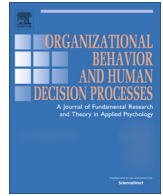




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## Thinking about time as money decreases environmental behavior



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## ABSTRACT

Surprisingly, Americans are no more likely to engage in environmental behavior today than 20 years ago. A novel explanation for this pattern may lie in the increased tendency to see time as money. Using large-scale survey data, we show that people are less likely to engage in environmental behavior if they are paid by the hour, a form of compensation that leads people to see their time as money. Using experimental methodology, we show that making the economic value of time salient reduces environmental intentions and behavior. This occurs in part because thinking about the economic value of time creates awareness of the opportunity costs associated with environmental behavior. We mitigate these effects by reframing environmental behavior as an act consistent with self-interest. Together, this research suggests that viewing time as money shapes environmental decisions, potentially shedding light on patterns of environmental behavior across time and around the world.

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## Introduction

Despite high profile environmental campaigns, Americans are no more likely to engage in environmental behavior today than they were 20 years ago (Morales, 2010). One surprising explanation for the stagnation of environmental behavior may lie in the increased value that individuals place on their time. Although the number of hours people work has remained relatively constant over the last five decades (Aguilar & Hurst, 2009), Americans report feeling that their time is more valuable than ever before (Carroll, 2008). Research suggests that being paid by the hour leads people to see their time as financially valuable (DeVoe & Pfeffer, 2007a, 2007b), and the proportion of the workforce paid by the hour increased significantly in the 1980s and 1990s (Hamermesh, 2002; CPS Survey), maintaining these gains through 2012 (Bureau of Labor Statistics, 2013). A growing body of research demonstrates that reminding people how much money their time is worth can have far-reaching effects on the decisions they make about their time (DeVoe & Pfeffer, 2010), pointing to a novel explanation for the limited impact of environmental campaigns on everyday behavior.

Research suggests that hourly-wage workers are chronically oriented to think of their time as money, leading them to devalue uncompensated activities and spend less time volunteering (DeVoe & Pfeffer, 2007a, 2007b). Consistent with the notion that thinking about time as money can have far-reaching effects on thoughts

and behavior, simply asking people to calculate their hourly wage in the lab decreases willingness to volunteer without compensation (DeVoe & Pfeffer, 2007a, 2007b, 2010). Of course, volunteering often carries a significant time cost, which might seem particularly unappealing when time is seen as money. Going beyond past research, we propose that environmental behaviors—even those that require mere moments such as recycling—might also be affected by thinking about the monetary value of one's time.

Why would putting an economic value on time undermine environmental behavior? Prior work has demonstrated that reminding individuals how much their time is worth makes money-related concepts more relevant to the self and leads individuals to focus on their own needs and goals as opposed to the needs and goals of others (Pfeffer & DeVoe, 2009; Vohs, Mead, & Goode, 2006, 2008). Researchers have argued that this ability to focus on others is a necessary condition for both prosocial and pro-environmental behavior (Allen & Ferrand, 1999; Geller, 1995; Schwartz, 1977). We propose that thinking about time as money, which leads individuals to focus on personal pursuits, will decrease engagement in environmental behaviors.

Specifically, research on the structure of values suggests that values are organized in a circumplex fashion, whereby certain values and goals are psychologically consistent with one another, and other values and goals stand in conflict with one another. Relevant to our research, Shalom Schwartz's classic work on human values demonstrates that "community" values, which entail trying to help others outside of one's own in-group, stand in stark opposition to values related to "power" and "achievement" (Schwartz, 1977, 1992, 2009). For example, research has demonstrated that the value of financial success is 192 degrees in opposition to values

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related to community, with 180 degrees representing perfect opposition (Grouzet et al., 2005). In an experimental demonstration of this phenomenon, individuals primed with statements related to financial success were less likely to help others during an in lab task (Maio, Pakizeh, Cheung, & Rees, 2009). Together with work showing that reminders of money reduce engagement in prosocial behaviors (Vohs et al., 2006, 2008), these studies suggest that there is a motivational conflict between values related to money and values supportive of prosociality. This research suggests that thinking about time as money may result in the suppression of the self-transcendent component of an individual's motivational system that allows individuals to focus on the needs of others. Thus, we propose that thinking about time as money, which may lead individuals to desire compensation for their work, and to prioritize personal goals, will decrease engagement in everyday environmental behaviors.

To provide an initial test of this hypothesis, we analyzed data from a large-scale, nationally representative survey (Study 1). We then investigated the causal relationship between thinking about time as money and intentions to engage in environmental behavior (Study 2). In Study 3, we moved beyond self-report to examine whether seeing one's time as money would decrease the likelihood of recycling, a prototypical form of environmental behavior. In Study 4, we explored a mechanism for this effect—the spontaneous recognition of the opportunity costs associated with environmental behavior. Because reminders of money can lead individuals to prioritize their own needs and goals, we attempted to mitigate the negative effects of thinking about time as money by reframing environmental behavior as an act consistent with self-interest (Study 5).

Across these studies, we follow the reporting standards proposed by Simmons, Nelson, and Simonsohn (2011) to maximize transparency: we report the decision rule regarding each sample size, all data exclusions, the results with and without data exclusions, every condition that was run and every measure that was given. Due to the changing norms in our field, we pre-registered the hypotheses of Studies 4 and 5 and rewrote the consent form to enable us to post the data from these studies online ([osf.io/p7xme](https://osf.io/p7xme)); data from our earlier studies are available upon request from the first author.

## Study 1

### Method

#### Participants

In Study 1, we analyzed data from Wave 18 of the British Household Panel Survey (BHPS). The British Household Panel Survey was established in 1999 at the University of Essex. The purpose of the survey is to further understanding of social and economic change at the individual and household level in Britain. The BHPS is a nationally representative sample consisting of over 5000 British households, and approximately 10,000 individual interviews of adults 16 years of age and above.

We analyzed the most recent wave of the BHPS (Wave 18), as this was this first wave that included measures of both hourly-wage status and environmental behavior.

Because past research shows that individuals who are paid by the hour are more likely to see their time as money (DeVoe & Pfeffer, 2007a, 2007b, 2010), we predicted that hourly (vs. salaried) workers would report engaging in fewer environmental behaviors.

#### Measures

Respondents reported whether or not they were paid by the hour (4128 respondents were salaried and 2802 were paid hourly), as well as how often they typically engage in eight pro-environmental

behaviors, which we averaged to create an index of engagement in environmental behavior ( $\alpha = .67$ ; See Appendix A for BHPS survey items and variable names). Participants answered these questions on a 1–5 scale ranging from 1 = *Always* to 5 = *Never*; we reverse-scored the items such that positive coefficients would represent greater self-reported engagement in environmental behavior. Another valid response to these items was “I cannot do this,” and this response was re-coded to missing in our analyses.

#### Covariates

We used the same set of covariates as previous research on the effects of hourly vs. salaried payment (monthly income, number of hours worked, marital status, age, education, and number of children and other people in the home; DeVoe, Lee, & Pfeffer, 2009). We also controlled for gender given the robust finding that women are more likely to engage in environmental behavior (Zelezny, Chua, & Aldrich, 2000).

#### Results and discussion

First, we wanted to explore whether hourly-wage workers reported decreased self-reported engagement in environmental behavior. We obtained an average score for participants on self-reported frequency of engagement in environmental behavior. We used this average score to conduct a regression analysis between hourly-wage status (0 = Non-hourly, 1 = Hourly) and self-reported engagement in environmental behavior.

As predicted, hourly (vs. salaried) workers reported less frequent engagement in environmental behaviors,  $r(6930) = -.08$ ,  $p < .001$ ,  $CI_{95}[-.13, -.07]$ . This relationship held after controlling for our set of covariates,  $\beta = -.06$ ,  $p < .001$ ,  $CI_{95}[-.11, -.04]$  (Table A).

#### Summary of results

In Study 1, we found initial support for the hypothesis that thinking about time as money is associated with reduced engagement in everyday acts of environmental behavior. While these results are consistent with our hypothesis, the correlational nature of these data precludes causal claims. Building on this evidence, we conducted an experiment investigating whether making the economic value of time salient would decrease environmental intentions.

## Study 2

### Method

#### Participants

We chose a target sample size of approximately 200 participants based on prior research using an identical manipulation (Pfeffer & DeVoe, 2009). We succeeded in recruiting 193 undergraduates at the University of British Columbia (UBC) in exchange for course credit. Nine participants failed to complete our manipulation due to confusion (5 in the experimental condition and 4 in the control condition), leaving a total of 184 participants (77.6% female;  $M_{age} = 19.68$ ,  $SD = 2.39$ ). Our critical results are robust to the inclusion/exclusion of these participants,  $ps < .05$ .

#### Procedure

After providing informed consent, participants were randomly assigned to an hourly-wage or control condition. Next, participants reported their intentions to engage in environmental behaviors and rated the worthwhileness of these behaviors (in that order). Participants then completed additional measures tangential to

the present hypothesis (Appendix B), provided demographic information, and completed items assessing suspicion. No participant guessed the hypothesis of the study, thus the suspicion items are not discussed further.

#### *Hourly-wage manipulation*

In the hourly-wage condition, participants completed three questions about expected income during their first year after graduation. Participants reported how many hours they would work per week, how many weeks they would work per year, and their expected income the year following graduation. All participants then used this information to complete an identical calculation. In the experimental condition, participants were informed that they had just calculated their future hourly wage—a technique that has been used in past research to make the economic value of one's time salient (DeVoe & Pfeffer, 2007a, 2007b). In the control condition, participants were not informed that they had just calculated their future hourly wage. Thus, the key component of this manipulation is that participants across both conditions complete identical calculations of time and money, yet only participants in the hourly-wage condition are explicitly asked to think about their own time as money.

#### *Measures*

##### *Environmental intentions*

All participants rated the likelihood that they would engage in 14 environmentally beneficial behaviors their first year after graduation, such as reusing ziplock bags and paying bills electronically (adapted from the Ecologically Responsible Behavior Questionnaire; 1-Never to 7-Always;  $\alpha = .68$ ; Brown & Kasser, 2005; See Appendix C for scale items).

##### *Perceived worth*

Participants also reported the worthwhileness of engaging in each of these environmental behaviors their first year after graduation (1-Not at all Worthwhile to 7-Very Worthwhile;  $\alpha = .82$ ).

#### *Results and discussion*

As predicted, participants in the hourly-wage condition reported reduced intentions to engage in environmental behavior ( $M = 4.79$ ,  $SD = .79$ ) compared to participants in the control condition ( $M = 5.01$ ,  $SD = .72$ ),  $F(1,183) = 3.85$ ,  $p = .05$ ,  $\eta^2 = .02$ ,  $CI_{95}[-.44, -.00]$ . Participants in the hourly-wage condition reported that engaging in these behaviors was less worthwhile ( $M = 5.06$ ,  $SD = .86$ ) than participants in the control condition ( $M = 5.37$ ,  $SD = .89$ ),  $F(1,183) = 5.67$ ,  $p = .02$ ,  $\eta^2 = .03$ ,  $CI_{95}[-.56, -.05]$ .

#### *Summary of results*

Study 2 demonstrates that thinking about time as money decreases intentions to engage in environmental behavior and makes these behaviors seem less worthwhile. It is possible, however, that participants in the hourly-wage condition might have been disinclined toward environmental behaviors due to an enhanced concern with the financial costs of these behaviors (Liu & Aaker, 2008). Therefore, we asked a separate group of 70 students to rate each of the 14 environmental behaviors on a scale from  $-5$  (costs money) to  $+5$  (saves money). Only two of these behaviors (buying local and buying organic) were rated as significantly negative from a cost perspective and all of our critical effects remained significant when these items were eliminated from the scale.

Because intentions do not necessarily translate into action (Webb & Sheeran, 2006), we sought to replicate our central finding

using a behavioral outcome. In Study 3, we examined paper recycling because it is one of the most widely adopted forms of environmental behavior and is neutral with respect to costing or saving money.

### **Study 3**

#### *Participants*

We recruited sixty UBC students to participate in a study for course credit; we selected this sample size based on previous research using a similar manipulation to affect behavior in the lab (DeVoe & Pfeffer, 2010). One participant did not complete the manipulation due to experimenter error, five participants failed to complete the manipulation due to confusion, and two participants reported not hearing about the option to recycle, leaving a total of 52 participants (73.1% females;  $M = 20.18$ ,  $SD = 2.27$ ). Our critical results are robust to the inclusion of these participants,  $p < .04$ .

#### *Procedure*

Participants were assigned to an hourly-wage or control condition using identical procedures from Study 2. Participants were told that they would complete a series of tasks, one of which involved cutting out shapes from construction paper (adapted from Catlin & Wang, 2013). The experimenter mentioned that participants could discard the paper in a trash bin inside the room or a recycling bin just outside the room. Our measure of environmental behavior was whether participants chose to walk a few extra feet to recycle their scrap paper. Participants then completed questionnaires including identical ancillary measures from Study 2, demographics, and suspicion items. None of the participants guessed the true purpose of the experiment, therefore these suspicion items are not discussed further. Because this measure was intentionally subtle, we did not explicitly ask participants to rate the perceived worthwhileness of recycling. It is important to note that although the recycling bin was placed further away, it only took participants three seconds longer to recycle compared to throwing out the scrap paper.

#### *Results and discussion*

A chi-square revealed that fewer participants in the hourly-wage condition recycled their scrap paper upon completing the task compared to participants in the control condition (12% vs. 41%),  $\chi^2(1, N = 52) = 5.45$ ,  $p = .02$ . The odds ratio for the condition coefficient is 5.04 with a 95% confidence interval of [1.21, 21.06], indicating that participants were five times less likely to recycle if they had calculated their future hourly wage.

#### *Summary of results*

As predicted, participants in Study 3 were less likely to recycle scrap paper after calculating their future hourly-wage. We next wanted to extend our experimental research to a community sample of working adults, while investigating a psychological mechanism for this effect. Given that thinking about time as money leads people to feel that their time is increasingly valuable (DeVoe & Pfeffer, 2010), we hypothesized that hourly workers might be chronically aware of the time costs associated with environmental behaviors.

When thinking about how to spend money, people typically overlook opportunity costs; for example, people may choose a \$400 phone over a \$300 phone without spontaneously considering

what they could do with the \$100 they would save by buying the cheaper model (Frederick, Novemsky, Wang, Dhar, & Nowlis, 2009). Similarly, when thinking about how to spend time, individuals may fail to consider the other activities that they could do during the same period of time. However, there are individual differences in the extent to which individuals are chronically aware of opportunity costs: people who care about saving money readily consider the opportunity costs of purchasing decisions (Frederick et al., 2009; Rick, Cryder, & Loewenstein, 2008; Study 5). To the extent that hourly workers see the value of their time, they may recognize the time costs associated with environmental behavior. In contrast, salaried workers may not spontaneously recognize these time costs—unless they are provided with an explicit reminder. Thus, we expected that reminding individuals of the time costs associated with environmental behavior would have a greater impact on salaried (vs. hourly) workers, leading salaried workers to exhibit the same reluctance to engage in environmental behaviors that hourly workers exhibit by default. This prediction is consistent with research showing that manipulations designed to make the economic value of time salient exert the greatest influence on individuals who are not already paid by the hour (DeVoe & Pfeffer, 2007a, 2007b).

## Study 4

### Method

#### Participants

Based on the results from Studies 1–3, we assumed a small to medium effect size, and determined that we would need 141 participants for 95% power (GPower, 2013; Faul, Erdfelder, Lang, Buchner, 2007). Because we were only interested in studying individuals who were paid an hourly or salaried wage, we excluded unemployed, retired, or student respondents. To allow for exclusions on our *a priori* criteria, we recruited 188 adults from a public market in Vancouver, Canada who participated in our study for the chance to win \$100 in a lottery. In our sample, 70 respondents reported being paid by the hour and 61 respondents reported receiving a salaried wage, resulting in a total of 131 participants for our analyses (55% females;  $M = 33.57$ ,  $SD = 12.83$ ). Four participants failed to complete the dependent measure, thus the following results are based on 127 participants. On average, hourly-wage workers were significantly more likely to be female, were younger, and reported making less money compared to salaried workers,  $p < .001$ . Our critical results are statistically equivalent upon controlling for these demographic variables (Table B).

#### Procedure

We first asked participants whether they were paid an hourly or salaried wage. All participants were then assigned to the opportunity-cost or to the control condition, and were asked to read one of two scenarios that involved making an environmentally beneficial choice (Appendix D). After indicating their decision, participants reported their age, gender, ethnicity, and annual household income, as well as completed an exploratory measure of environmental concern (Appendix B).

#### Scenarios

Participants were asked to imagine that they had recently learned about the positive impact that daily decisions can have for the environment, and were then faced with one of two hypothetical scenarios. In one scenario, they were told that they had left their travel mug at home, which would take approximately five minutes to retrieve. Participants were then asked to consider whether they would make the environmentally beneficial choice

(i.e., return home to retrieve their travel mug). To increase the generalizability of our results, we also used a second scenario, in which participants were told that they would miss the next bus home if they made the decision to recycle a soda can (which would increase their commute by approximately five minutes). In the control condition, participants were then simply asked if they would make the environmental choice, whereas in the opportunity cost condition they were first reminded that making the environmental choice would take time that they could spend doing something else (adapted from Frederick et al., 2009).

### Results and discussion

Overall, 47% of participants made the environmental choice. To predict the likelihood of making the environmental choice, we entered Payment (0 = Salaried, 1 = Hourly), Condition (0 = Control, 1 = Opportunity Cost), and a Payment  $\times$  Condition interaction term into a binary logistic regression model (0 = No Environmental Choice, 1 = Environmental Choice). As expected, there was a significant interaction between Payment  $\times$  Condition (Table C).

Follow-up analyses revealed that 39% of salaried workers in the opportunity cost condition made the environmental choice compared to 67% of salaried workers in the control condition,  $\chi^2(1, N = 60) = 4.42, p = .04$  (Fig. A). In contrast, the opportunity cost reminder had no significant impact on hourly-wage workers,  $\chi^2(1, N = 67) = 1.27, p = .26$ .<sup>1</sup>

Consistent with our previous work, salaried workers were more likely to make the environmental choice in the control condition (67%) compared to hourly-wage workers (36%),  $\chi^2(1, N = 60) = 5.46, p = .02$ , whereas this difference was eliminated in the opportunity cost condition,  $\chi^2(1, N = 67) = .76, p = .38$ .

#### Summary of results

Study 4 provides evidence that hourly-wage workers spontaneously consider the opportunity costs associated with environmental behavior. This increased awareness reduces hourly-wage workers' proclivity to engage in minimally costly behaviors, such as taking five minutes out of one's day to make an environmentally beneficial choice. By studying hourly vs. salaried workers outside of the lab, we show that thinking about time as money influences environmental decision-making among working adults. Additionally, this study documents a previously unexplored mechanism by which hourly-wage payment affects time-use: individuals paid by the hour are chronically aware of the trade-offs they are making with every minute of their time.

If individuals who see time as money are especially aware of the time costs associated with environmental behavior, they should be less willing to engage in such behavior—unless the costs are balanced by benefits to themselves. In other words, when people are attuned to the specific value of each minute of their time, they might be reluctant to engage in any behaviors that do not have direct benefits for themselves. To explore this possibility, in Study 5 we assigned participants to think of their time as money and framed environmental behavior as either a self-beneficial or self-transcendent act. We predicted that framing environmental behavior as a self-beneficial act would mitigate the negative effect of thinking about time as money on recycling. In this study, we

<sup>1</sup> It is notable that within the control condition, hourly-wage workers were less likely to engage in environmental behavior compared to salaried workers even though hourly workers were more likely to be female and were younger—demographic characteristics that are sometimes associated with more pro-environmental behaviors (e.g., Jones & Dunlap, 1992; Zelezny et al., 2000). In the context of our study, payment type may have mattered more than age or gender given that choosing the environmental action specifically required a trade-off in terms of time (a salient concern for hourly workers).

harnessed a different manipulation that has been shown to affect the perceived value of one's time (DeVoe & Pfeffer, 2010). In this study, all participants completed a consulting task and were assigned to a billing or control condition. This manipulation allows us to extend our research from hourly vs. salaried payment schedules to provide insight for organizations where employees bill their time (e.g., law firms).

## Study 5

### Method

#### Participants

Based on the effect sizes from Studies 1–4, we assumed a small to medium effect, and determined that we would need 180 participants for 95% power (GPower, 2013; Faul, Erdfelder, Lang, Buchner, 2007). We recruited 190 students to allow for exclusions on our *a priori* criteria (See “Exclusions”).

#### Procedure

Participants completed a consulting task (described below), in which they were asked to bill their time every six minutes (experimental condition) or were not (control condition). After completing the task, participants were asked to complete true and false quizzes on several topics. As part of these quizzes, some participants answered questions that framed environmental behavior as a self-beneficial act; other participants answered questions that framed environmental behavior as a self-transcendent act. Participants then completed the identical paper-cutting task from Study 3 and decided whether or not to recycle their scrap paper. Finally, participants reported their age, gender, ethnicity, and items assessing suspicion. None of the participants guessed the true purpose of the experiment, thus our suspicion items are not discussed further.

#### Billing task

All participants completed a consulting task in which they were asked to make personnel decisions for a fictitious company, and to communicate their decisions in writing to relevant employees (DeVoe & Pfeffer, 2010). As part of the task, participants were assigned to a billing or control condition. Participants in the billing condition filled out a time log, and were asked to charge \$0.25 for each minute that they spent on the task. At the end of the task, participants in the billing condition completed a “Billing Summary” sheet where they tallied the total time billed, the total money charged, and the total time billed/money charged for the session. Participants in the control condition completed the identical consulting activity, however they did not keep a time log. In both cases, participants knew that they had a set amount of time to complete the task and were being timed; yet only participants in the billing condition were explicitly asked to state how much money they should charge for their time in six minute intervals. Participants spent 35 min on the task, and were told that for the remaining time left in the study (25 min) they would complete a series of unrelated activities.

#### Self-other focus

We manipulated the nature of environmental behavior as a self-beneficial or self-transcendent act through a true and false quiz. This methodology was used successfully in past research to reframe environmental behavior as a self-beneficial or self-transcendent act (Evans et al., 2012). This quiz contained seven items from each of the following topics: hobbies, health, and travel. In the self-transcendent condition, participants were asked to evaluate several statements about the environment such as “Driving a car is good for the environment.” In the self-interested condition, participants were asked to evaluate several statements about the

environment such as “Some companies offer special parking arrangements for staff who car-share.”

### Results and discussion

#### Exclusions

Given the complex written instructions inherent in the consulting task, we made the *a priori* decision to exclude participants who were not fluent in English. We excluded 5 participants who reported that they were not fluent in English, and 9 participants who did not complete the consulting task due to confusion ( $N = 3$  in the billing condition,  $N = 6$  in the control condition), leaving 179 participants for analysis (73.1% females;  $M = 20.18$ ,  $SD = 2.27$ ). Three participants (in the control condition) were not fluent in English and did not successfully complete the consulting task. Including all participants who completed the study ( $N = 190$ ), our critical results are marginally significant in the predicted direction,  $ps < .06$ .

In this study, 60% of participants recycled their scrap paper after completing the paper cutting task. To predict the likelihood of recycling, we entered Task (0 = Control, 1 = Billing), Framing (0 = Self-Beneficial, 1 = Self-Transcendent), and a Task  $\times$  Framing interaction term into a binary logistic regression model (0 = Did Not Recycle, 1 = Recycled). As expected, there was a significant Task  $\times$  Framing interaction (Table D). Follow-up analyses revealed that when environmental behavior was framed as a self-transcendent act, 45% of participants who completed the billing task recycled their scrap paper, compared to 73% of participants who completed the control task,  $\chi^2(1, N = 92) = 7.79, p < .01$ . As predicted, this difference did not emerge when environmental behavior was framed as a self-beneficial act,  $\chi^2(1, N = 87) = .47, p = .49$  (Fig. B). This study provides evidence for an important boundary condition: the detrimental effect of seeing time as money on recycling is eliminated when people are led to see environmental behavior as self-beneficial.

### General discussion

The current research provides the first empirical evidence that thinking about time as money decreases environmental behavior. In a large, nationally representative sample of adults, individuals who were paid by the hour—making the economic value of time chronically salient—were less likely to engage in a broad range of environmental behaviors. In a sample of undergraduates, simply asking participants to calculate their future hourly wage reduced participants' intentions to engage in environmental behavior. Moving beyond self-report, students were less likely to recycle scrap paper after thinking about the economic value of their time. Next, we documented a mechanism for this effect—working adults with a chronic orientation to think of their time as money spontaneously recognize the trade-offs that they make with every minute of their time. While thinking about the economic value of time makes people aware of the temporal costs associated with environmental behavior, we show that highlighting the personal benefits of environmental behavior can mitigate this detrimental effect.

This research adds to a growing body of literature documenting the impact of thinking about time as money on time-use attitudes and behavior. Critically, our research expands the conceptualization of what time as money alters in terms of psychological and behavioral consequences. Correlational and experimental evidence suggest that thinking about time as money leads individuals to prioritize compensated activities over social and prosocial activities (Evans, Kunda, & Barley, 2004; DeVoe & Pfeffer, 2007a, 2007b). However, this research has primarily focused on volunteering—which can take a substantial amount of time to complete. Our

research extends this work by examining the effects of thinking about time as money on environmental behaviors that take a negligible amount of time to complete. In Studies 3 and 5, participants were given the opportunity to recycle their scrap paper, an action that took three additional seconds. In Study 4, we assessed the likelihood that participants would engage in an environmental act that takes five minutes to complete (comprising .003% of an individual's time in a 24 h period).

Why might individuals fail to engage in environmental behaviors that take mere minutes—or even seconds—to complete? We suggest that when time is perceived as valuable, individuals may become irrationally overprotective of their time. Of course, broadly speaking, it is rational to protect valued resources, including time. But when people become focused on protecting a resource, they may protect it even when doing so is not defensible on rational grounds (e.g., it does not actually save a meaningful amount of time). In particular, people who see time as money may develop a chronic heuristic to avoid wasting time, and they may continue to follow this heuristic even when considering trade-offs involving negligible amounts of time. To be clear, in the absence of any time cost we do not expect people to act in anti-environmental ways. Instead, we suggest that when facing even a trivial trade-off, people are less likely to engage in environmental behavior when they put a price tag on their time. This perspective dovetails with research on heuristics, showing that decision rules enable people to make quick and often valid choices, but sometimes lead to irrational behavior (e.g., [Tversky & Kahneman, 1974](#)).

Consistent with previous research ([DeVoe & Pfeffer, 2007a, 2007b, 2010](#)), these findings demonstrate that temporarily leading individuals to see their time as money produces acute effects that are consistent with chronic patterns of behavior exhibited by hourly workers. Our finding that people are less likely to engage in environmental behaviors when thinking about time as money may provide a novel explanation for a vexing puzzle: Despite high profile campaigns, the adoption of everyday environmental actions has flat-lined. In the US, hourly-wage payment has become more predominant, potentially creating a previously unrecognized barrier to environmental behavior.

This research has direct implications for organizations. Our findings suggest that thinking about the economic value of time decreases engagement in minimally time-costly behavior by leading individuals to prioritize personal goals. The first implication of this work is that organizations may want to reduce the saliency of cues that remind employees of the economic value of their time. To the extent that managers can make choices about payment schedules, there may be benefits associated with using non-partitioned time schedules. The next implication of this work is that framing environmental behavior as an act consistent with self-interest may be a particularly effective way to increase sustainable behavior for organizations with payment practices that promote an orientation to think about time as money.

It is worth noting that the effect sizes across our studies were small—which is unsurprising given research suggesting that numerous factors can influence environmental intentions and behavior. However, subtle changes in environmental behavior can translate into meaningful differences when multiplied by a large number of individuals ([Prentice & Miller, 1992](#)). For example, if each of the 75 million hourly workers in the US recycled an additional pound of paper each year, this act alone would save 28 million trees ([AFPA, 2010](#)).

### Future directions

Across five studies using correlational and experimental methodology ( $N = 7431$ ), and examining three distinct ways of making the economic value of time salient—through hourly-wage calculations,

hourly-wage payment, and billable hours—we show that thinking about the economic value of time decreases environmental behavior. In doing so, the basic research presented here lays the ground for fieldwork in an organizational context. For example, it would be interesting to test whether changing employee payment schedules (either through an experimental manipulation or a more naturalistic shift in organizational structure) would influence workplace environmental behaviors such as recycling.

Another logical extension of this research would be to investigate the extent to which thinking about time as money decreases engagement in other prosocial behaviors that require relatively little time. For instance, it would be worthwhile to examine whether thinking about the economic value of time decreases charitable giving when the charitable act has a negligible time cost (e.g., the donation involves putting a check in the mail or scrolling to the bottom of a webpage to place a donation). Such investigations would help charities more effectively target professionals who work in employment settings that promote an orientation to think about time as money.

Future research should also examine whether changes in the economic value of time predicts global changes in environmental behavior. Although the proportion of Americans paid by the hour has increased, the proportion of hourly workers has remained relatively low in many European countries ([Hamermesh, 2000](#)). In a study of 17,000 consumers across 17 countries, Americans ranked lowest on the Consumer Greendex—an index reflecting the percentage of consumers who make sustainable consumer decisions, such as using paper bags as opposed to plastic ([Greendex Index, 2012](#)). In contrast, Europeans scored near the top of rankings among developed countries. National differences in the proportion of hourly workers might help to explain global differences in sustainable behavior. While the present research sheds light primarily on individual decision-making, this work can potentially provide novel insight regarding patterns of environmental behavior across time and around the world.

### Conclusion

The current work demonstrates that thinking about time as money can decrease environmental intentions and actual environmental behavior. Extending previous research, this investigation suggests that thinking about time as money decreases engagement in environmental behaviors that take only a few minutes or a few seconds to complete by making the time costs chronically salient, and by leading individuals to prioritize their own needs and goals over the needs and goals of others. Future work should explore the extent to which differences in the tendency to think about time as money help to explain patterns of environmental behavior across time and around the world. Together, this research lays the foundation for understanding how the payment structures used by organizations may enhance or undermine sustainable behavior.

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## Appendix A. BHPS scale items and variable names

See Fig. A and Table A.

Environmental Scale	BHPS Name
Leaves TV on standby overnight	RGRNLFA
Switches off lights in empty rooms (R)	RGRNLFB
Lets the tap run while brushing teeth	RGRNLFC
Wears extra rather than turning up the heat (R)	RGRNLFD
Doesn't buy because of excess packaging	RGRNLFE
Buys local food	RGRNLFF
Buys recycled products	RGRNLFG
Takes own bag shopping	RGRNLFH
<i>Covariates</i>	
Number of hours worked per week	RJBHRS
Income earned per month	RFIHHMN
Marital Status	RMLSTAT
Age	RAGE
Highest level of education	RQFEDHI
Number of own children in the home	RNCHILD
Household size	RHHSIZE
Gender	RSEX

## Appendix B. Additional materials and results

In Studies 2 and Study 3, we asked participants to complete measures of time pressure and time scarcity. Specifically, participants rated their agreement with seven statements about feelings of time pressure (1-Strongly Disagree to 7-Strongly Agree;  $\alpha = .91$ ) and a 1-item question assessing the extent to which they felt that time was one of their scarcest resources (Mogilner, Chance & Norton, 2012; 1-Strongly Disagree to 7-Strongly Agree). For exploratory purposes, at the end of the survey in each study, we also asked participants to complete a 15-item measure of materialism (Richins & Dawson, 1992;  $\alpha = .77$ ), a 5-item measure assessing environmental concern (Dutcher, Finley, Luloff & Johnson, 2007;  $\alpha = .69$ ). These measures were not central to the present hypothesis. Controlling for each of these measures across Studies 2, 3, and 4 did not substantively affect our central results; thus, these measures are not discussed further (We did not measure materialism or environmental concern in Study 3).

In Study 2, consistent with past research (DeVoe & Pfeffer, 2011), participants in the hourly-wage condition ( $M = 4.82$ ,

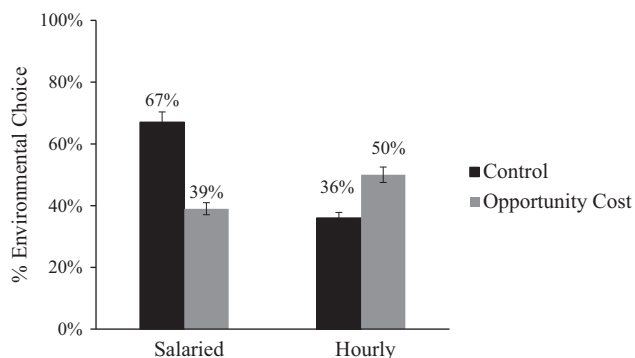


Fig. A. Logistic regression analysis predicting environmental choice.

$SD = 1.19$ ) reported marginally higher levels of time pressure than participants in the control condition ( $M = 4.52$ ,  $SD = 1.10$ ),  $F(1,185) = 3.20$ ,  $p = .08$ ,  $\eta^2 = .02$ . Participants in the hourly-wage condition ( $M = 5.00$ ,  $SD = 1.47$ ) were also more likely to report that time was one of their scarcest resources compared to participants in the control condition ( $M = 4.46$ ,  $SD = 1.70$ ),  $F(1,183) = 5.45$ ,  $p = .02$ ,  $\eta^2 = .03$ . Our critical effects remained significant when adding time pressure and time scarcity as covariates. Controlling for time pressure, participants in the hourly-wage condition ( $M = 5.01$ ,  $SD = .72$ ) reported reduced intentions to engage in environmental behavior compared to participants in the control condition ( $M = 4.79$ ,  $SD = .79$ ),  $F(1,184) = 3.73$ ,  $p = .06$ ,  $\eta^2 = .02$ . Similarly, controlling for time pressure, participants in the hourly-wage condition felt that engaging in environmental behaviors the year following graduation was less worthwhile ( $M = 5.37$ ,  $SD = .89$ ) compared to participants in the control condition ( $M = 5.06$ ,  $SD = .86$ ),  $F(1,180) = 6.16$ ,  $p = .01$ ,  $\eta^2 = .03$ . Thus, although seeing time as money increased feelings of time pressure and time scarcity (in line with previous research), the effect of our manipulation on environmental intentions was not explained by feelings of time pressure.

In Study 3, participants in the hourly-wage condition ( $M = 4.78$ ,  $SD = .89$ ) reported slightly higher levels of time pressure than participants in the control condition ( $M = 4.43$ ,  $SD = 1.23$ ),  $F(1,51) = 1.34$ ,  $p = .25$ ,  $\eta^2 = .03$ . Participants in the hourly-wage condition also reported slightly higher levels of time scarcity ( $M = 4.64$ ,  $SD = 1.38$ ) compared to participants in the control condition ( $M = 4.46$ ,  $SD = 1.36$ ),  $F(1,51) = .22$ ,  $p = .64$ ,  $\eta^2 = .00$ . However, these differences were not significant,  $ps > .25$ , and thus could not explain the effect of condition on recycling in this experiment.

## Appendix C. Survey Items Study 2

1. Packing my own lunch to take to work or school.
2. Travelling by foot, bike or mass transit.
3. Reusing ziplock bags.
4. Turning off the lights in unoccupied rooms before leaving home.
5. Buying locally grown food.
6. Turning off car engines vs. idling.
7. Composting and/or recycling household waste.
8. Turning off the computer vs. leaving it on standby.
9. Using a travelling mug versus a disposable cup.
10. Using electronic methods to pay for bills.
11. Hang drying your clothes rather than using the dryer.
12. Using rechargeable batteries instead of buying disposable.
13. Recycling newspapers once you have read them.

Buying organic food (see Table C).

## Appendix D. Study 5 vignettes

### Travel Mug:

Imagine that you have recently listened to a radio program about the importance of everyday environmental behaviors. This radio program reminded you about a simple daily action that can help the environment—using a travel mug vs. a disposable cup for your favorite morning beverage (e.g., coffee). You have purchased a travel mug, but after leaving the house this morning, you realize that you have left your travel mug at home (which is about a 5 min walk away) (see Table D).

### Can Recycling:

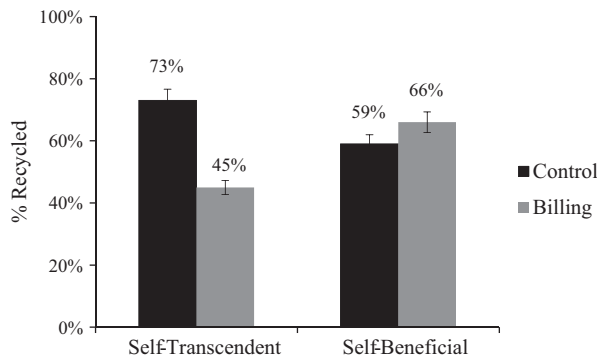
Imagine that you have recently learned about the importance of everyday environmental behaviors and you are reminded about a simple daily action that can help the environment while listening

**Table A**  
Predicting environmental behavior from hourly-wage status and covariates.

Hourly Status (0 = non-hourly; 1 = hourly) β (SE)	Number of hours worked per week β (SE)	Income earned per month β (SE)	Marital Status (1 = married) β (SE)	Age β (SE)	Highest level of education (1 = at least A-levels) β (SE)	Number of own children in household β (SE)	Household size β (SE)	Gender (1 = female) β (SE)
-.08** (.02)								
-.11** (.02)	-.12** (.00)							
-.10** (.02)	-.13** (.00)	.02 (.00)						
-.09** (.02)	-.11** (.00)	-.00 (.00)	.11** (.02)					
-.09** (.02)	-.11** (.00)	-.02 (.00)	.03* (.02)	.19** (.00)				
-.08** (.02)	-.10** (.00)	-.04* (.00)	.03* (.02)	.19** (.00)	.08** (.04)			
-.08** (.02)	-.10** (.00)	-.04* (.00)	.03* (.02)	.19** (.00)	.08** (.04)	.00 (.00)		
-.08** (.02)	-.11** (.00)	-.04 (.00)	.04* (.02)	.18** (.00)	.08** (.04)	.03* (.00)		-.06** (.00)
-.06** (.02)	-.07** (.00)	-.00 (.00)	.04* (.02)	.18** (.00)	.08** (.04)	.03* (.01)		-.06** (.00)
R <sup>2</sup>								.08
N								6880

Note. Environmental items were reverse coded so that positive coefficients represented greater self-reported environmental behavior.

† p < .10.  
\* p < .05.  
\*\* p < .001.



**Fig. B.** Logistic regression analysis predicting recycling.

**Table B**  
Logistic regression analysis of environmental choice with covariates.

Predictor	β	SEβ	Wald	Sig.	eβ	CI
Gender	.11	.39	.08	.78	1.11	[.52, 2.40]
Age	.00	.02	.04	.84	1.00	[.97, 1.04]
Income	-.04	.05	.74	.39	.96	[.88, 1.05]
Cost	.58	.51	1.29	.26	1.79	[.66, 4.89]
Hourly	1.42	.60	5.51	.02	4.12	[1.26, 13.46]
Cost × Hourly	-1.60	.75	4.54	.03	.20	[.05, .88]
Model	χ <sup>2</sup> = 6.41		p = .09			
Pseudo R <sup>2</sup>	.07					
N	123					

Note. N = 4 participants did not provide age, gender, or income information, thus these analyses are based on 123 of a possible 127 participants.

**Table C**  
Logistic regression analysis of environmental choice without covariates.

Predictor	β	SEβ	Wald	Sig.	eβ	CI
Cost	.56	.50	1.26	.26	1.75	[.66, 4.65]
Hourly	1.25	.55	5.27	.02	3.50	[1.20, 10.20]
Cost × Hourly	-1.68	.74	5.23	.02	.19	[.04, .79]
Model	χ <sup>2</sup> = 6.65		p = .08			
Pseudo R <sup>2</sup>	.07					
N	127					

to the radio—recycling your aluminum cans instead of throwing them out. You intend to recycle your aluminum can from a coke you were drinking on your way out of the office. However, the bus has arrived and while the garbage bin is on the way to the

**Table D**  
Logistic regression analysis of recycling.

Predictor	β	SEβ	Wald	Sig.	eβ	CI
Task	.30	.45	.47	.49	1.36	[.57, 3.25]
Condition	.66	.45	2.14	.14	1.94	[.80, 4.68]
Task × Condition	-1.53	.63	5.89	.02	.22	[.06, .75]
Model	χ <sup>2</sup> = 8.61		p = .04			
Pseudo R <sup>2</sup>	.06					
N	179					

bus, the recycling bin is across the street. Recycling the can will mean waiting for the next bus (which will arrive in about 5 min).

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