiment 3: Experimental Materials

Main Text and DV

Please read the following news article and answer the questions that follow.

Nonprofit exec retains top salary at Save the Children

March 19, 2015 | by Lou Smith

A recent survey of the compensation paid to heads of nonprofit organizations shows that the executive director of Save the Children, an international nonprofit organization, earned \$401,000 in 2013. The executive director became the first international CEO of Save the Children in 2010. Before that, the director worked for Oxfam, first as regional director for west Africa, then as international director, and, prior to joining the non-profit sector, was a managing director with Thomson Financial. Save the Children is an international children's charity that fights for children's rights in 120 countries across the world. Its work ranges from emergency relief to long-term projects that tackle child hunger and poverty and promote health and education.

[DVs]

What is your impression of the executive director's salary at Save the Children? (7-point scale; 1=It is definitely too low, 4=It is just about right, 7=It is definitely too high)

Please indicate the extent to which you agree with the following statements. (7-point scale; 1=Not at all, 7=Very much)

A charity's CEO can be paid less because he or she gets satisfaction from working for the charity. (1-WG)

A charity's CEO does not need a high salary because he or she benefits in other ways such as feeling good about working for the charity. (2-WG)

A charity's CEO gets more enjoyment from working for the charity than from making money. (3-WG)

A charity's CEO should willingly agree to earn less than he or she could elsewhere on behalf of the charity's mission. (4-WG)

A CEO that chooses to work for a charity should care more about the cause than about making money. (5-WG)

Money spent on the salary of a charity's CEO takes away from the cause the charity is trying to help. (6-ALLOC)

Paying a charity's CEO is a wasteful use of donations. (7- ALLOC)

The CEO's salary is a lavish expense for a charity. (8- ALLOC)

It is wrong for a charity's CEO to earn a large salary. (9-MORAL)

It is unethical for donations to be used to pay a CEO. (10- MORAL)

It is immoral for a charity's CEO to benefit from others' misfortune. (11- MORAL)

Additional Questions

What is your gender? (multiple choice; male, female)

What is your age? (open-ended response)

On average, how often do you donate money to non-profits/charities? (6-point scale; 1=never to 6=6 or more times a year)

What is the highest level of education you have completed?

Some schooling, but no diploma or degree

High school diploma or GED

Some college

College degree

Some graduate school

Graduate degree

Are you currently a student? (multiple choice; no, yes)

Where are you primarily employed?

PRIVATE-FOR-PROFIT company, business or individual, for wages, salary or commissions

PRIVATE-NOT-FOR-PROFIT, tax-exempt, or charitable organization

GOVERNMENT employee (city, county, state, federal, etc.)

SELF-EMPLOYED in own business, professional practice, or farm

Working WITHOUT PAY in family business or farm

Unemployed

I am retired, but my primary place of employment was: _____

Other: _____

What is your combined household annual income range in U.S. dollars? (9-point scale; 1=\$0-\$25,000 to 9=\$200,001+)

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Chapter 2, in full, is currently being prepared for submission for publication of the material. Keenan, Elizabeth A., Ayelet Gneezy, and Wendy Liu. The dissertation author was the primary investigator and author of this paper.

Chapter 3.

DRIVING PRO-ENVIRONMENTAL CHOICE

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ABSTRACT

Despite ongoing efforts to encourage sustainable behavior and consumers' claims that they are eco-minded, green attitudes remain insufficiently reflected in consumers' choices. In order to better understand and help explain what drives consumers' choice of green products we consider three major theoretical accounts drawn from literature highlighting positive and negative spillover effects in green choice: a) a moral account involving the desire for a moral token or activation of moral standards, b) an identity account involving the motive for consistent green behavior and identity, and c) an accessibility account whereby sustainability is top of mind. Using a combination of hypothetical and consequential choice experiments, we tested the relative role of these drivers in governing peoples' choices of pro-environmental options over equivalent non-green alternatives, as each dictates vastly different marketing strategies. We find green product choice is largely and consistently explained by the real-time accessibility of eco-friendly concepts. Moral and identity drivers also play a role but to lesser and varying degrees. We discuss the implications of our findings for increasing consumers' choice of green products.

INTRODUCTION

Mounting evidence suggests human consumption patterns are approaching the upper limit of what Earth's resources can sustain (Wackernagel et al., 2002; WWF, 2012). Nearly two-thirds of the planet's natural resources are being degraded or used unsustainably, and resource conservation has never been more critical (Millennium Ecosystem Assessment, 2005). In response, countless dollars are spent on "Save the Earth" campaigns, such as Bank of America's recent \$50 billion environmental business initiative (2012), highlighting the importance of these issues. Unfortunately, the impact of efforts like these has been limited (Gardner & Stern, 1996; Stern, 2000a), suggesting a need to better understand what drives pro-environmental choices.

Choosing Green (Or Not)

Pro-environmental choices and behaviors encompass a wide range of activities from activism and "good" citizenship (e.g., organizing demonstrations, voting) to private-sphere behaviors (e.g., purchase of environmentally friendly goods, curtailing energy waste, see Stern, 1999). In this series of experiments we investigated the latter, specifically addressing drivers of environmentally friendly¹ (i.e., eco-friendly, green) product choice. Understanding what underlies consumers' preference (or lack thereof) for an eco-friendly product over a conventional alternative could help improve strategies, policies, and interventions aimed at generating greater sustainability (Dietz et al., 2009; Gardner & Stern, 2008; Stern, 2000b).

Green products such as organic food, natural cleaners, eco-friendly clothing and

¹ We adopt the definition used by Haws, Winterich, & Naylor (2013)—a product "with at least one positive environmental attribute", which "reflects the impact of the product on the environment."

energy saving appliances have flooded the market in recent years. From 2009-2010 alone there was a 73% increase in eco-friendly product offerings (Terra Choice, 2010).

Notably, although a number of consumers claim to be eco-friendly, green purchases still represent a small percentage of total product sales (Bonini & Oppenheim, 2008).

Similarly, it has been shown that awareness, knowledge, and attitudes motivate a limited fraction of pro-environmental behaviors (Cleveland, Kalamas, & Laroche, 2012; Finger, 1994; Kollmuss & Agyeman, 2002; Minton & Rose, 1997). This discrepancy between attitudes and behavior poses a challenge for those focused on promoting green choices and remains a puzzle for anyone trying to understand them, a sentiment that is further supported by the existence of complex theoretical frameworks used to explain environmental behavior (Gifford, 2014; Kollmuss & Agyeman, 2002; Moisander, 2007; Stern, 2000a).

There are a number of existing explanations for why expressed green attitudes often fail to correspond with real purchase behavior. For example, while green attitudes may be positively linked with intentions, actual behavior requires deeper held values such as a personal norm or moral obligation to make green choices (Minton & Rose, 1997; Stern et al., 1999). Moreover, despite caring about the environment, perceptions of high prices and/or low quality deter some consumers from purchasing green products (GfK Roper, 2008; Luchs et al., 2010; Ottman, Stafford, & Hartman, 2006). Relatedly, it has been suggested that individuals may adopt “willful ignorance” while shopping—even those who deeply value the environment fail to seek readily available information about products’ green attributes in order to avoid negative emotions triggered by tradeoffs (e.g., price, quality; Ehrich & Irwin, 2005). Finally, the gap between attitudes and behavior

may be related to the fact that products' environmental attributes are weighted differently depending on elicitation methods and the decision context (e.g., likelihood of purchase or choice vs. willingness to pay, embedding of attributes, product consideration set formation), resulting in inconsistent preferences for environmental goods (Irwin & Baron, 2001; Irwin & Naylor, 2009; Irwin et al., 1993; Irwin & Spira, 1997).

Rather than attempt to explain the attitude-behavior gap, this paper seeks to shed light on drivers that increase the choice share for green products. To do so, we tested the relative role of three accounts that play a role in driving green choice—moral, identity, and accessibility—allowing us to move toward a more unified theory of green choice. These accounts are drawn from literature highlighting positive and negative spillover effects in green choice (i.e., one green choice leading to another green or otherwise, non-green choice). Importantly, identifying the relative impact of these psychological drivers in green choice can inform those working to encourage sustainable behavior, as each dictates vastly different strategies for marketing. Moreover, the experiments reported in this paper involve real, consequential choices made by participants, adding external validity and predictive power to “real world” settings.

Our results are unambiguous: green choice is largely and consistently explained by real-time accessibility of eco-friendly concepts. Moral and identity accounts also play a role but to lesser and varying degrees.

Drivers of Green Choice

Imagine observing a shopper purchase green toilet paper. Her choice might be due to any number of product specific factors such as price, quality, brand, and design (Bloch, 1995; Dodds, Monroe, & Grewal, 1991; Lichtenstein, Ridgway, & Netemeyer, 1993;

Luchs et al., 2010; Zeithaml, 1988) or even social factors such as reference groups and word of mouth (Bearden & Etzel, 1982; Chevalier & Mayzlin, 2006). Alternatively, her choice may be due to the product's environmental and socially responsible (i.e., moral) attributes (Caruana, 2007; Mazar & Zhong, 2010; Schlegelmilch, Bohlen, & Diamantopoulos, 1996; Shrum, McCarty, & Lowrey, 1995).

To date, research has identified a number of demographic (e.g., gender, age, income, education) variables that correlate with self-reported, hypothetical, and to some extent, actual green purchase behaviors or intentions (for reviews see Diamantopoulos et al., 2003; Kilbourne & Beckmann, 1998; Roberts, 1996). However, there is growing consensus that demographics are not powerful predictors of green choices and behaviors (Roberts, 1996; Shrum et al., 1995; Straughan & Roberts, 1999). Research has further explored psychographic variables and links green purchase behavior with having an internal locus of control (Cleveland et al., 2012; Schwepker & Cornwell, 1991), higher perceived consumer effectiveness (Berger & Corbin 1992; Ellen, Wiener, & Cobb-Walgren, 1991; Straughan & Roberts, 1999), altruism (Cleveland, Kalamas, & Laroche, 2005; Straughan & Roberts, 1999), and environmental attitudes or norms (Cleveland et al., 2005; Dunlap et al., 2000; Haws et al., 2013; Roberts & Bacon, 1997; Sparks & Shepherd, 1992; Stern et al., 1999; Thøgersen & Ölander, 2006; Whitmarsh & O'Neill, 2010).

As with general consumer behavior, green purchase behaviors are highly situational and depend on a combination of personal, behavioral and contextual forces (Stern et al., 1999, Stern, 2000a). For example, activating individuals' status motives increases preference for green products; in particular when shopping is done in public

and when green products cost more than conventional versions (Griskevicius, Tybur, & Van den Bergh, 2010). Similarly, activating individuals' desire to live up to self-standards can increase preference for ethical (e.g., ecofriendly, fair trade) products, presumably due to guilt avoidance (Pelozo, White, & Shang, 2013). In addition, merely priming environmental values through pro-environmental messaging or pictures has been shown to increase individuals' preference for environmentally friendly products (Biel, Dahlstrand, & Grankvist, 2005; Tate, Stewart, & Daly, 2014; Verplanken & Holland, 2002) and environmental labels appear to increase consumers' willingness to pay for green products such as toilet paper (Bjørner, Hansen, & Russell, 2004).

Green choice can beget green choice, thereby leading to consistent (i.e., positive spillover) behavior (Thøgersen & Crompton, 2009). Studies demonstrate significant correlations between using alternative transportation and buying organic food (Thøgersen & Ölander, 2006) as well as recycling and purchasing recycled products (Biswas et al., 2000). Additionally, framing people's behavior as environmental increases the likelihood they will subsequently choose eco-friendly products (Cornelissen et al., 2008). In contrast, other study results suggest negative spillover, such that individuals who engage in pro-environmental behavior might use it to justify avoiding other environmentally significant actions (Diekmann & Preisendörfer, 1998). Even choosing green products in a hypothetical setting can license individuals to engage in subsequent amoral behavior (Mazar & Zhong, 2010). Finally, recent evidence demonstrates an increase in both positive and negative spillover after one engages in a green behavior (Karmarkar & Bollinger, 2014). Shoppers who choose to bring reusable shopping bags to grocery stores are more likely to purchase environmentally friendly products such as organic food and at

the same time purchase indulgent products such as dessert or chips.

The preceding work highlights the complexity and lack of cohesive understanding of motivators of green choice. Given that, we draw attention to three drivers that emerge related to spillover effects in green product choice: *moral*: either a decreased sense or need to behave morally due to a moral token earned by prior behavior (Khan & Dhar, 2006; Monin & Miller, 2001), or activation of one's moral standards or rules, leading to a subsequent increase in moral behavior (Mazar, Amir, & Ariely, 2008; Schwartz, 1977); *green identity*: a motivation to maintain consistency, such that behavior is in line with held attitudes, past behaviors, or one's identity (Bem, 1972; Bénabou & Tirole, 2011; Cialdini, 2007; Festinger, 1957; Gneezy et al., 2012); and *accessibility*: a "top of mind" effect, whereby green choice is more likely when relevant mental constructs are made accessible through priming of related concepts (Kahneman, 2003; Schwarz et al., 2003; Weber & Johnson 2006). While the abovementioned research has suggested that all of these drivers play a role in green choice (Thøgersen & Crompton, 2009), their relative impact in a product choice setting is not well understood. We elaborate on each in the next section.

Moral Token and Moral Activation

The moral token account derives from licensing effects in choice whereby consumers who receive a moral "credit" or "credential" from a prior choice or behavior would be *less likely* to subsequently choose a morally satisfying alternative (Miller & Effron, 2010). For instance, individuals who initially endorsed minorities were more likely to subsequently express prejudice viewpoints (e.g., Effron, Cameron, & Monin, 2009; Monin & Miller, 2001), and recalling previous helping behavior resulted in weaker

intentions to be helpful (Jordan, Mullen, & Murnighan, 2011). Specific to the green domain, it has been shown that after purchasing green products or recalling past moral behavior, individuals were more likely to cheat or steal (Jordan et al., 2011; Mazar & Zhong, 2010). In the context of the present work, these findings imply that once an individual engages in morally relevant behavior, she may be subsequently less likely to choose green if her choice of green was motivated by a desire for a moral token.

Alternatively, a prior choice or action could activate one's moral standards or sense to do the "right" thing and lead to a subsequent increase in moral behavior. For instance, activating moral standards (e.g., writing down the Ten Commandments) enhances moral action by reducing individuals' tendency to cheat (Mazar et al., 2008). Relatedly, different decision settings can cue or invoke various rules by which people make decisions (Amir & Ariely, 2007). Therefore, a moral behavior could cue a moral rule and subsequently *increase* the likelihood of choosing a green product.

Green Identity

An identity account can be derived from self-perception theory—inferring one's own attitudes from one's behavior (Bem, 1972), and cognitive dissonance theory—individuals' desire to maintain harmonious attitudes and beliefs (Festinger, 1957). These theories predict a prior action or attitude expression endorsing environmental conservation may increase the likelihood of choosing a green product (over an equivalent alternative) due to self-signaling, dissonance avoidance, and identity maintenance (Bénabou & Tirole, 2011; Cialdini, 2007; Festinger, 1957). Specifically, engaging in a green or moral behavior can serve as a signal of an individual's values and identity both to herself and to others (Bem, 1972; Bénabou & Tirole, 2011) and guide subsequent

consistent behavior. Recent evidence suggests the costliness of the initial behavior (e.g., expenditure of time or money) is an important moderator of consistent actions because an initial costly act sends a strong signal to an individual about the type of person she or he is (Bénabou & Tirole, 2011; Gneezy et al., 2012). In the context of the current work, there is evidence highlighting identity consistency in green behaviors (e.g., recycling and purchasing recycled products, see Biswas et al., 2000). Therefore, the identity account predicts that a *costly* prior pro-green act would *increase* the likelihood of subsequent green choices.

Accessibility

As with many decisions, the preference for green products can reflect a “top of mind” effect whereby exposure to eco-friendly concepts activates related constructs in one’s mind. Accessibility to a construct is typically activated by exposure to a stimulus that causes related information to become available in memory (Higgins, 1996; Weber & Johnson, 2006), and increased accessibility to mental constructs such as goals, schemas, identities, values, emotions, or norms has been shown to influence judgment and behavior, even without awareness (Kahneman, 2003; Weber & Johnson, 2006; Wegner & Bargh, 1998). Notably, unlike the identity and moral accounts, increased accessibility does not depend on individuals’ prior choices or behaviors, or on the costliness of those choices. Therefore, merely priming a pro-environment construct may increase preference for green products by virtue of increased accessibility.

To identify the degree to which these mechanisms drive pro-environmental choice, we designed a combination of hypothetical and consequential choice experiments. Each of the three experiments reported in this paper pit the above-proposed accounts

against one another, in a type of “horse race,” which allowed us to test the relative strength of each in governing green choice.

MATERIALS AND METHODS

Overview of Experiments

Participants were randomly assigned to one of four tasks that varied in a) level of effort, b) environmental relevance, and c) degree of morality. Participants in the first three conditions were asked to write slogans (higher effort) for one of three national campaigns to: increase recycling, increase poverty awareness, or encourage exercise (hereafter referred to as recycling, poverty, and exercise conditions, respectively).

Participants in the fourth group were asked to read and rate (lower effort) the quality of eight pre-written recycling slogans (hereafter referred to as rating condition). Later sections include results from a pre-test and manipulation checks used to verify the level of effort, environmental relevance and degree of morality associated with the tasks used in our experiments. Following the task, participants were asked to choose between a standard and eco-friendly product (e.g., toilet paper; see Figure 3.1 for experimental flow)². The proportion of people choosing the eco-friendly option in the recycle (g_g), rating (g_r), poverty (g_p), and exercise (g_e) conditions served as our measure of green choice—the main dependent variable in our experiments.

² See the Appendix for complete experimental materials.

Theoretically Derived Predictions

Our experimental design allows us to identify specific effects predicted by each of the three accounts. The exercise condition (higher effort; lower moral and environmental relevance) serves as a control group. We start with theoretical predictions for the moral and accessibility accounts and use these to build predictions for the green identity account.

Moral. If a moral token drives choices, participants in the poverty condition should be *less likely* to choose the eco-friendly option relative to the exercise condition ($g_p < g_e$) because writing slogans for a poverty campaign (higher moral and effort; lower environmental relevance) provides a moral token and decreases the need to engage in another moral action. Alternatively, if moral activation drives choices, participants in the poverty condition should be *more likely* to choose the eco-friendly option relative to the exercise condition ($g_p > g_e$) because writing poverty slogans invokes moral standards, making choosing green more likely. As a result, $g_p - g_e = \Delta_m$, reflects the change in green choice due to moral considerations.

Accessibility. If heightened accessibility influences participants' decisions, individuals in the rating condition (higher environmental relevance only) should be *more likely* to choose the eco-friendly option than those in the exercise condition due to green construct activation ($g_r > g_e$). Therefore, $g_r - g_e = \Delta_a$, reflects the change in green choice due to accessibility.

Green Identity. The identity account would predict that participants in the recycle condition (higher effort, moral, and environmental relevance) would be *more likely* to choose the eco-friendly option after accounting for any changes due to moral and

accessibility ($g_g > g_e + \Delta_m + \Delta_a$), presumably because their initial effortful green behavior would “inform” them they truly care about the environment, making the eco-friendly option most appealing. The change in green choice due to identity is therefore reflected by $g_g - (g_e + \Delta_m + \Delta_a) = \Delta_i$.

Note that another way to conceptualize the identity account is to assign participants to an activity with a varying degree of signal about their identity, such as in the classic dissonance paradigm (Festinger, 1957), or any activity where the driver of behavior can be thought of as either internal or external. We chose to manipulate the costliness of the signal by contrasting the lengthy slogan writing activities with the quick slogan rating activity in order to preserve the similarity of participant activity across conditions and to minimize potential confounds.

Experiment 1: Hypothetical Choice of Conventional or Eco-Friendly Toilet Paper

Method

We recruited 819 participants (38.46% female; age range: 18-72) from an online pool via Amazon Mechanical Turk (Buhrmester, Kwang, & Gosling, 2011). Participants were paid \$1 for their participation in the experiment. After they completed the writing or rating task, we instructed all participants to choose between two packages of toilet paper, presented as images on the screen: Charmin (conventional) or Seventh Generation (eco-friendly)³. A separate pre-test with 202 participants verified that Seventh Generation toilet paper is rated as significantly more eco-friendly than Charmin toilet paper, $p < .01$.

³ The number of rolls available in each package varied: Charmin had 9 rolls and Seventh Generation had 4 rolls. This difference was consistent across conditions.

Specifically, participants were told, “Imagine you are shopping at a grocery store for toilet paper and you come across the following two options, which cost the same. What package of toilet paper would you choose to buy?” Toilet paper image order was counter-balanced. We also recorded participants’ demographic information (gender, age, political orientation, and race) and used the New Ecological Paradigm (NEP) to measure their existing pro-environmental orientation (Dunlap et al., 2000). Though the NEP is not perfectly designed to measure environmentally friendly product preferences, it is a widely used and validated measure of environmental attitudes. A copy of the NEP scale is available in the Appendix.

Check of the Manipulations

We measured the amount of time spent on the experimental tasks and included manipulation check questions to verify perceived differences in the timing, effort, eco-friendliness, and morality associated with the tasks. See the Appendix for a copy of the manipulation check questions. Kruskal-Wallis tests were used to determine differences and pairwise comparisons were performed with a Bonferroni correction for multiple comparisons. Results confirmed that the tasks varied in a) timing, b) level of effort, c) environmental relevance, and d) degree of morality as expected (see the Appendix for Figure S3.1).

Task Timing. There was a significant difference in time spent between conditions, $\chi^2(3) = 525.47, p < .01$. Rating slogans took significantly *less* time in seconds ($M_{\text{rating}} = 36.78$) than writing recycle ($M_{\text{recycle}} = 326.12$), poverty ($M_{\text{poverty}} = 347.27$), and exercise ($M_{\text{exercise}} = 328.18$) slogans, $p < .01$. All other differences were non-significant.

Effort. There was a significant difference in effort rating between conditions, $\chi^2(3) = 192.83, p < .01$. Rating slogans ($M_{\text{rating}} = 3.64$) was considered significantly *less* effortful than writing recycle ($M_{\text{recycle}} = 5.58$), poverty ($M_{\text{poverty}} = 5.57$), and exercise ($M_{\text{exercise}} = 5.58$) slogans, $p < .01$. All other comparisons were non-significant.

Eco-friendly. There was a significant difference in eco-friendly rating between conditions, $\chi^2(3) = 176.01, p < .01$. Writing recycling slogans ($M_{\text{recycle}} = 5.25$) was rated as significantly *more* eco-friendly than all other tasks, $p < .01$. This was followed by rating slogans ($M_{\text{rating}} = 4.73$), which was rated as significantly *more* eco-friendly than writing poverty ($M_{\text{poverty}} = 3.23$) slogans and exercise ($M_{\text{exercise}} = 3.36$), $p < .01$. The difference between writing poverty and exercise slogans was non-significant.

Moral. There was a significant difference in moral rating between conditions, $\chi^2(3) = 62.51, p < .01$. Rating slogans ($M_{\text{rating}} = 4.81$) was rated as significantly *less* moral than writing recycling ($M_{\text{recycle}} = 5.51, p < .01$), poverty ($M_{\text{poverty}} = 5.73, p < .01$), and exercise ($M_{\text{exercise}} = 5.17, p = .04$) slogans. Likewise, writing exercise slogans was rated as significantly *less* moral than writing recycle and poverty slogans, $p = .02$ and $p < .01$, respectively. The difference between writing recycle and poverty slogans was non-significant.

Overall, the manipulation checks confirmed the relative differences intended by the design to tap into the different accounts being tested in our experiment.

Results

There was an effect of condition on toilet paper choice, $\chi^2(3) = 29.30, p < .01, \Phi = .19$. Participants in the recycle condition ($n = 193$) were more likely to choose eco-friendly toilet paper ($g_g = 63.21\%$) than those in the rating ($n = 272; g_r = 43.75\%; \chi^2(1) =$

17.13, $p < .01$, $\Phi = .19$), poverty ($n = 164$; $g_p = 47.56\%$; $\chi^2(1) = 8.82$, $p < .01$, $\Phi = .16$), and exercise ($n = 190$; $g_e = 36.84\%$; $\chi^2(1) = 26.63$, $p < .01$, $\Phi = .26$) conditions (Figure 3.2). Furthermore, participants in the poverty condition were more likely to choose green toilet paper than those in the exercise condition ($\chi^2(1) = 4.16$, $p = .04$, $\Phi = .11$). There was no difference in choice likelihood of the green toilet paper in the rating and exercise conditions, $p = .14$, *ns*. Similarly, there was no difference in choice likelihood of the green toilet paper in the rating and poverty conditions, $p = .44$, *ns*.

We also performed a logistic regression in which we regressed green choice on condition. Condition was dummy coded with exercise as the reference group. Only participants in the recycle and poverty conditions were significantly more likely to choose green compared to those in the exercise condition (recycle: Wald(1) = 25.99, $p < .01$; poverty: Wald(1) = 4.14, $p = .04$).

Age, political orientation, and NEP score significantly predicted toilet paper choice ($p < .01$). Participants who were older, more liberal and had a stronger pro-environmental orientation were more likely to choose green, however, they were all equally distributed across conditions, $p > .05$. Gender and race did not significantly predict toilet paper choice. Political orientation was significantly correlated with NEP score ($r_s = -.40$, $p < .01$; liberals scored higher on the scale) as has been found in previous studies that use the NEP (Dunlap et al., 2000). When we controlled for age and NEP in the logistic regression, participants in the recycle condition were still significantly more likely to choose green than those in the exercise condition (Wald(1) = 21.82, $p < .01$), however, the difference in the poverty condition became non-significant, $p = .11$.

Discussion

These findings suggest that an effortful environmental task increases hypothetical preference for the eco-friendly option. Participants who wrote recycling slogans, a green, moral, and higher effort activity, were significantly *more* likely to choose the hypothetical green toilet paper than participants in all other conditions. Additionally, those in the poverty condition were more likely to choose green compared to the exercise condition suggesting that engaging in an effortful and moral, but non-green, activity may also impact choice. When age and NEP were added as controls, however, this difference was no longer significant. In light of the predictions, the moral account (Δ_m) explains approximately an 11% increase in green choice and we see a 7% increase in green choice due to accessibility (Δ_a). When we account for these increases in choice in the recycle condition, we find a remaining 8% increase in green choice due to identity (Δ_i).

The results of Experiment 1 could, in part, reflect lay theories of choice in this setting. When the choice of toilet paper is hypothetical, it is plausible that participants use implicit, but incorrect, lay theories about what one might choose in that context (i.e., what one might be most likely to choose after writing or rating a particular set of slogans) rather than what one would actually choose in that context (Nisbett & Wilson, 1977). The results could, therefore, be another demonstration of the attitude-behavior paradox such that individuals may predict writing recycling slogans would make one more likely to choose green than engaging in any of the other tasks. However, had this choice been consequential, it is possible that we would have seen a different set of results. In Experiment 2, we make the choice consequential in order to avoid the potential for hypothetical or “intentions” bias.

*Experiment 2: Consequential Choice of Conventional or Eco-Friendly Toilet Paper**Method*

We recruited 1016 participants⁴ (51.57% female; age range: 18-86) from an online panel managed by Qualtrics.com. Participants were paid \$0.25 for their participation in the experiment. After they completed the writing or rating task, we instructed all participants to choose between two packages of toilet paper as a thank you for their participation in the experiment (approximately a \$4 value), presented as images on the screen: Charmin (conventional) or Seventh Generation (eco-friendly). They were told that the toilet paper would be sent to them in the mail. Alternatively, participants had the option to have \$0.25 added to their participation payment. As an example, participants were told, “As a way to say thank you for the time you spent writing slogans for the recycling campaign, we will send you one of the following two products (approximately a \$4 value). Alternatively, you may choose to have \$0.25 added to your participation payment instead. [Note: This is a real choice. We will send the product in the mail to you if you choose it.] Which of the following products would you like to receive (please select one)?” Toilet paper image order was counter-balanced. We also recorded participants’ demographic information (age, gender, political orientation, and household income) and used the New Ecological Paradigm (NEP) to measure their existing pro-environmental orientation (Dunlap et al., 2000).

⁴ We planned to recruit 1000 participants total. The panel company dropped an additional 150 participants that did not follow slogan task directions. There were no differences in the number of participants dropped by slogan condition and overall results remain the same if we include these participants in the analyses, albeit more noisy.

Check of the Manipulations

We again measured the amount of time spent on the experimental task and included manipulation check questions to verify perceived differences in the effort, eco-friendliness, and morality associated with the experimental tasks. See the Appendix for a copy of the manipulation check questions. As in Experiment 1, Kruskal-Wallis tests were used to determine differences and pairwise comparisons were performed with a Bonferroni correction for multiple comparisons. Results confirmed that the tasks varied in a) timing, b) level of effort, and c) environmental relevance as expected (see the Appendix for Figure S3.2). Tasks also varied in the degree of morality, as expected, except the difference between the exercise and recycle condition was non-significant (more below).

Task Timing. There was a significant difference in time spent between conditions, $\chi^2(3) = 529.88, p < .01$. Rating slogans took significantly *less* time in seconds ($M_{\text{rating}} = 48.69$) than writing recycle ($M_{\text{recycle}} = 496.88$), poverty ($M_{\text{poverty}} = 566.89$) slogans, and exercise ($M_{\text{exercise}} = 470.91$), $p < .01$. All other differences were non-significant.

Effort. There was a significant difference in effort rating between conditions, $\chi^2(3) = 41.22, p < .01$. Rating slogans ($M_{\text{rating}} = 4.15$) was considered significantly *less* effortful than writing recycle ($M_{\text{recycle}} = 5.23$), poverty ($M_{\text{poverty}} = 5.15$), and exercise ($M_{\text{exercise}} = 4.95$) slogans, $p < .01$. All other comparisons were non-significant.

Eco-friendly. There was a significant difference in eco-friendly rating between conditions, $\chi^2(3) = 50.88, p < .01$. Recycling slogans ($M_{\text{recycle}} = 5.97$) was rated as significantly *more* eco-friendly than all other tasks, $p < .01$. This was followed by rating

slogans ($M_{\text{rating}} = 5.51$), which was rated as significantly *more* eco-friendly than writing exercise slogans ($M_{\text{exercise}} = 5.03$, $p = .02$) and directionally but not significantly more eco-friendly than writing poverty slogans ($M_{\text{poverty}} = 5.11$, $p = .11$). As expected, the difference between exercise and poverty slogans was non-significant.

Moral. There was a significant difference in moral rating between conditions, $\chi^2(3) = 48.58$, $p < .01$. Rating slogans ($M_{\text{rating}} = 5.46$) was rated as significantly *less* moral than all other tasks, $p < .01$. Writing exercise slogans ($M_{\text{exercise}} = 5.93$) was rated as significantly *less* moral than writing poverty slogans ($M_{\text{poverty}} = 6.27$, $p = .01$), but in this experiment, writing exercise slogans was not considered less moral than writing recycle slogans ($M_{\text{recycle}} = 6.09$, $p = .93$, *ns*). The difference between writing recycling and poverty slogans was non-significant.

Although we would predict that writing exercise slogans would be considered significantly less moral than writing recycle slogans, this was not found in the manipulation check. We did, however, find this difference between the exercise and recycle conditions in the manipulation check for Experiment 1 as well as in a separate pre-test measuring just the morality associated with each of the experimental tasks (see the Appendix for task morality pre-test results).

Results

For the purposes of our experiment, we are only interested in those who chose toilet paper. Of 1016 participants, 715 (70.37%) chose either Charmin or Seventh Generation. The remaining 301 participants chose to receive \$0.25 instead. Importantly, there was no difference between conditions in the proportion of individuals who chose \$0.25. Additionally, the overall results remain largely the same when we analyze the

entire sample. See the Appendix for a summary of results that includes those who chose \$0.25.

We again found an effect of condition on toilet paper choice, $\chi^2(3) = 27.61, p < .01, \Phi = .20$. Participants in the recycle condition ($n = 178$) were more likely to choose eco-friendly toilet paper ($g_g = 45.51\%$) than those in the rating ($n = 193; g_r = 34.72\%$; $\chi^2(1) = 4.50, p = .03, \Phi = .11$), poverty ($n = 173; g_p = 28.90\%$; $\chi^2(1) = 10.34, p < .01, \Phi = .17$), and exercise ($n = 171; g_e = 19.88\%$; $\chi^2(1) = 25.92, p < .01, \Phi = .27$) conditions (Figure 3.3). Furthermore, participants in the rating and poverty conditions were more likely to choose green toilet paper than those in the exercise condition ($\chi^2(1) = 9.95, p < .01, \Phi = .17$ and $\chi^2(1) = 3.79, p = .05, \Phi = .11$, respectively). There was no difference in choice likelihood of the green toilet paper in the rating and poverty conditions, $p = .23, ns$.

We further regressed green choice on condition (dummy coded) with exercise as the reference group. Participants in the recycle, rating, and poverty conditions were significantly more likely to choose green compared to those in the exercise condition (recycle: Wald(1) = 24.80, $p < .01$; rating: Wald(1) = 9.75, $p < .01$; poverty: Wald(1) = 3.76, $p = .05$).

Political orientation and NEP score significantly predicted green toilet paper choice ($p < .01$; participants who were more liberal and had a stronger pro-environmental orientation were more likely to choose green), though both were distributed equally across conditions, $p > .05$. Age, gender, and income did not significantly predict toilet paper choice, however, age was significantly different between conditions (those in the rating condition were significantly older than those in the recycle and poverty conditions,

$p < .01$). Again, political orientation was significantly correlated with NEP score ($r_s = -.28, p < .01$; liberals scored higher on the scale). When we controlled for age and NEP in the logistic regression, participants in the recycle, rating, and poverty conditions were still significantly more likely to choose green than those in the exercise condition (recycle: Wald(1) = 24.58, $p < .01$; rating: Wald(1) = 11.07, $p < .01$; poverty: Wald(1) = 4.16, $p = .04$).

As in Experiment 1, these findings suggest that an effortful environmental task increases preference for the eco-friendly option. Participants who wrote recycling slogans, a green, moral, and higher effort activity, were significantly *more* likely to choose the green toilet paper than participants in all other conditions. Additionally, while less likely to choose green compared to those in the recycle condition, those in the poverty and rating conditions were more likely to choose green compared to the exercise condition. This suggests that engaging in an effortful moral activity and making green constructs accessible also impacts choice. In light of the predictions, we see a 15% increase in green choice due to accessibility (Δ_a) and a 9% increase due to the moral account (Δ_m). When we account for these relative increases in choice in the recycle condition, we find a 2% increase in green choice due to green identity (Δ_i). Notably, real choice for green in Experiment 2 was on average lower than hypothetical choice for green in Experiment 1. We also see a much larger effect for accessibility and consequently, a much smaller effect for identity in Experiment 2 compared to Experiment 1. As we suggested, this may be due to the hypothetical nature of Experiment 1 and reflect individuals' lay intuitions about green preference as well as what drives green

choice. Specifically, individuals may not be able to anticipate the influence that exposure to green concepts can have on their choices.

Because the environmental benefits associated with a specific green product can come into question and/or limit the applicability of any particular finding to other product categories, in Experiment 3 we had subjects make a consequential choice between gift cards, rendering greater generalizability.

Experiment 3: Consequential Choice of A Standard or Eco-Friendly Gift Card

Method

Participants (N = 818; 49.39% female; age range: 18-70) were recruited from the Amazon Mechanical Turk online subject pool. Participants were paid \$0.50 for their participation in the experiment. We dropped 62 participants from the sample (55 had already participated in an earlier related experiment, and the remaining 7 did not complete the task as directed), leaving N = 756 for analyses. The overall results remain the same if we include all participants in the analyses.

After they completed the writing or rating task, we instructed all participants to choose between two thank-you gift cards: Amazon.com (\$9 value) or Greenhome.com (an online green megastore, \$20 value). The difference in value was intended to avoid a floor effect in choices, and was determined after multiple pre-tests, which suggested that individuals have a strong preference for Amazon.com. To make this choice consequential, we informed participants that one in twenty participants would be randomly selected to receive their preferred gift card. Card display order was counter-balanced. Finally, we recorded participants' demographic information (gender, age, race,

and political orientation) and used the New Ecological Paradigm (NEP) to measure their existing pro-environmental orientation (Dunlap et al., 2000).

Check of the Manipulations

As in Experiments 1 and 2 we measured the amount of time spent on the experimental task, however, given the similarity in manipulations, we did not include additional manipulation check questions. Kruskal-Wallis tests were used to determine differences and pairwise comparisons were performed with a Bonferroni correction for multiple comparisons. Results confirmed that the tasks varied in timing as expected.

Again, there was a significant difference in time spent between conditions, $\chi^2(3) = 441.92, p < .01$. Rating slogans took significantly less time in seconds ($M_{\text{rating}} = 37.76$) than writing recycle ($M_{\text{recycle}} = 387.14$), exercise ($M_{\text{exercise}} = 359.62$), or poverty ($M_{\text{poverty}} = 341.72$) slogans, $p < .01$. All other differences were non-significant.

Results

The conditions differed in the proportion of participants who chose the green gift certificate, $\chi^2(3) = 18.71, p < .01, \Phi = .16$. Participants in the recycle condition ($n = 181$) were more likely to choose green gift cards ($g_r = 29.28\%$) than those in the poverty ($n = 163; g_p = 14.72\%; \chi^2(1) = 10.46, p < .01, \Phi = .17$) and exercise ($n = 199; g_e = 18.09\%; \chi^2(1) = 6.62, p = .01, \Phi = .13$) conditions (Figure 3.4). Furthermore, participants in the rating condition ($n = 213$) were also more likely to choose green gift cards ($g_r = 30.05\%$) than those in the poverty ($\chi^2(1) = 12.09, p < .01, \Phi = .18$), and exercise ($\chi^2(1) = 8.00, p < .01, \Phi = .14$) conditions. There was no difference in choice likelihood of the green gift card in the recycle and rating conditions, $p = .87, ns$. Similarly, there was no difference in choice likelihood of the green gift card in the poverty and exercise conditions, $p = .39, ns$.

A logistic regression of green choice on condition (dummy coded) with exercise as the reference group revealed that only participants in the recycle and rating conditions were significantly more likely to choose green compared to those in the exercise condition (recycle: Wald(1) = 6.52, $p = .01$; rating: Wald(1) = 7.87, $p < .01$).

Gender, age and NEP significantly predicted gift card choice ($p < .01$; females, older participants and those that had a stronger pro-environmental orientation were more likely to choose green), however, they were all equally distributed across conditions, $p > .05$. Race and political orientation did not significantly predict gift card choice, but as in Experiments 1 and 2 political orientation was significantly correlated with NEP score ($r_s = -.42$, $p < .01$; liberals scored higher on the scale). When we controlled for gender, age and NEP in the logistic regression, participants in the recycle and rating conditions were still significantly more likely to choose green compared to those in the exercise condition (recycle: Wald(1) = 8.30, $p < .01$; rating: Wald(1) = 7.95, $p < .01$).

Participants primed with the environment, and participants who engaged in an effortful environmental task, were *equally* and significantly more likely to choose the green gift card—nearly twice as much—than participants in all other conditions. Unlike the previous two experiments the moral account (Δ_m) causes a 3% *decrease* in green choice. As in Experiment 2, the largest increase in green choice, 12%, is due to accessibility (Δ_a), and when we account for the relative changes due to morals and accessibility in the recycle condition, we find a 2% increase in green choice due to identity (Δ_i), an amount consistent with findings in Experiment 2.

NEP and Accessibility

If we consider the combined results of our two consequential choice experiments,

accessibility accounts for an average 13.5% increase in green choice while moral and identity account for 3% and 2%, respectively (Table 3.1). Evaluating these percentages in terms of change relative to baseline (the exercise condition), then accessibility accounts for a 71% increase in green choice while morals and identity account for 14% and 10.5%, respectively (Table 3.2). The combined results of all three experiments, including the hypothetical choice setting, show a similar pattern, but with slightly larger effects for the moral and identity accounts. Of course, the relative effects of these drivers may vary given different contexts, but based on our findings it appears that accessibility could be a key component in driving pro-environmental choice.

The accessibility account presumes activation of an *existing* mental structure that subsequently influences preference. Such preferences can be influenced by a salient, accessible identity, for instance, particularly when the identity resonates with the individual (LeBoeuf, Shafir, & Bayuk, 2010). For example, research in the domain of moral behavior shows that activating moral standards reduces the tendency for dishonest behavior, implying that a highly accessible moral identity may drive consistent moral action (Mazar et al., 2008). Research has further suggested priming stimuli that are consistent with a self-concept may be processed more intensely, potentially making the prime more effective (Markus, 1977; Sela & Shiv, 2009; Shih et al., 2002; Wheeler, DeMarree, & Petty, 2007).

In the context of the current paper, these findings suggest we should observe a larger effect of accessibility on preference for the green product options among individuals with more developed green attitudes, as measured by their NEP scores (range 15 to 75; higher scores indicate a higher “ecological worldview”). The accessibility

account would predict that participants with high NEP scores, and whose task activated the green construct (i.e., the recycle and rating conditions), would be more likely to choose green relative to individuals with low NEP scores. We explored this possibility in all three experiments, and found evidence that the green tasks activated an existing green construct captured by the NEP in Experiment 3 only.

Experiment 1 NEP

As mentioned in Experiment 1 results, NEP predicted toilet paper choice, $\text{Wald}(1) = 54.97, p < .01$. Those with higher NEP scores were more likely to choose green toilet paper, and separate logistic regressions revealed that the effect of NEP on choice was significant regardless of condition, $p < .01$. Importantly, a Kruskal-Wallis test found no difference in NEP scores between conditions, confirming task type did not influence NEP score, $\chi^2(3) = 4.76, p = .19, ns$. In a logistic regression testing the effect of task type (green vs. non-green), NEP (mean-centered), and their interaction on choice likelihood of the green toilet paper we found a main effect of task type—51.83% of green task participants chose the green toilet paper compared to 41.81% in the non-green tasks, $\text{Wald}(1) = 6.49, p = .01$ —and an effect of NEP, $\text{Wald}(1) = 28.01, p < .01$, but the interaction of task type and NEP was non-significant $\text{Wald}(1) = 0.76, p = .38, ns$.

Experiment 2 NEP

Again, NEP predicted toilet paper choice, $\text{Wald}(1) = 18.98, p < .01$. Those with higher NEP scores were more likely to choose green toilet paper, and separate logistic regressions revealed that the effect of NEP on choice was significant in the recycle and exercise conditions, $p < .01$ and $p = .03$, respectively, and marginal but not significant in the rating condition, $p = .07$. NEP was not a significant predictor in the poverty condition,

$p = .45$. A Kruskal-Wallis test found no difference in NEP scores between conditions, confirming task type did not influence NEP score, $\chi^2(3) = 3.16, p = .37, ns$. A logistic regression testing the effect of task type (green vs. non-green), NEP (mean-centered), and their interaction on choice likelihood of the green toilet paper revealed a main effect of task type—39.89% of green task participants chose the green toilet paper compared to 24.42% in the non-green tasks, $\text{Wald}(1) = 16.77, p < .01$ —and an effect of NEP, $\text{Wald}(1) = 4.02, p = .05$, but the interaction of task type and NEP was non-significant $\text{Wald}(1) = 2.10, p = .15, ns$.

Experiment 3 NEP

As in Experiment 1 and Experiment 2, NEP predicted gift card choice, $\text{Wald}(1) = 10.07, p < .01$. Those with higher NEP scores were more likely to choose the green gift card. Also, a Kruskal-Wallis test found no difference in NEP scores between conditions, confirming task type did not influence NEP score, $\chi^2(3) = 1.8, p = .62, ns$. Importantly, separate logistic regressions revealed that NEP was a significant predictor of gift card choice in the rating condition, $p < .01$ and a marginal but not significant predictor of gift card choice in the recycle condition, $p = .07$. NEP was *not* a predictor of gift card choice in the exercise ($p = .79$) or poverty ($p = .55$) conditions, suggesting it did not affect preferences when preceded by non-environmental tasks. When we regressed the effect of task type (green vs. non-green), NEP (mean-centered), and their interaction on choice likelihood of the green gift card we found a main effect of task type—29.7% of green task participants chose the green gift card compared to 16.57% in the non-green tasks, $\text{Wald}(1) = 15.07, p < .01$. The effect of NEP alone was non-significant, $\text{Wald}(1) = .3, p = .58$, however, the interaction of task type and NEP was significant $\text{Wald}(1) = 3.86, p =$

.05. As can be seen in Figure 3.5, the interaction is driven by the difference in green gift card choice *only* among green task participants, further highlighting the combined impact of existing green mental constructs *and* increased accessibility on green choice.

We, therefore, find mixed support for green construct activation as captured by the NEP scale in our experiments, consistent with previous work. Verplanken and Holland (2002) found that priming environmental values increases hypothetical choices of environmentally friendly televisions, but only among those with environmental values central to the self. In contrast, Tate et al. (2014) found that priming environmental-protection goals increased hypothetical choices for pro-environmental products, but this was not contingent on existing environmental attitudes.

Though the best option available, our measure of green attitudes, the NEP scale (Dunlap et al., 2000), is not specifically designed to measure eco-friendly product preferences. Moreover, while it is the most widely used measure of environmental attitudes, studies have questioned its ability to perfectly capture environmental attitudes (e.g., Tate et al., 2014). Recent research also suggests the scale may be dated (Haws et al., 2013). Future studies should, therefore, consider a measure of environmental product attitudes in addition to the NEP.

Additionally, while our results provide evidence for the accessibility account, we are unable to conclude exactly what is being accessed. Writing and rating recycling slogans may activate any number of constructs (e.g., identities, norms, goals, emotions, traits, stereotypes) that then lead to an increased preference for green (Kahneman, 2003; Weber & Johnson, 2006; Wegner & Bargh, 1998). Also, while our rating condition was not designed to invoke moral standards, there is a chance morals are activated when

individuals read recycling slogans. Given our pattern of results, however, moral activation in our rating condition seems unlikely.

Future research should examine the role that different construct activation plays in green choice, as this information would be valuable to educational campaigns aimed at improving this behavior.

GENERAL DISCUSSION

Accessibility accounted for the largest increase in green choice in our experiments. The moral account also played a role, but to a lesser degree, and its influence either increased green choice or even backfired (see Experiment 2), making green choice less likely. Finally, we find small but detectable evidence for the role of identity in green choice in a private consumption setting.

Priming green concepts may have important consequences by drawing consumers' attention to relevant product attributes at the time they are considering purchases with environmental benefits (e.g., noticing the "Energy Star" label on appliances; Dietz et al., 2009; Vandenberg et al., 2010). Notably, education and awareness are essential building blocks for the growth of eco-minded attitudes, though it appears that consistent with previous findings of an attitude-behavior gap, instilling these understandings alone is not enough. Our results imply that one reason for the attitude-behavior gap could be that green attitudes alone are insufficient to drive green choice and may need to be activated in order to exert influence on individuals' behavior.

Though having replicated our findings with a common everyday product (i.e.,

toilet paper) and with an abstract, non-specific product (i.e., gift certificate), we acknowledge that the nature of our experiments may limit their applicability to instances of private consumption (e.g., online and in the comfort of participants' homes) and may not extend to social consumption settings, where other factors such as social norms and social signaling might influence behavior (e.g., Cialdini & Trost, 1998; Griskevicius et al., 2010). As Griskevicius and colleagues (2010) found, status motives increase individuals' preference for green products in public settings but not in private ones.

Another important consideration relates to the particular manipulations used in our experiments. One may argue that while conforming to the accounts we intended to test, a different manipulation may have generated larger effects than the ones we used and may have provided a fairer chance for the accounts to play out. In order to minimize these critiques, we attempted to equate style, type, length and other task characteristics to reduce noise and potential alternative accounts. Furthermore, we tried to conceptually replicate well-tested manipulations for the moral, identity, and accessibility accounts, as well as provided participants with consequential choices. Future work may shed light on the adequacy of this design.

Ultimately, one should use caution when assuming individuals who report caring about the environment are already won over. Instead, our results suggest these individuals may need timely reminders of their pro-environmental orientation in order to behave in line with those attitudes. The findings presented in this paper imply a strategic two-stage framework that may be helpful in motivating pro-environmental choice: fostering eco-minded attitudes through education *and* subsequently triggering those constructs in real-time. For the marketer looking to design a campaign tomorrow, we recommend

increasing accessibility to a pro-environmental construct prior to intended customer decision making.

Table 3.1. Actual changes in green choice

	Moral $(g_p - g_e = \Delta_m)$	Accessibility $(g_r - g_e = \Delta_a)$	Identity $(g_g - (g_e + \Delta_m + \Delta_a) = \Delta_i)$
Experiment 1: TP (hypothetical)	11%	7%	8%
Experiment 2: TP (real)	9%	15%	2%
Experiment 3: GC (real)	-3%	12%	2%
Total (real choice)	3%	13.50%	2%

Note. Actual changes in green choice due to the moral, accessibility, and identity accounts in Experiments 1-3.

Table 3.2. Relative changes in green choice

	Moral $(g_p - g_e = \Delta_m)$	Accessibility $(g_r - g_e = \Delta_a)$	Identity $(g_g - (g_e + \Delta_m + \Delta_a) = \Delta_i)$
Experiment 1: TP (hypothetical)	30%	19%	22%
Experiment 2: TP (real)	45%	75%	10%
Experiment 3: GC (real)	-17%	67%	11%
Total (real choice)	14%	71%	10.5%

Note. Relative changes in green choice due to the moral, accessibility, and identity accounts in Experiments 1-3.

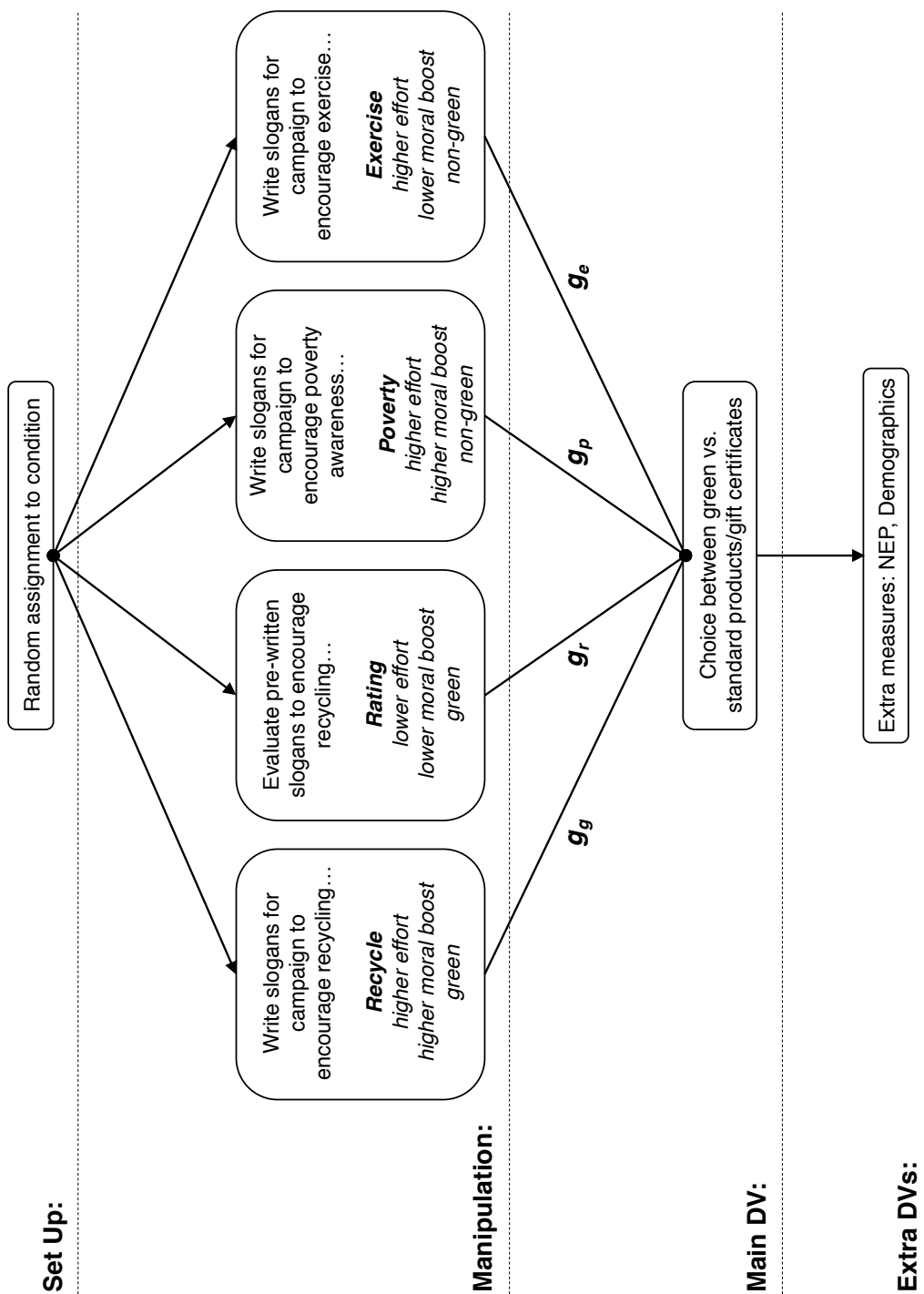


Figure 3.1. Graphical representation of the experiments.

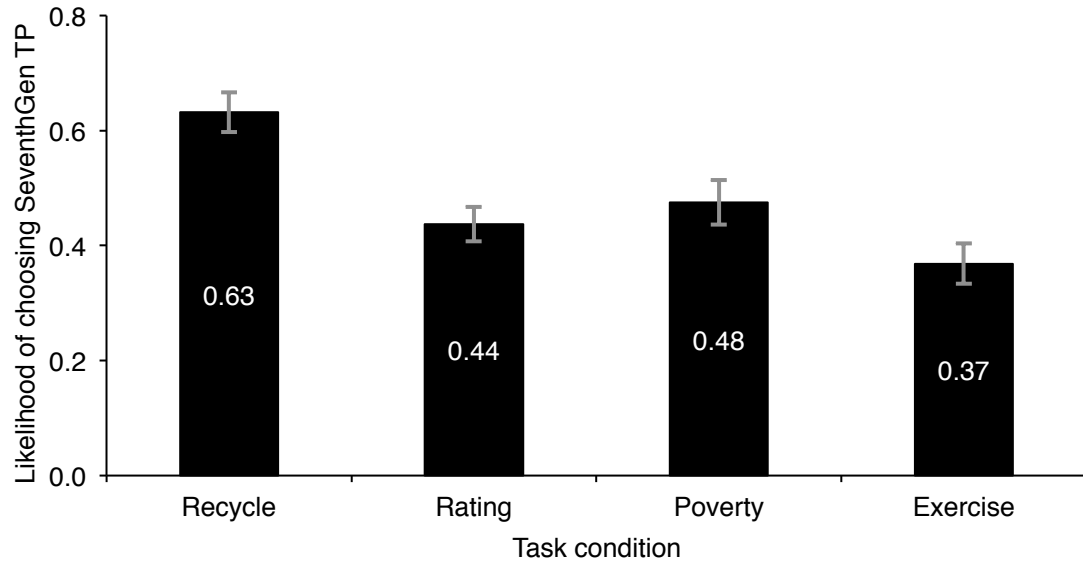


Figure 3.2. Hypothetical green toilet paper choice. Likelihood of choosing Seventh Generation toilet paper by recycle (g_r), rating (g_r), poverty (g_p), and exercise (g_e) conditions. Bars are ± 1 s.e.m. $n_{\text{recycle}} = 193$, $n_{\text{rating}} = 272$, $n_{\text{poverty}} = 164$, $n_{\text{exercise}} = 190$.

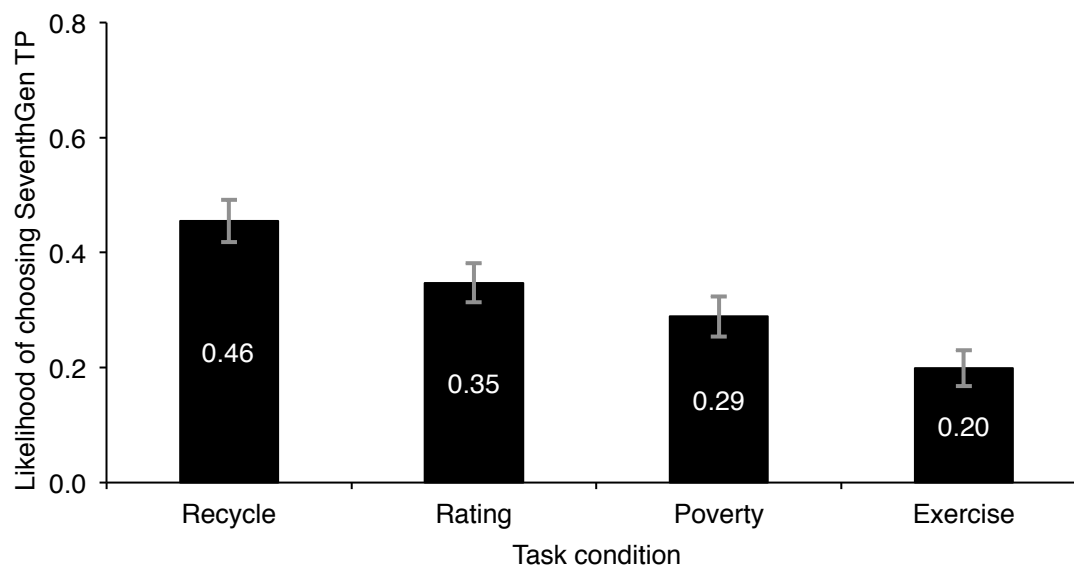


Figure 3.3. Real green toilet paper choice. Likelihood of choosing Seventh Generation toilet paper by recycle (g_g), rating (g_r), poverty (g_p), and exercise (g_e) conditions. Bars are ± 1 s.e.m. $n_{\text{recycle}} = 178$, $n_{\text{rating}} = 193$, $n_{\text{poverty}} = 173$, $n_{\text{exercise}} = 171$.

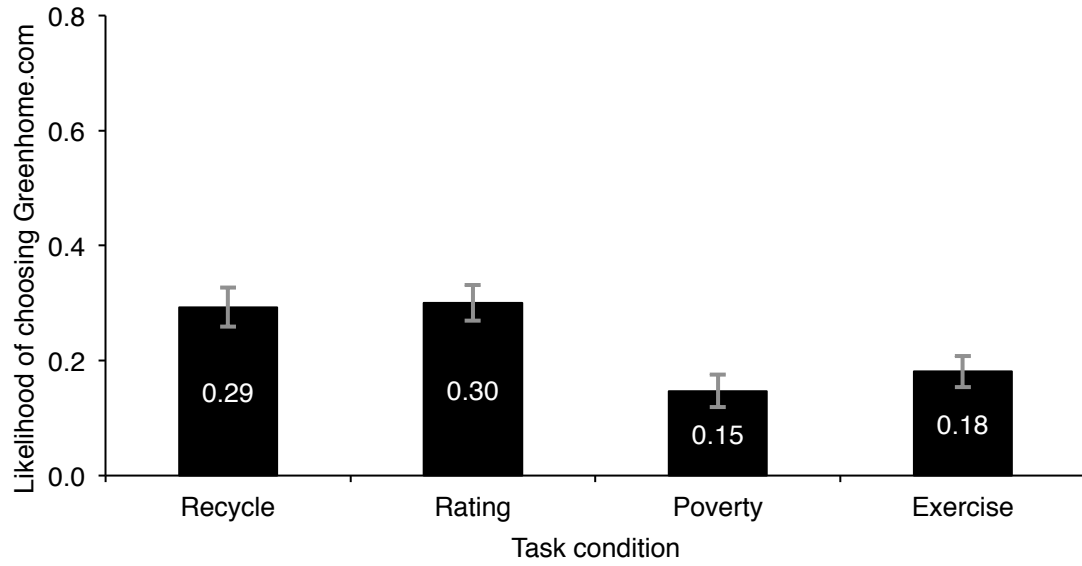


Figure 3.4. Green gift card choice. Likelihood of choosing Greenhome.com by recycle (g_g), rating (g_r), poverty (g_p), and exercise (g_e) conditions. Bars are ± 1 s.e.m. $n_{\text{recycle}} = 181$, $n_{\text{rating}} = 213$, $n_{\text{poverty}} = 163$, $n_{\text{exercise}} = 199$.

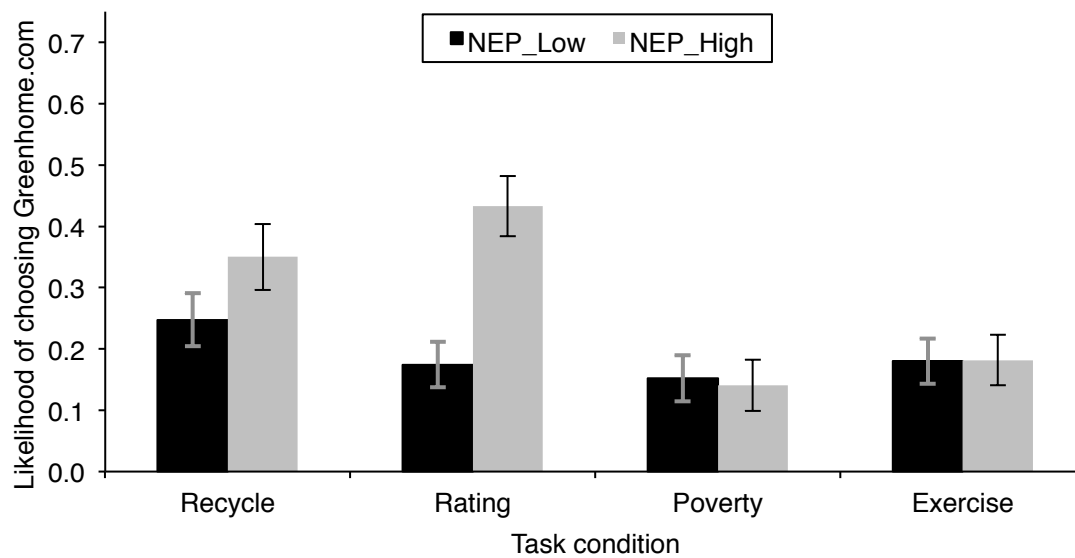


Figure 3.5. Green gift card choice and NEP. Likelihood of choosing Greenhome.com by condition and NEP score (low vs. high based on median split). Bars are ± 1 s.e.m.

APPENDIX

Experimental Stimuli for Experiments 1 – 3

Participants were randomly assigned to one of the following four tasks:

Recycling slogans. A national non-profit organization will soon be launching a recycling campaign with the goal of encouraging a cleaner environment. This organization is looking for slogans to be used on posters and in ads, and they are soliciting the public for ideas. We would like you to donate the next several minutes of your time to come up with eight slogan ideas that this organization could use for their recycle for the environment campaign. Please type your ideas in the eight spaces below.

Poverty slogans. A national non-profit organization will soon be launching an anti-poverty campaign with the goal of encouraging poverty awareness. This organization is looking for slogans to be used on posters and in ads, and they are soliciting the public for ideas. We would like you to donate the next several minutes of your time to come up with eight slogan ideas that this organization could use for their poverty awareness campaign. Please type your ideas in the eight spaces below.

Exercise slogans. A national non-profit organization will soon be launching an exercise campaign with the goal of encouraging the public to exercise more. This organization is looking for slogans to be used on posters and in ads, and they are soliciting the public for ideas. We would like you to donate the next several minutes of your time to come up with eight slogan ideas that this organization could use for their exercise campaign. Please type your ideas in the eight spaces below.

Rating recycling slogans. Please rate the quality of the following slogans using the scale provided (1 = very low quality to 7 = very high quality):

1. Reduce your waste! Put cans in their place!
2. Recycle today for a greener tomorrow.
3. A clean environment is a healthy environment.
4. Keep it clean, keep it green.
5. Preserve and protect our resources--recycle whenever and wherever you can!
6. Reduce, reuse, and recycle.
7. Don't throw away, recycle for another day.
8. Live green, live clean.

Experiment 1 DV: Hypothetical Choice of Conventional or Eco-friendly Toilet Paper

Imagine you are shopping at a grocery store for toilet paper and you come across the following two options, which cost the same. What package of toilet paper would you choose to buy? (*Participants were presented with two images, one of Charmin Comfort toilet paper and one of Seventh Generation toilet paper. Order of images was counterbalanced.*)

Experiment 2 DV: Consequential Choice of Conventional or Eco-friendly Toilet Paper Choice

As a way to say thank you for the time you spent writing slogans for the recycling campaign, we will send you one of the following two products (approximately a \$4 value). Alternatively, you may choose to have \$0.25 added to your participation payment instead. [Note: This is a real choice. We will send the product in the mail to you if you choose it.] Which of the following products would you like to receive (please select one)? (*Participants were presented with two images below the following text, one of Charmin Comfort toilet paper and one of Seventh Generation toilet paper. Order of images was counterbalanced.*)

Charmin toilet paper, 4 rolls

Seventh Generation toilet paper, 4 rolls

No, thank you. I would rather receive \$0.25 instead.

Experiment 3 DV: Consequential Choice of a Standard or Eco-friendly Gift Card

Gift card choice DV. Those who wrote slogans responded to the following:

As a way to say thank you for the time you spent writing slogans for the recycling campaign, you will be given an opportunity to receive a gift card. One out of every twenty participants will be randomly selected to receive a gift card. If you are selected to receive a gift card, which of the following two gift cards would you like to receive? (Please select one.)

1. \$9 Amazon.com Gift Card
2. \$20 Greenhome.com Gift Card (Note: Greenhome.com, the original online eco-store which has been featured on NBC and HGTV, is one of the most popular and trusted online sources for greener, more sustainable, and eco-friendly products for your home and office. They have a large selection of organic and recycled products for your bedroom, bathroom, kitchen, garden, children, pets, etc.)

Gift card choice DV. Those who rated slogans responded to the following:

As a way to say thank you for the time you spent rating the slogans, you will be given an opportunity to receive a gift card. One out of every twenty participants will be randomly selected to receive a gift card. If you are selected to receive a gift card, which of the following two gift cards would you like to receive? (Please select one.)

1. \$9 Amazon.com Gift Card
2. \$20 Greenhome.com Gift Card (Note: Greenhome.com, the original online eco-store which has been featured on NBC and HGTV, is one of the most popular and trusted online sources for greener, more sustainable, and eco-friendly products for your home and office. They have a large selection of organic and recycled products for your bedroom, bathroom, kitchen, garden, children, pets, etc.)

Manipulation Check Questions

In Experiments 1 and 3, we included the following manipulation check questions, after participants made their toilet paper selection, in order to measure differences in the

perceived effort, eco-friendliness, and morality associated with the experimental tasks (1 = *not at all*, 7 = *very*):

- How effortful did it feel to [write slogans for the recycling/anti-poverty/exercise campaign | rate the quality of the slogans]?
- To what extent did you feel that [writing slogans for the recycling/anti-poverty/exercise campaign | rating the quality of the slogans] was an eco-friendly thing to do?
- To what extent did you feel that [writing slogans for the recycling/anti-poverty/exercise campaign | rating the quality of the slogans] was a morally good thing to do?

NEP Scale

Participants completed the following widely used, validate scale (Dunlap, Van Liere, Mertig, and Jones, 2000).

Listed below are statements about the relationship between humans and the environment. For each one, please indicate the extent to which you agree or disagree with the statement. Provide a rating from Strongly Disagree to Strongly Agree using the following scale:

1 = strongly disagree, 2 = mildly disagree, 3 = unsure, 4 = mildly agree, 5 = strongly agree.

- i. We are approaching the limit of the number of people the earth can support.
- ii. Humans have the right to modify the natural environment to suit their needs.
- iii. When humans interfere with nature, it often produces disastrous consequences.
- iv. Human ingenuity will ensure that we do NOT make the earth unlivable.
- v. Humans are severely abusing the environment.
- vi. The earth has plenty of natural resources if we just learn how to develop them.
- vii. Plants and animals have as much right as humans to exist.
- viii. The balance of nature is strong enough to cope with the impacts of modern industrial nations.
- ix. Despite our special abilities humans are still subject to the laws of nature.
- x. The so-called “ecological crisis” facing humankind has been greatly exaggerated.
- xi. The earth is like a spaceship with very limited room and resources.
- xii. Humans were meant to rule over the rest of nature.
- xiii. The balance of nature is very delicate and easily upset.
- xiv. Humans will eventually learn enough about how nature works to be able to control it.
- xv. If things continue on their present course, we will soon experience a major ecological disaster.

Manipulation Check Figures

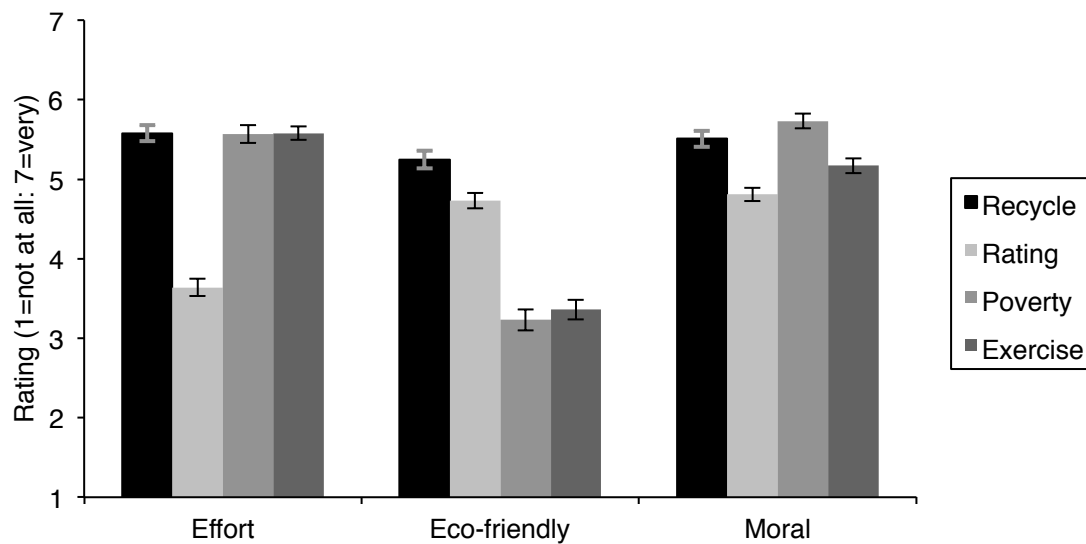


Figure S3.1. Experiment 1 manipulation check results

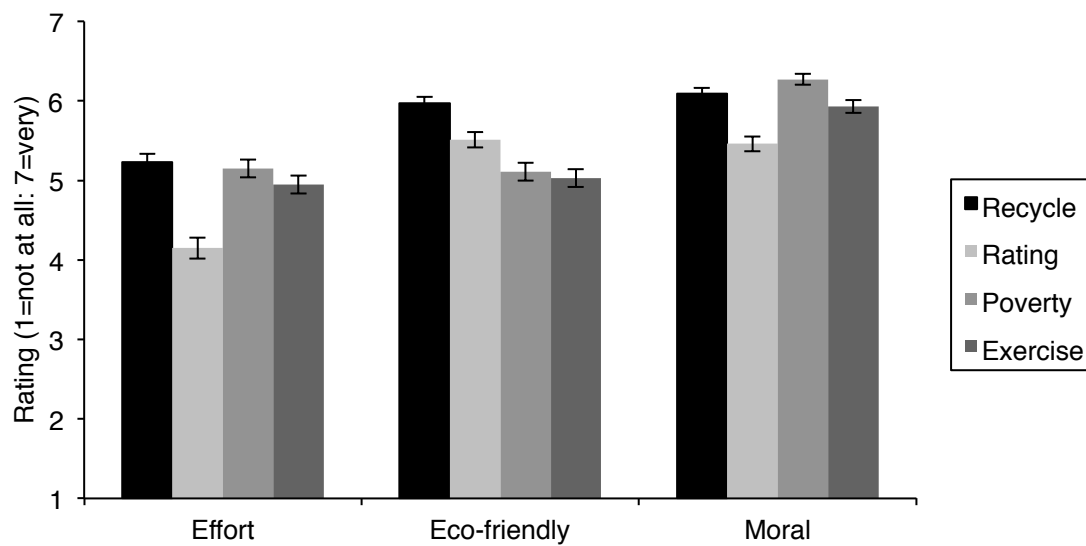


Figure S3.2. Experiment 2 manipulation check results

Task Morality Pre-Test Results

We conducted a separate pretest measuring the morality associated with each of the experimental tasks (1 = *not at all moral*, 7 = *very moral*). Participants (N = 201) rated the morality of each of the four tasks (randomly ordered). We used a repeated measures ANOVA and a Bonferroni correction for post-hoc comparisons. There was a significant difference in moral rating between conditions, $F(2.481, 488.74) = 39.87, p < .01$, partial $\eta^2 = 0.17$. *Post-hoc* analysis revealed rating recycling slogans ($M_{\text{rating}} = 5.09$) is considered significantly *less* moral than writing recycle ($M_{\text{recycle}} = 5.77$), poverty ($M_{\text{poverty}} = 5.86$), and exercise ($M_{\text{exercise}} = 5.59$) slogans, $p < .01$. The pretest results also indicated that writing recycle and poverty slogans is considered equally and significantly *more* moral than writing exercise slogans, $p = .02$ and $p < .01$, respectively.

Experiment 2 Results (Including Those Who Chose \$0.25)

Overall, there was an effect of condition on choice, $\chi^2(6) = 30.77, p < .01, \Phi = .17$. Participants in the recycle condition (n = 257) were more likely to choose eco-friendly toilet paper ($g_g = 31.52\%$) than those in the rating (n = 257; $g_r = 26.07\%$; $\chi^2(2) = 6.67, p = .04, \Phi = .11$), exercise (n = 251; $g_e = 13.55\%$; $\chi^2(2) = 25.99, p < .01, \Phi = .23$), and poverty (n = 251; $g_p = 19.22\%$; $\chi^2(2) = 10.35, p < .01, \Phi = .14$) conditions (see Figure S3.3 below). Furthermore, participants in the rating condition were more likely to choose green toilet paper than those in the exercise condition ($\chi^2(2) = 12.95, p < .01, \Phi = .16$). There was no difference in choice likelihood of the green toilet paper in the rating and poverty conditions, $p = .15, ns$. Similarly, there was no difference in choice likelihood of the green toilet paper in the poverty and exercise conditions, $p = .15, ns$.

We also ran a logistic regression in which we regressed green choice on condition. Condition was dummy coded with exercise as the reference group. Participants in the recycle and rating conditions were significantly more likely to choose green compared to those in the exercise condition (recycle: Wald(1) = 22.31, $p < .01$; rating: Wald(1) = 12.14, $p < .01$), and those in the poverty conditional were marginally more likely (poverty: Wald(1) = 3.62, $p = .06$).

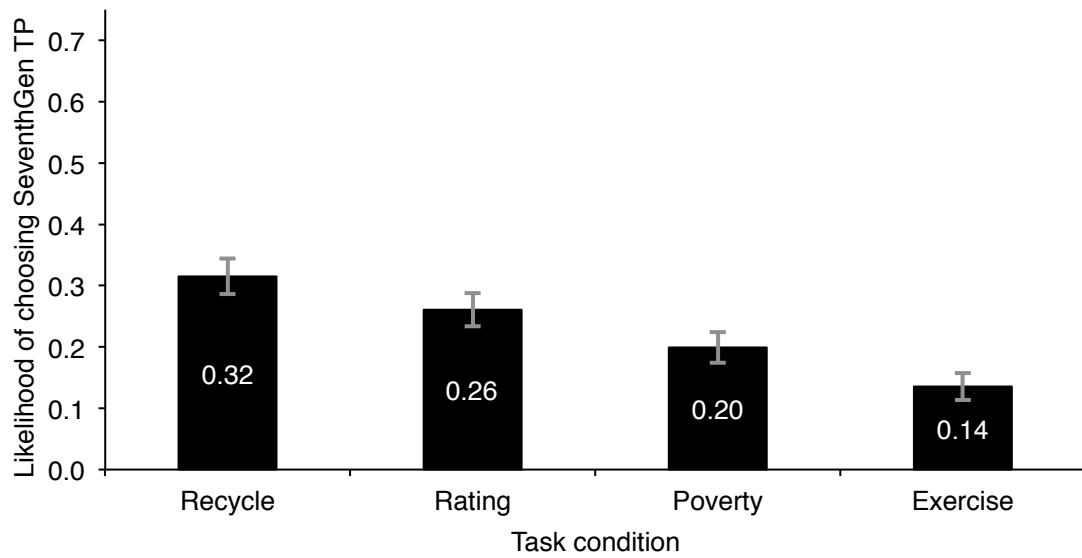


Figure S3.3. Experiment 2 results including those who chose \$0.25. Likelihood of choosing Seventh Generation toilet paper by recycle (g_g), rating (g_r), exercise (g_e), and poverty (g_p) conditions. Bars are ± 1 s.e.m. $n_{\text{recycle}} = 257$, $n_{\text{rating}} = 257$, $n_{\text{exercise}} = 251$, $n_{\text{poverty}} = 251$.

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Chapter 3, in full, is currently being prepared for submission for publication of the material. Keenan, Elizabeth A., On Amir, and Ayelet Gneezy. The dissertation author was the primary investigator and author of this paper.

How warm days increase belief in global warming

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Climate change judgements can depend on whether today seems warmer or colder than usual, termed the local warming effect. Although previous research has demonstrated that this effect occurs, studies have yet to explain why or how temperature abnormalities influence global warming attitudes. A better understanding of the underlying psychology of this effect can help explain the public's reaction to climate change and inform approaches used to communicate the phenomenon. Across five studies, we find evidence of attribute substitution, whereby individuals use less relevant but available information (for example, today's temperature) in place of more diagnostic but less accessible information (for example, global climate change patterns) when making judgements. Moreover, we rule out alternative hypotheses involving climate change labelling and lay mental models. Ultimately, we show that present temperature abnormalities are given undue weight and lead to an overestimation of the frequency of similar past events, thereby increasing belief in and concern for global warming.

During a particularly hot summer in 1988, James Hansen testified before a congressional hearing on the dangers of global warming. The night before his testimony, committee members had opened the room's windows and turned off the air conditioning, hoping the sweltering heat would underscore Hansen's warnings and make the greenhouse effect concrete to anyone present¹. This intuition, that today's temperature would affect climate change beliefs, anticipates a more recent finding that subjective temperature does, in reality, affect reported beliefs in climate change.

Given that the challenge of reducing carbon emissions depends, in part, on changes in individual behaviour, it is important to understand the basis of global climate change perception and concern. Notably, individuals' beliefs about the phenomenon seem to be constructed at the moment of elicitation, rather than simply retrieved from memory². This is demonstrated by the fact that individuals are sensitive to normatively irrelevant features of the judgement context, including transient temperature^{3–8}. Mounting evidence shows personal experience with the daily weather tends to dominate more diagnostic but paler statistical information provided by experts^{9–11}, because the former is more vivid and accessible. Notably, perceived abnormalities in present temperature have been linked causally with changes in belief in global warming, an effect termed local warming¹². Specifically, respondents who perceived today's temperature as being warmer than usual exhibited greater belief in and heightened concern for global warming and also donated more money to a climate change charity.

Despite accumulating evidence that global warming judgements are influenced by short-lived temperature variation and local weather, the underlying psychological processes regarding how or why this relationship occurs have not been fully explored in the literature (see Supplementary Table 1 for a review of existing literature). There are at least three mechanisms by which transient, local temperatures may influence individuals' judgements about global climate change. One mechanism suggests that choice option labels influence belief construction. For many issues, subtle changes in question terminology can result in pronounced

differences in obtained answers^{13,14}, a phenomenon supported by the literature on attribute framing effects in decision research^{15,16}. Specifically, the term global warming, which has been used in previous studies, may prime heat-related cognitions, leading to biased judgements. Second, the local warming effect could be due to a knowledge deficit on the part of respondents, causing them to mistakenly believe that long-term climate and short-term temperature deviations are highly related. A third explanation, rooted in the cognitive heuristics literature¹⁷, proposes that individuals use less relevant but salient and available information (for example, today's temperature) in place of more diagnostic but less accessible information (for example, global climate change patterns) in belief generation. Although this process, known as attribute substitution¹⁸, may seem highly irrational if done consciously and explicitly, other psychological process implementations give it greater plausibility. In particular, we suggest that unusually warm or cold weather conditions may increase the availability of other unusual warm or cold temperature events in memory, changing estimates of the frequency of such events, and thereby affecting respondents' global warming attitudes. To preview our results, we find evidence for only the last of these three mechanisms.

Main results

Study 1 explored whether the local warming effect is caused by the use of the term global warming in question wording. Global warming may prime associations of heat-related impacts and rising temperatures¹⁹, whereas the term climate change is more readily associated with a wider range of weather events²⁰. To examine if the influence of perceived temperature depends on the phrasing of the survey question, we asked respondents ($N = 686$) about their belief in and concern for global warming or climate change using a web-based study (see Supplementary Table 2 for demographic details for all studies). Participants also reported whether the local temperature on the day they completed the survey was colder or warmer than usual for that time of year.

Results from study 1 show that the overall effect of perceived temperature deviation on belief in and concern for global climate

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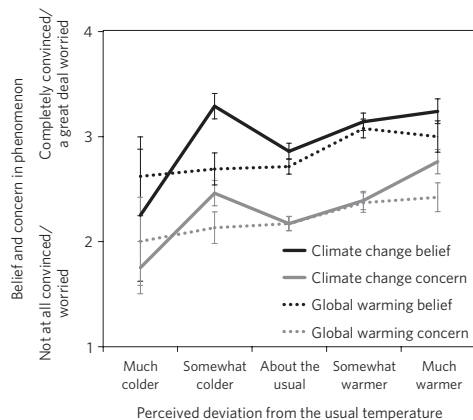


Figure 1 | Climate change labelling and local warming. Level of belief in and concern about climate change and global warming as a function of perceived temperature deviation in study 1. Bars denote ± 1 s.e.m.

change persisted whether the phenomenon was described as climate change or global warming. A multiple regression testing the effect of perceived temperature, framing condition (warming versus change) and their interaction on belief and concern revealed a main effect of perceived temperature on concern, $\beta = 0.16$, $t(683) = 3.03$, $p < 0.01$ and a marginally significant effect on belief, $\beta = 0.10$, $t(683) = 1.73$, $p = 0.08$. However, the interactions were not significant (concern, $p = 0.64$ and belief, $p = 0.47$), suggesting that there was no effect of phrasing (Fig. 1). We conducted a number of additional regressions that directly control for actual temperature, actual deviation from the historical average, gender, education, age, income, political affiliation, environmental attitude and subjective knowledge of the phenomenon (see Supplementary Tables 3-A and 3-B). The effect of perceived temperature remained significant in the presence of these controls for both frames. Furthermore, to control for reverse causality and omitted variable biases, we employed instrumental variable regression, an econometric tool used to help establish causality in observational data. Using actual temperature deviation as an instrument for perceived deviation, we causally link perceived temperature abnormalities with changes in global warming attitude (see Supplementary Information). Although attribute labels can produce pronounced differences in judgements and choices^{13,21}, termed attribute framing effects in decision research^{15,16}, the idea that the local warming effect is simply caused by being primed with the term global warming was not supported by our results.

Study 2 tested the possibility that participants have limited understanding of climate science and incorrectly believe that today's local temperature is relevant information to use in global warming judgements. Local short-term and broad long-term temperature trends are related, but it is only when temperatures are averaged over space and time that climate change patterns emerge²². If the local warming effect is due to a lay understanding that local temperature is a useful metric for predicting long-term temperature trends, then information about the scientific distinction between local temperature and global climate change should reduce or eliminate the local warming effect. We randomly assigned participants ($N = 330$) to either an information or no-information (control) condition. Those in the information condition read a passage highlighting the differences between minor weather fluctuations and global climate change whereas those in the no-information condition read a passage on the science of sleep (see Supplementary Methods for study 2 passages).

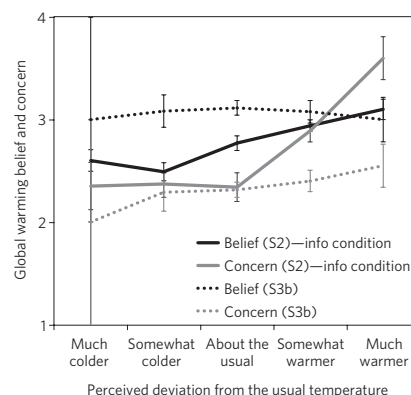


Figure 2 | Information, recency and local warming. Level of belief in and concern about global warming as a function of perceived temperature deviation, given the information condition in study 2 (S2). Level of belief in and concern about global warming as a function of yesterday's perceived temperature deviation in study 3b (S3b). Bars denote ± 1 s.e.m.

This was followed by a series of questions to assess text comprehension. All participants then completed an unrelated filler task and answered the same temperature, belief and concern questions used in study 1.

Results from study 2 show that increased knowledge does not eliminate the local warming effect. A moderation analysis using hierarchical multiple regression revealed a main effect of perceived temperature deviation on belief ($\beta = 0.16$, $p = 0.02$), but there was no main effect of information ($\beta = 0.08$, $p = 0.76$). Notably, the information \times perceived temperature interaction term was also non-significant ($\beta = 0.04$, $p = 0.67$). Similarly, for concern, we find a main effect of perceived temperature deviation ($\beta = 0.14$, $p = 0.04$), but neither a main nor an interaction effect for the information condition. Participants in the information condition were more likely to believe in and be concerned about global warming if they perceived today to be warmer than usual (belief, $\beta = 0.14$, $t(132) = 3.27$, $p < 0.01$ and concern, $\beta = 0.15$, $t(132) = 0.16$, $p = 0.03$), suggesting that the effect of perceived temperature on climate change perceptions cannot be attributed to a knowledge deficit or incorrect lay theory (Fig. 2).

Having eliminated the first two possible mechanisms, we turn to examining the details of attribute substitution. Specifically, we hypothesized that the availability of today's temperature deviation may make today's temperature observation disproportionately salient, changing estimates of the frequency of similar events^{9,23}, and affecting respondents' global climate change judgements. This interpretation has several testable implications, which we examine in the following studies. Ultimately, we provide a process-level explanation for how attribute substitution leads to biased judgements about global warming.

Studies 3a and 3b examined the role of accessibility of temperature abnormalities. In study 3a, we manipulated accessibility using a priming methodology. A body of research in psychology suggests that behaviours and social inferences can be subtly influenced through the use of temperature primes^{6,24,25}. We hypothesized that when the concept of heat or cold is activated in one's mind (primed), that concept is more likely to be used for subsequent evaluation of global warming. Participants ($N = 300$) first answered the standard temperature perception question and completed one version (heat-prime, cold-prime or control) of a scrambled-sentences priming task²⁶ (see Supplementary Methods for study 3a scrambled-sentences text). After completing the

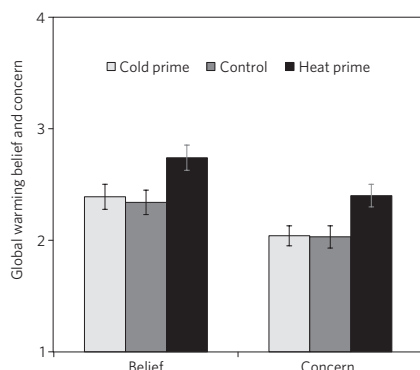


Figure 3 | Temperature priming and local warming. Effect of cold and heat temperature primes on global warming belief and concern (study 3a). Bars denote ± 1 s.e.m.

scrambled-sentences task, all participants reported their belief in and concern about global warming.

Supporting the role of immediate temperature perception in generating the local warming effect, we find that priming individuals with heat-related cognitions increases levels of belief and concern in global warming. The priming manipulation had a direct effect on average ratings of reported belief in and concern about global warming, as shown in Fig. 3. There was a significant main effect of condition on global warming belief, $F(2, 288) = 3.88$, $p = 0.02$ and concern, $F(2, 288) = 4.74$, $p = 0.01$. *Post hoc* comparisons showed that those in the heat condition exhibited greater concern for global warming than those in the control condition ($p = 0.02$) and cold condition ($p = 0.03$). Similarly, those in the heat condition showed greater belief in global warming than those in the control condition ($p = 0.03$) and cold condition ($p = 0.07$).

Study 3b examined the need for recency of temperature abnormalities by exploring whether prompting people to think about yesterday's perceived temperature deviation also affects their belief in or concern about global warming. We predicted that people rely on the most immediately available temperature (today's deviation) and that past temperature events, such as the previous day's temperature, will have less influence on global warming belief and concern. Participants ($N = 251$) were asked, "was yesterday's temperature in your local city or town colder or warmer than usual for this time of year?" Respondents then reported their belief in and concern about global warming. We used participants' ZIP code information to calculate actual objective temperature deviations for the day that subjects participated in the study (today), as well as the day before subjects participated (yesterday).

Asking respondents about yesterday's temperature eliminated the relationship between perceived temperature deviation and global warming judgements. This suggests that the immediacy of experience with temperature affects judgements of global climate change. Linear regressions revealed that perceived deviation of yesterday's temperature had no effect on belief, $\beta = -0.02$, $t(250) = -0.38$, $p = 0.70$ or concern, $\beta = 0.08$, $t(250) = 1.30$, $p = 0.20$ (Fig. 2). When controlling for political affiliation and other demographic variables, the results remain non-significant for belief, $\beta = -0.06$, $t(208) = -0.79$, $p = 0.43$ and concern, $\beta = 0.03$, $t(208) = 0.43$, $p = 0.67$ (see Supplementary Tables 4-A and 4-B). To confirm that subjects were attending to yesterday's temperature deviation and not today's temperature, we compared yesterday's perceived temperature ratings with actual objective temperature deviations from the historical average for both

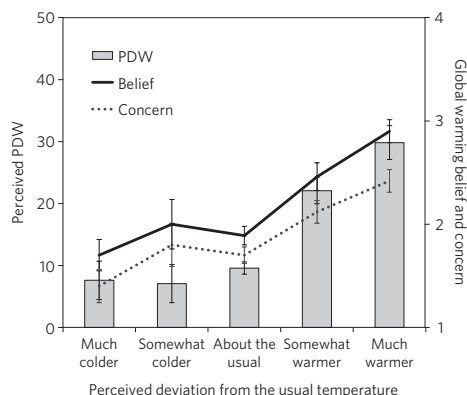


Figure 4 | Perceived PDW and local warming. Perceived PDW and belief in and concern about global warming as a function of perceived deviation from the usual temperature (study 4). Bars denote ± 1 s.e.m.

yesterday and today. Results show that yesterday's perceived temperature deviation correlated positively with yesterday's actual deviation from the historical average ($r_s = 0.26$, $p < 0.01$). However, yesterday's perceived temperature deviation did not correlate with today's actual temperature deviation ($r_s = 0.08$, $p = 0.23$); suggesting that participants were indeed attending to yesterday's temperature and not today's. Additional regressions controlled for actual temperature and demographic factors, including political affiliation (see Supplementary Tables 4-A and 4-B), and found that the effect of perceived deviation on belief and concern remained non-significant. These findings suggest that it is the immediacy of experience with temperature that affects judgements of global climate change. Although one difference between yesterday and today relates to recency of experience, another important distinction is that the former is a memory and the latter is currently experienced as sensory input. Thus, our results are also consistent with the hypothesis that beliefs are influenced by the use of the most salient sensory information available (for example, perceived deviation of today's temperature).

In study 4, we further investigated our proposed mechanism for attribute substitution, namely construct-consistent recall from memory. We hypothesized that thinking about today's unusually warm weather will increase the availability of other unusually warm temperature events from memory, leading respondents to overestimate the frequency of such events. To test this hypothesis, we examined whether days that are perceived as being warmer than usual lead one to overestimate the frequency of unusually warm days throughout the year and whether this overestimation mediates the local warming effect. Participants ($N = 270$) answered the temperature, belief and concern questions, as in the preceding studies. They then answered the question, "over the past year, what percentage of days seemed to be warmer than usual for that time of year, compared with the historical average?" We refer to this variable as percentage days warmer (PDW).

Results reveal that people who thought today was warmer than usual reported more days in the year as being warmer than usual compared with people who thought today was colder than usual (Fig. 4). PDW was positively correlated with perceived temperature deviation, $r = 0.41$, $p < 0.01$, today's actual temperature, $r = 0.15$, $p < 0.05$ and global warming belief and concern, $r = 0.35$, $p < 0.01$; $r = 0.33$, $p < 0.01$, respectively. A regression controlling for today's actual temperature and today's objective temperature deviation reveals perceived temperature deviation influenced PDW, $\beta = 0.39$, $t(269) = 7.4$, $p < 0.01$. This suggests that attention to and perception

of today's temperature, and not actual temperature deviation, affects recall of past temperature events. Path analysis conducted to test our mediation hypotheses indicates that perceived PDW partially mediates the effect of perceived temperature deviation on belief in and concern about global warming. A Sobel Z test showed a similar effect on belief in (perceived deviation, direct: $t(270) = 4.92$, perceived deviation, mediated: $t(268) = 2.74$, bootstrapped Sobel's $Z = 3.91$, $p < 0.01$) and concern about global warming (perceived deviation, direct: $t(270) = 3.84$, perceived deviation, mediated: $t(268) = 1.62$, bootstrapped Sobel's $Z = 4.02$, $p < 0.01$). Results from study 4 suggest that those who perceive today to be warmer than usual are more likely to overestimate the frequency of unusually warm days throughout the year, which then mediates global warming judgements.

Conclusions

A growing body of research shows that transient temperature variation influences the public's opinion of global climate change. We extend this research by examining several hypotheses regarding why this happens and exploring the mechanisms underlying the local warming effect. Our results suggest that an attempt to de-bias this robust effect will not be easy, as changes to survey terminology and enhanced scientific knowledge do not eliminate the effect of perceived temperature abnormalities. Further research is needed to determine how people's belief in global climate change can be encouraged to develop over time from constructed, experienced-based reactions to more stable conclusions. Furthermore, although we find that attribute substitution is an important cause of the effect, rule out two alternative explanations and show that temperature priming can influence global warming attitudes, there may well be other sources of biases and heuristics that lead to the very stable local warming effect.

The local warming effect is an important real-world demonstration of how opinion on important issues can be constructed in response to a direct enquiry, rather than retrieved from memory. For climate change, a complex issue with contradictory coverage, individuals can draw weak conclusions and seem to reconsider their opinion each time they are asked a question. This characterization of climate change opinion and the apparent difficulties individuals experience when dealing with uncertain climate-related decisions have strong implications for public policy. For instance, these findings raise important questions regarding the potential role of the local warming bias in polling results. Our results suggest that recency and salience of warming constructs are promising ways of promoting heightened concern about climate change, at least among those whose beliefs or disbeliefs are not well established²⁷. However, the opposite can also occur: the so-called snowpocalypse of 2010 in Washington DC resulted in increased media coverage of climate sceptics denying the existence of climate change. As climate change continues to cause an increase in the intensity of extreme weather fluctuations²⁸, the local warming effect may lead to even greater confusion among the general public. Weather variability will need to become better associated with heightened belief in climate change, though this new association will need to be accomplished through education and analogies, and not personal experience. If the United States is to take a stronger stance against climate change, forecasters may be well advised to make increasing warming abnormalities more cognitively available to the general public.

Methods

In studies 1, 3a and 3b, US participants were recruited from the website Amazon Mechanical Turk, where participants can take short surveys online in exchange for small payments²⁹. In studies 2 and 4, US participants were recruited through Columbia University's Center for Decision Sciences national panel, which consists of more than 56,500 people who have agreed to participate in psychological and decision research for financial compensation. These panels represent a wide range of socioeconomic factors not seen in university lab settings (see

Supplementary Table 2 for demographic details for all studies). Notably, the effect of temperature on global warming judgements has also been corroborated in nationally representative panels^{5,7}.

In study 1, participants were randomly assigned to the global warming versus climate change conditions and answered three standard questions, based on previous methodology¹². Respondents reported how convinced they were "that global warming (climate change) is happening" and how much they "personally worried about global warming (climate change)". Response options ranged from 1 (not at all convinced/worried) to 4 (completely convinced/a great deal worried). These questions and response scales were adapted from previous public opinion studies about global warming³⁰. Belief and concern correlated significantly in this and all subsequent studies ($r = 0.59$, $p < 0.01$). Participants also reported whether the local temperature on the day they completed the survey was colder or warmer than usual for that time of year, using a five-point scale that ranged from -2 (much colder) to 2 (much warmer). The belief question came before the concern question, in this and all subsequent studies; however, the presentation order of the belief/concern and temperature questions was counterbalanced. As well as these questions in this and all other studies, respondents provided information about political affiliation and extensive demographic information. We also collected actual temperature and historical temperature deviation data (degrees Fahrenheit) for the day that participants completed the studies, using their ZIP code information (see Supplementary Methods for actual temperature data collection methods).

In study 2, participants were first asked to read one of two passages (regarding the differences between minor weather fluctuations and global climate change or the science of sleep phases), which constituted our manipulation of knowledge. Participants were told that the purpose of the research was to determine the best way to present scientific information to the general public. Both passages were similar in length and educational in tone. To check our manipulation of knowledge, we examined whether participants in the information condition correctly answered an open-ended question about the difference between daily temperature and climate. Two coders independently categorized level of understanding (Cohen's Kappa measurement for agreement was 0.83, $p < 0.01$) and found that 82% of participants responded accurately. Only these participants were included in analyses. Participants were also asked to state what they thought the specific purpose of the study was. None of the participants correctly guessed the true purpose of the research.

In study 3a, participants were randomly assigned to one of the three experimental conditions. Mean perceived temperature ratings did not differ by condition ($F(2, 288) = 0.07$, $p = 0.93$), supporting random assignment of participants to conditions. After answering the standard temperature perception question, participants completed ten minutes of unrelated filler material. The scrambled-sentences priming task consisted of 13 sets of 5 scrambled words containing heat-related, cold-related, or neutral words^{25,31}. For each set of available words, participants chose four words to make a grammatically correct sentence (see Supplementary Methods for scrambled-sentences text). Participants were told that the task was designed to clear their minds before other measures were taken. Twelve subjects did not complete the sentence task and were removed from further analysis.

In study 3b, unlike previous studies, all participants were first asked about yesterday's temperature rather than the present day's temperature. Participants responded using a five-point scale that ranged from 1 (much colder) to 5 (much warmer). As well as calculating the present day's objective temperature deviations, we used participants' ZIP code information to calculate objective temperature deviations for the day before subjects participated (yesterday). Study 3b did not include a control condition in which participants were asked about today's temperature and this prevents us from completely ruling out the possibility that we would not have found the local warming effect in this particular sample. This is unlikely, however, given the robust nature of the effect in previous studies drawn from the same subject pool.

In study 4, in addition to answering the temperature, belief and concern questions as in the preceding studies, participants were asked, "over the past year, what percentage of days seemed to be warmer than usual for that time of year, compared with the historical average?" Participants indicated their answer by clicking their mouse anywhere on a 100-point slide scale anchored by 0, 50 and 100%.

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Author contributions

L.Z. and E.A.K. designed studies 1 and 3b. L.Z., E.A.K. and E.U.W. designed studies 2, 3a and 4. L.Z. and E.A.K. analysed the data. All authors contributed to writing the manuscript. E.U.W. and E.J.J. supervised the project.

Additional information

Supplementary information is available in the [online version of the paper](#). Reprints and permissions information is available online at www.nature.com/reprints. Correspondence and requests for materials should be addressed to L.Z.

Competing financial interests

The authors declare no competing financial interests.

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Supplementary Information

Supplementary Tables

Supplementary Table 1. Temperature and public perception of global climate change in the literature.

Authors	Year	Journal	Effect
Ungar, S. ¹	1992	Sociological Quarterly	Public anxiety over global warming peaks during hot, dry summers.
Krosnick, J., Holbrook, A., Lowe, L., & Visser, P. ²	2006	Climatic Change	Self-stated personal experience of recent increases in local temperatures exerts positive effects on the on the perceptions of global warming.
Semenza, J., Hall, D., Wilson, D., Bontempo, B., Sailor, D., & George, L. ³	2008	American Journal of Preventive Medicine	Concern about climate change is positively related to perceptions of how hot the temperature was on the previous day (mild, hot, or extremely hot).
Brody, S.D., Zahran, S., Vedlitz, A., & Grover, H. ⁴	2008	Environment and Behavior	Long term temperature trends do not predict individual risk perceptions of climate change.
Hamilton, L., & Klein, B. ⁵	2009	International Journal of Climatology	Regional winter warming trends are associated with an increased likelihood of perceiving major local effects of climate change.
Joireman, J., Barnes Truelove, H., & Duell, B. ⁶	2010	Journal of Environmental Psychology	Belief in global warming is positively correlated with actual outdoor temperature, but only on the low end of the temperature range.

Li, Y., Johnson, E. J., & Zaval, L. ⁷	2011	Psychological Science	Belief in and concern about global warming depends on whether today seems warmer or colder than the historical average, a bias termed ‘the local warming effect’.
Risen, J.L., & Critcher, C.R. ⁸	2011	Attitudes and Social Cognition	Outdoor and indoor ambient temperature predicts belief in the validity of global warming, and this effect is not qualified by political ideology.
Egan, P. J., & Mullin, M. ⁹	2012	Journal of Politics	Americans more likely to agree there is “solid evidence” that the earth is getting warmer when local temperature rises above normal.
Howe, P. D., Markowitz, E. M., Lee, T. M., Ko, C., & Leiserowitz, A. ¹⁰	2012	Nature Climate Change	Perceptions of local temperature trends are most influenced by abnormal average temperatures in the most recent three months and perceptions of a long-term local warming trend are most associated with warmer recent average temperatures than with long-term local temperature trends.
Hamilton, L.C., & Stampone, M.D. ¹¹	2013	Weather, Climate, and Society	In a statewide sample, among Independents, but not Democrats or Republicans, belief that humans are changing the climate is predicted by temperature abnormalities on the day of the interview and previous day.
Deryugina, T. ¹²	2013	Climatic Change	Among conservatives, longer-run temperature fluctuations (1 month – 1 year) are significant predictors of belief that the effects of global warming had begun to happen.

Supplementary Table 2. Demographic characteristics of the study samples.

Variable	Study 1 (<i>N</i> = 686)	Study 2 (<i>N</i> = 330)	Study 3a (<i>N</i> = 300)	Study 3b (<i>N</i> = 251)	Study 4 (<i>N</i> = 270)
Sex, %					
Males	43	37	49	51	52
Females	57	63	51	49	48
Age, <i>M</i> (SD)	34 (12.7)	38 (13.1)	31 (14.46)	28 (13.5)	33 (14.9)
Education, %	45.1	51.4	40.6	38.2	43.9
Race/ethnicity, %					
African American	7	5	5	3	7
White	74	78	73	79	75
Polit. Affiliation, %					
Democrat	35	40	48	53	35
Republican	20	23	27	16	23
Independent/Other	45	37	25	28	40
U.S. Region, %					
Northeast	22.4	27.5	25.8	25.3	31.0
South	35.6	28.3	30.3	28.1	28.7
Central	19.8	20.8	19.0	21.0	19.1
West	22.1	22.6	24.1	24.5	19.8
Objective Temp Deviation, % (yesterday)	51.1	50.8	53.3	60.2 (63.1)	60.5

Due to some participants choosing not to answer, the race/ethnicity, political affiliation columns do not total to 100.

*Educational Attainment = *at least some college*.

*Actual Temperature Deviation = *Day of survey* > 1° (F) warmer than the historical average temperature for each ZIP code.

Supplementary Table 3-A. Linear regressions for *belief* for GW/CC in Study 1. Note: Standardized regression coefficients in parentheses. Sample size is smaller for some regressions due to incomplete responses. * < .10, ** < .05, *** < .01.

Model	1	2	3
Perceived deviation	0.120*** (0.123)	0.107** (0.114)	0.112*** (0.116)
CC Frame		0.270 (0.150)	0.144 ** (0.079)
Frame x perceived deviation		0.025 (0.026)	
Actual temperature		0.005 (0.006)	0.002 (0.023)
Actual deviation		-0.002	0.015 (0.091)
Female		0.022 (0.012)	0.026 (0.014)
Education		0.032* (0.054)	0.042** (0.078)
Age			-0.001 (-0.011)
Income (thousands)			0.025 (0.042)
Democrat (relative to Other)		.565*** (0.301)	0.549*** (0.295)
Polit. x perceived deviation			-0.131 (-.120)
Environmental attitude			0.160*** (0.231)
Knowledge			0.020 (0.014)
Constant	2.532***	2.45***	1.83***
Observations	685	628	577
R ²	0.015	0.124	0.191

Supplementary Table 3-B. Linear regressions for *concern* for GW/CC in Study 1. Note: Standardized regression coefficients in parentheses. Sample size is smaller for some regressions due to incomplete responses. * < .10, ** < .05, *** < .01.

Model	1	2	3
Perceived deviation	0.137*** (0.147)	0.133** (0.142)	0.132*** (0.142)
CC Frame		0.027 (0.006)	0.063 (0.036)
Frame x perceived deviation		0.038 (0.041)	
Actual temperature		0.006 (0.070)	0.012 (0.089)
Actual deviation			0.020 (0.101)
Female		0.118* (0.070)	0.162** (0.091)
Education		0.008 (0.016)	0.032 (0.061)
Age			-0.001 (-0.013)
Income (thousands)			-0.037 (-0.063)
Democrat (relative to Other)		0.437*** (0.241)	0.383*** (0.210)
Polit. x perceived deviation			-0.688 (-0.073)
Environmental attitude			0.199*** (0.293)
Knowledge			0.132* (0.093)
Constant	1.84***	1.65***	0.845***
Observations	685	628	577
R ²	0.021	0.092	0.193

Supplementary Table 4-A. Linear regressions of *yesterday's* temperature on *belief* in global warming in Study 3b. Note: Standardized regression coefficients in parentheses. Sample size is smaller for some regressions due to incomplete responses. * < .10, ** < .05, *** < .01.

Model	1	2
Perceived deviation	-0.026 (-0.024)	-0.059 (-0.055)
Actual temperature (today)		0.088 (0.886)
Actual deviation (today)		-0.092 (-0.553)
Actual temperature (yesterday)		-0.101 (-0.780)
Actual deviation (yesterday)		0.087 (0.492)
Female		0.186 (0.109)
Education		-0.025 (-0.034)
Age		-0.004 (-0.048)
Democrat (relative to Other)		0.511*** (0.298)
Income (thousands)		-0.009 (-0.022)
Constant	3.179***	4.071***
Observations	250	208
R ²	0.001	0.131

Supplementary Table 4-B. Linear regressions of *yesterday's* temperature on *concern* in global warming in Study 3b. Note: Standardized regression coefficients in parentheses. Sample size is smaller for some regressions due to incomplete responses. * < .10, ** < .05, *** < .01.

Model	1	2
Perceived deviation	0.091 (0.082)	0.034 (0.031)
Actual temperature (today)		0.042 (0.415)
Actual deviation (today)		-0.057 (-0.334)
Actual temperature (yesterday)		-0.045 (-0.339)
Actual deviation (yesterday)		0.045 (0.248)
Female		0.067 (0.38)
Education		-0.096* (-0.123)
Age		-0.006 (-0.065)
Democrat (relative to Other)		0.436*** (0.246)
Income (thousands)		0.003 (0.008)
Constant	2.049***	2.716***
Observations	250	208
R ²	0.007	0.098

Supplementary Methods

Study 2 Passages

Instructions. We are conducting a survey to determine the best way to present scientific information to the general public. Our goal is to explain terms simply and clearly so people can fully understand them. On the next page, we will ask you to carefully read several paragraphs, which describe some scientific terms. You will then be asked questions about what you have read.

Information Condition: What is the difference between weather and climate? In most places, weather can change from minute-to-minute, day-to-day, and season-to-season. Climate, however, is the average of weather over time and space. An easy way to remember the difference is that climate is what you expect, like a hot summer, and weather is what you get, like a hot day with thunderstorms. We talk about climate change in terms of years, decades or even centuries. Weather is the combination of temperature, humidity, cloudiness, and wind in one day while climate is the weather of a location averaged over some period (usually 30 years).

(http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html)

No-Information Condition: What is REM sleep? REM stands for rapid eye movement sleep, and is one stage of sleep that most people go through each night. When we switch into REM sleep, our breathing becomes more rapid, and our heart rate increases. Also during REM sleep, our eyes move quickly in various directions, which is what gave this stage its name. Interestingly, it is during REM sleep that a person will dream. The first REM sleep period usually occurs about 70 to 90 minutes after we first fall asleep.

(<http://www.howstuffworks.com/environmental/life/inside-the-mind/human-brain/sleep1.htm>)

Study 3a Scrambled-sentences Text

Heat Prime	Cold Prime	Neutral Prime
boils eggs she the of	freezes leftovers she the of	ball the sudden toss once
fleas ago cat had the	fleas ago cat had the	fleas ago cat had the
his was sunburn painful although	his was frostbite painful although	was letter she a wrote
walk for go path a	walk for go path a	walk for go path a
had hot felt water the	had cold felt water the	dinner were dog ate the
new was gave movie the	new was gave movie the	new was gave movie the
saw over train he the	saw over train he the	saw over train he the
should the burning was tree	lake the frozen was should	played there band music the
ball the sudden toss once	ball the sudden toss once	ball the sudden toss once
The sweats man old of	the shivers man old of	heard should the he phone
curtain green how was the	curtain green how was the	curtain green how was the
glove gone she a found	glove gone she a found	glove gone she a found
potatoes she the roasted it	meat she the defrosted it	a should wrote a he letter

Actual Temperature Data Collection Methods

Temperature data were accessed using the ASOS (Automated Surface Observing Systems) system, which includes approximately 2,000 weather stations located at airports across the country. The ASOS program is a joint effort of the National Weather Service, the Federal Aviation Administration, and the Department of Defense. The ASOS weather stations are the United State's primary surface weather observing network used by NOAA

(National Oceanic and Atmospheric Administration).

(<http://www.nws.noaa.gov/ost/asostech.html>).

Participants' ZIP codes were used to specify the location for each query in order to generate actual and historical temperatures for the day that participants participated in our study. The Weather API returned the temperature data from the National Weather Service ASOS weather station nearest to each zip code. Temperature data were accessed through the Weather API maintained by Weather Underground, Inc.

(<http://www.wunderground.com/weather/api>). We used the Weather API to access the daily high and low temperatures for the date and location each participant took the survey (midpoints were calculated directly from these values). Average temperatures were calculated by taking the midpoint of the high and low temperatures, and objective deviations were calculated by taking the difference between that day's average and the historical average. To generate the historical averages, we queried the daily high and low temperatures for the same calendar day on each of the 15 years prior to the date the survey was taken. Ninety-five percent of the cases have two or less years of historical data missing. The mean number of years of historical data missing is .53. For cases where years of historical data missing totaled seven or more (1.5% of cases), we deemed the historical averages unusable and treated them as missing data.

U.S. temperatures during Study 1 averaged 75.8 degrees Fahrenheit ($sd = 10.9$) with a mean deviation of 1.1 degrees ($sd = 5.2$). During Study 2, temperatures averaged 51.2 degrees ($sd = 9.1$) with a mean deviation of -1.0 degrees ($sd = 4.9$). U.S. temperatures during Study 3a averaged 65.6 degrees ($sd = 14.4$) with a mean deviation of 2.58 degrees ($sd = 5.2$), whereas Study 3b averaged 66.9 degrees Fahrenheit ($sd = 8.82$),

with a mean deviation of 3.81 degrees ($sd = 4.7$). Finally, in Study 4, which was conducted over the summer, temperatures averaged 78.5 ($sd = 11.6$) degrees with a mean deviation of 4.11 degrees ($sd = 5.1$)

Supplementary Analyses

Instrumental Variable Regression

To control for reverse causation and omitted variable biases, we employ instrumental variable regressions, a technique widely used in economics to help establish causality in observational data when randomized experiments are not possible^{13, 14}. This was the analysis employed by Li, Johnson and Zaval (2011) to causally link perceived abnormalities in current temperature with changes in belief in global warming. The idea is to model the purported causal variable (global warming attitude) using a third variable that is related to but not possibly caused by it. In our case, we can use objective temperature measures as instrumental variables for the perceived deviation from usual temperature and perform two-stage least squares regressions. We reason that although actual temperature deviations can affect perceived deviations, the reverse case—that peoples' beliefs influence actual temperature—cannot be true.

Using data from the GW Frame in Study 1, and using actual temperature deviation from the historical average as an instrumental variable for perceived temperature deviation, we establish that perceived deviation has a direct causal link to global warming attitudes, and this analysis weakens the possibility of any 3rd omitted variable producing the result.

We used actual temperature deviation from the historical average (T) as an instrumental variable for perceived temperature deviation. Estimates for instrumental variables were calculated using two-stage least squares regression. The first-stage regression used actual temperature deviation to generate predicted values of perceived deviation ($\hat{Y}P$). These predicted values of perceived deviations, which were free of any effects of global warming attitude, were then used to estimate effects on global warming attitudes (A). In other words, P was regressed on T, which generated $\hat{Y}P$; we then ran regressions estimating A as a function of $\hat{Y}P$. We find that actual deviation was correlated with perceived deviation ($r = .24, p < .01$), as well as concern about global warming ($r = .14, p < .01$). The variance estimator used the original endogenous regressor to construct residuals and not the first-stage fitted values. The F statistic from the first-stage regression was 21.17 and was therefore strong enough to yield results that are substantially less biased than OLS. The second stage regression confirmed our central result: The predicted values of perceived deviation obtained from the first-stage regression had significant effects on concern for global warming ($\beta = .57, t(343) = 2.60, p = .02$). Because the predictor was a function of only objective temperature deviation, this analysis should eliminate the concern about reverse causality and omitted variable biases¹⁴. We also conducted an analysis in which we interact $\hat{Y}P$ with framing condition (Warming vs. Change) to test this regression coefficient for statistical significance. As expected, there was no significant interaction between the predicted values of perceived deviation and framing condition. This result remained the same in the presence of demographic controls.

We ran similar analyses for Studies 2, 3b and 4.¹ For Study 3b, yesterday's deviation from the historical average was used as an instrument for yesterday's perceived temperature. The F statistic from the first-stage regression was 13.91. As expected, the predicted values of yesterday's perceived deviation obtained from the first-stage regression did not have significant effects on either belief or concern in global warming ($p = .51, .45$). In Study 4, the F statistic from the first-stage regression was 121.6. The predicted values of perceived deviation obtained from the first-stage regression had significant effects on belief in global warming ($\beta = .21, t(321) = 2.52, p = .01$). We also used predicted values of perceived deviations to estimate effects on PDW (percentage days warmer) as the dependent variable. Consistent with our hypothesis, the predicted values of today's perceived deviation obtained from the first-stage regression also had highly significant effects on PDW ($\beta = .36, t(271) = 3.96, p < .01$).

¹ We recognize that a reliable implementation of an IV must utilize a sufficient sample size to allow for reasonable estimation of the treatment effect. This assumption may not be satisfied in Study 2 (in the knowledge condition): The effect of the predicted values of perceived deviation obtained from the first-stage regression on belief in global warming did not reach significance, though the direction was similar ($t = 1.2, p = ns$). Though we expect direction in all of these studies, it is unlikely that reverse causality operates in some studies but not others, given that these are replicating the same paradigm.

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