Mo' Money, Less Performance: A Juxtaposition of Environmental and Monetary Rewards

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Abstract

To reduce environmental problems, we must understand how to promote pro-environmental behavior, including how people motivate one another to act pro-environmental, i.e., advocacy. This study investigated the effect of rewarding on an individual and collective basis (via their two-person teams) with environmental rewards (trees planted locally), monetary rewards (cash), and no rewards on pro-environmental behavior and advocacy. The effects of rewards on behavior were investigated via a three-week diary survey study over seven timepoints. It was expected that (a) participants receiving any reward would engage in more pro-environmental behavior and advocacy compared to participants receiving no reward; and (b) environmental rewards would yield the highest participant pro-environmental behavior and advocacy, followed by monetary rewards, while no reward would yield the lowest. Two-person teams, who already knew one another, were recruited from the researcher's personal and professional network (n = 36). Results from repeated measures multivariate two-way ANOVAs revealed that (a) participants receiving rewards, compared to no rewards, showed more pro-environmental behavior while no differences were found for advocacy; (b) environmental and monetary rewards both led to significantly better pro-environmental behavior compared to no reward with environmental rewards proving slightly more effective; however, no improvement was found for advocacy; (c) the pro-environmental behavior performance gains were approximately the same when comparing environmental rewards to monetary rewards. Rewarding people with environmental rewards is just as motivating as providing monetary rewards. Theoretical and practical implications are discussed.

Keywords: pro-environmental behavior, intervention, biospheric rewards, environmental rewards

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Climate change, driven by human behavior, is causing serious environmental problems (Brand et al., 2021). A large and rapid societal transition to sustainable behavior is needed to avert a worsening environmental situation (IPCC, 2022). Such a transition requires people whose behavior has the greatest degrading environmental impact (e.g., global north societies and the most wealthy people) to adopt pro-environmental behavior (Gore, 2021) and to recruit others within society to do the same (Nygrén et al., 2015). The European Union is running its large-scale intervention program, called Green Deal, to address and change environmentally harmful behaviors (Krämer, 2020).

This large-scale governmental behavioral change intervention program provides monetary rewards in return for adopting pro-environmental behavior (PEB), e.g., purchasing electric vehicles, diverting society to sustainable public transport, and installing energy-saving building insulation (IEA, 2020). Interventions are more effective when they target important antecedents of behavior and appeal to a value-congruent orientation (Bouman & Steg, 2019; Schwartz et al., 2012; Stern & Dietz, 1994). The antecedents (i.e., stimuli preceding behavior) of the PEB intervention Green Deal assume people are strongly responsive to money and/or strongly value money. Monetary rewards have indeed been found to be effective in promoting pro-environmental behavior (Maki et al., 2012; Rajapaksa et al., 2019; Sloot & Scheibehenne, 2022). However, research indicates that people more strongly value other factors over money, including values around the environment (Bouman & Steg, 2019). Therefore, research is needed to compare the effectiveness of rewards that appeal to values associated with the environment.

Schwartz's value theory defines values as "concepts or beliefs that pertain to desirable end states or behaviors, which transcend specific situations, guide selection or evaluation of behavior and events, and are ordered by relative importance" (Schwartz, 1992, p. 4). In other words, people's behavior uses values as a guiding principle in pursuing goals (Schwartz, 1992). When values hold significant importance to an individual, they are more likely to behave in a way that aligns with those values (Stern & Dietz, 1994). Biospheric and egoistic values are found to be of key importance to environmentally relevant behaviors (Bouman et al., 2019; Steg et al., 2014; Stern & Dietz, 1994).

Biospheric values indicate "unity with nature, a world of beauty, and protecting the environment" (Stern & Dietz, 1994, p. 74). More recently, biospheric values have been understood to be one's concern for nature for nature's own sake, without human well-being as the motive (De Groot & Steg, 2007; Steg et al., 2014). Individuals with stronger biospheric values have been shown to be more likely to engage in pro-environmental behavior, such as opting for donating money to environmental charities over humanitarian charities, supporting environmental political parties over social parties, and choosing organic over Fairtrade food. Activating such values can promote environmental behavior (Thøgersen & Ölander, 2006).

Alternatively, people with strong egoistic values care about the costs and benefits to themselves (De Groot & Steg, 2007). Their aim is to capture maximum benefit at minimal cost for themselves, with an ongoing pursuit of obtaining more wealth, power, and achievement (De Groot & Steg, 2007). Furthermore, Stern & Dietz (1994) posit that individuals with strong egoistic values will protect the environment when the personal cost is low to themselves and will fail to protect the environment when the personal cost is high. Thus, for individuals with strong egoistic values, environmental issues are of no concern when tied to the impact on society but rather only matter when they, as individuals, are personally affected by the environment (Stern & Dietz, 1994). Relatedly, Steg et al. (2014) state that biospheric and egoistic values are of the greatest importance regarding environmental actions. While using monetary rewards to prompt engagement in pro-environmental behavior may be particularly effective in promoting pro-environmental behavior among those with strong egoistic values, people with strong biospheric values may not be motivated by monetary rewards. Although monetary rewards are widely used in interventions authored by policymakers (IEA, 2020), most people have been found to endorse biospheric values, i.e., the environment, more strongly than egoistic values, i.e., money.

The values of the European population were assessed via the large-scale European Social Survey (2016). It found that overall egoistic values were deemed least important while biospheric values were deemed most important (Bouman & Steg, 2019). Based on those results, the possibility may exist that in the EU, rewards are more likely to promote pro-environmental behavior when they target biospheric values instead of egoistic values. Specifically, it may be more effective if EU governments avoid utilizing financial rewards that align with egoistic values and instead use rewards that directly benefit the environment because people strongly care about the environment, i.e., biospheric values. Biospheric-based non-monetary rewards remain

an underused strategy (Steg & De Groot, 2019) and have been largely overlooked within intervention research. Therefore, it is key to study the impact of biospheric "environmental rewards" on pro-environmental behavior and compare its effectiveness to financial rewards.

While individuals' adoption of PEB is of major concern for society, efforts to increase the absolute speed of spread and adoption must also be undertaken. The IPCC's (2022) sixth assessment report on climate change impacts explain the global situation bluntly, "Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all" (IPCC, 2022, p. vii). Time is of the essence; the speed of adoption is critical. Along these lines, the concept of advocacy becomes crucially important. Advocacy is defined as setting an example regarding the environment for others, motivating others to act on climate change, and raising the issue of climate change in conversations (Valkengoed et al., 2023). The same drivers of PEB based on biospheric values are expected to equally drive advocacy behavior. Activating advocacy behavior could lead individuals to prompt their friends, family, coworkers, and community to adopt PEB, accelerating the speed and spread of society-wide adoption.

Transitioning society to adopt PEBs widely will likely be a societal team effort. Thus, rewards may be more effective when they target both individual and team behavior instead of only individual or only team behavior. Therefore, it is important to study intervention efforts that embrace a team approach in addition to the individual. Chen and Kanfer (2006) explore this individual + team approach via the multilevel theory of team motivation. They state that motivational consideration must be given to the individual level and the team level simultaneously to effectively maximize motivation and performance. Pearsall et al. (2010) performed a study that found confirmatory evidence that information sharing and team performance was highest when the reward structure simultaneously rewarded individual performance and team performance, relative to rewarding only the team or only the individual. Pearsall et al. (2010) concluded that a hybrid approach is more effective in changing behavior due to the collective reward directing team attention, effort, and knowledge toward helping each other while simultaneously holding the individual accountable for their continued effort via the individual reward. Thus, better performance was achieved on both the team level and the individual level in the hybrid reward orientation. Therefore, I will test if such a hybrid reward

structure may facilitate greater PEB performance and advocacy behavior between two-person teams relative to no reward condition.

Research Questions

This study aims to answer the following questions:

Research Question 1: Does a hybrid incentive reward (collective + individual rewards) affect pro-environmental behavior and advocacy?

Research Question 2: To what extent does incentive reward type (environmental, monetary, no reward) affect pro-environmental behavior and advocacy behavior?

Hypotheses

Based on the reasoning above, the following hypotheses are proposed:

H1 Participants receiving hybrid rewards will lead to more pro-environmental behavior and advocacy compared to participants receiving no rewards.

H2 Environmental rewards will lead to the highest participant pro-environmental behavior and advocacy, followed by monetary incentive rewards, while no reward will lead to the lowest.

Method

Design

A three-week diary study was conducted with three conditions for reward type (environmental, monetary, no reward), each utilizing a hybrid reward structure (rewarding the participant for individual performance and team performance). The dependent variables, pro-environmental behavior was measured across 7-timepionts while participant advocacy and teammate advocacy were measured across 6-timepoints using an online questionnaire that was sent via email.

Participants and Procedure

An a priori power analysis via free-to-use G*Power (Faul et al., 2007) revealed a minimum sample of 54 participants required to detect a medium effect size $\eta^2 = .25$ at a power $\beta = .95$, the standard of significance $\alpha = .05$, via 3-timepoints. Due to the likelihood of high attrition, 72 participants were targeted. Participants were recruited in two-person teams (dyads-who-already-know-each-other), e.g., family, colleagues, friends, and dating couples; each dyad

consisted of two participants. Later it was advised that I should use all timepoint to achieve a more accurate result. Therefore, a retrospective power analysis was conducted for 7-timepoints using G*Power. It revealed a minimum sample of 33 participants required to detect a medium effect size $\eta^2 = .25$ at a power $\beta = .95$, the standard of significance $\alpha = .05$ (see Appendix A).

Participants ($N = 102$) were recruited, numbering 51 dyads. Exclusion criteria include participants who (a) did not complete the pre-measure survey ($n = 2$); (b) did not consent to the study ($n = 0$); (c) who were not 16 years old or older ($n = 0$); and (d) who did not consent to their personal data being processed ($n = 0$), thus $n = 100$, spanning three conditions (environmental reward $n = 32$, monetary reward $n = 30$, and no reward $n = 38$. The number of participants varied across the pre-measure (T0) and six waves (T1–T6): T0 ($n = 100$), T1 ($n = 88$), T2 ($n = 88$), T3 ($n = 82$), T4 ($n = 87$), T5 ($n = 77$), and T6 ($n = 83$).

Pairwise participant (and dyad) exclusions were performed for missing data, meaning if either participant in the dyad had any missing data at any timepoint (e.g., missing PEB on T0–T6 or advocacy data on T1–T6), the entire dyad data (both participants) were removed ($n = 62$ omissions, $n = 38$ remained). A single outlier was identified via boxplots for outliers using the 1.5 x IQR rule (Passer, 2017) and removed along with their teammate ($n = 2$). Thus, the remaining sample for analysis was $n = 36$, consisting of environmental rewards $n = 14$, monetary rewards $n = 8$, and no reward $n = 14$. The 18 dyads/36 participants consist of 69% female, 86% English language, and 14% Dutch language. Ages range from 18 to 53 years, $M = 28.64$, $SD = 9.20$. 92% of participants were of EU nationality, 44% of participants were enrolled students, 19% of participants only completed high school, 50% earned a bachelor's degree, and 25% earned a master's degree or higher. Dyads were associated with their teammate via 42% friend, 39% spouse/partner/mate, 11% family, and 8% other.

Step-1 of Pre-registration. This online six-wave diary study was conducted using the Qualtrics survey software (Qualtrics, 2005). The study was conducted in English and Dutch. Participant recruitment efforts focused on individuals over 16 years of age. Pre-registration began by sharing recruitment text, including an anonymous Qualtrics survey link, to participants (see Appendix B). The study was promoted within my personal and professional network, where individuals were asked to sign up for the study in the form of WhatsApp, LinkedIn, email messages, phone calls, and in-person pitches. Recruitment efforts were targeted at students from the University of Groningen, Erasmus University, individuals working at the University of

Groningen Green Office, Erasmus University (including at Design Impact Transition and the Erasmus Sustainability Hub), BlueCity, and personal friends. Specifically, students and professionals within my personal and professional network were recruited. These recruitment efforts led participants to (a) step-1 of the pre-registration process, a Qualtrics generic study information page, see Appendix J; (b) what is your email address page; (c) what is your teammate's email address page; (d) confirmation that the teammate provided consent to share teammate's email address via yes/no question, requiring a yes to proceed; (e) which triggered an email containing an email verification link, and used block randomization to assign each dyad randomly to condition-monetary, condition-environmental, or condition-no reward; (f) the email link led to step-2 of the pre-registration process.

Step-2 of Pre-registration. Pre-registration, continued via the email verification link, sent the participant to (a) the Qualtrics page reminding the participant to ensure their teammate finishes the entire registration process, see Appendix K; (b) the study's introduction information page; (c) the informed consent page; (d) age consent page; (e) data consent page; (f) the pro-environmental behavior scale (item order randomized) including an attention check item; (g) demographics page, including nationality, age, student status, gender, formal education, dyad association, order of questions randomized; (h) values scale page; (i) rewards explanation page only for participants in the environmental and monetary condition while the no rewards condition skips this page, see Appendix M; (j) a manipulation check for monetary and environmental condition, see Appendix N; (k) a user feedback form page, see Appendix O.

Wave 1–5. Waves 1 through 5 were initiated via (a) emails (see Appendix C for a timeline), including two additional reminder emails, reminding participants who had not yet responded to fill out the open survey before the survey closing deadline; (b) directing participants to Qualtrics introduction page; (c) rewards-feedback for monetary and environmental condition, while the no reward condition did not see this page; (d) advocacy items 1 and 2; (e) the pro-environmental behavior scale, including an attention check item; (f) and a feedback form page. The rewards-feedback page was (a) only visible to the environmental reward participants and the monetary reward participants; (b) to remind those participants of the rewards they could earn by their individual and team performance; (c) the level of pro-environmental behavior (PEB) performance the participant and their teammate needed to qualify

for the reward; (d) their most recent individual PEB score; and (e) their team's most recent pro-environmental score (see Appendix D).

Wave 6. The final wave was initiated via (a) email, including announcement email and reminder emails; (b) directing participants to Qualtrics introduction page; (c) rewards explanation/feedback for monetary and environmental condition; (d) advocacy items 1–2; (e) the pro-environmental behavior scale, including an attention check item; (e) a social desirability check page; (f) a debrief, see Appendix P; (g) and a feedback form page, see Appendix Q.

Materials

Manipulation and Lottery

Using block randomization, dyads were assigned to one of the three conditions (monetary reward, environmental reward, or no reward). Participants in the environmental and monetary reward conditions were entered into a lottery to receive a reward based on their individual (and their team's) self-reported pro-environmental behavior. The threshold to enter the lottery to win a reward was determined by increasing the average of all pre-measure PEB scores by 20%, ensuring that the participants and their team would have a goal that was not too difficult nor too easy (Becker, 1978). The maximum individual PEB score possible was 72 points and 144 points for the dyad. The environmental reward was up to two occurrences of 5 trees planted (10 trees total) locally by NGO TreesForAll (https://treesforall.nl/en). The monetary reward was up to two payments of 25 euros (50 euros total) via emailed giftcards. Once the data collection had ended, the no reward condition were made aware of their two lotteries, and those winners were given the option to choose the environmental or the monetary reward to be as fair as possible. Participants who met each wave's lottery-entry threshold criteria were identified and placed into the appropriate lottery contestant list (environmental, monetary, no reward). Dyads who together met each wave's lottery-entry PEB threshold minimum criteria were identified and placed into the appropriate lottery dyad lists (environmental, monetary, no reward). Six lotteries were performed (an individual and a dyad per condition; an environmental individual, an environmental dyad, a monetary individual, a monetary dyad, a control individual, and a control dyad) using Microsoft Excel's RANDBETWEEN and INDEX functions to select the lottery winners. The three dyads that won the lottery were matched to their corresponding participants so both of the winning teammates would be alerted of their win. All participants were emailed announcing whether they had won or lost the lottery.

Measurements

English and Dutch versions of all survey material were provided to the participants via the online surveys and emails. Survey content Dutch translations were generated by DeepL (DeepL GmbH, 2023), with proofing by a native Dutch speaker. This study used Schwartz's value scale from Steg et al. (2014) to measure biospheric and egoistic value clusters (see Appendix E). Biospheric values were measured with 4 items (e.g., *respecting the earth: harmony with other species*) and egoistic values with 5 items (e.g., *social power: control over others, dominance*). Participants could answer on a 9-point scale ranging from *opposed to my values* to of *supreme importance*. The items formed a reliable scale for biospheric ($\alpha = .90$, $M = 4.90$, $SD = 1.64$) and egoistic ($\alpha = .77$, $M = 2.57$, $SD = 1.37$) respectively on a -1 to 7 continuum.

The pro-environmental behavior scale (PEB) consisted of 18 items, based on Kaiser and Wilson (2004) and Kaiser (2020). Four of the items were reverse-coded. The 18 items were asked in the context of "*Over the past two days…*" (see Appendix F). These questions spanned daily behavior topic categories, including energy conservation (e.g., *I have/am waiting until I have a full load of clothing before doing my laundry*), mobility transportation (e.g., *I have ridden a bike, or used public transportation, or walked to get to work or school*), waste avoidance (e.g., *when I was in a store I bought a new plastic bag*), consumerism (e.g., *I bought products in refillable packages*), recycling (e.g., *I collected used paper for recycling*), and miscellaneous behaviors toward conservation (e.g., *I read about an environmental issue*). Participants could answer on a 5-point Likert scale spanning *No/Never* to *Very Often*. According to Table 1, the items formed a reliable scale.

Table 1

Cronbach's Alpha for 18-item Pro-environmental Behaviors Scale Across Timepoints

Timepoint	*Cronbach's Alpha*	*M*	*SD*
T0	.56	2.61	0.48
T1	.75	2.71	0.56
T2	.72	2.84	0.52
T3	.74	2.70	0.56
T4	.76	2.88	0.55
T5	.82	2.90	0.61
T6	.78	2.82	0.57

The advocacy behavior measures consist of two items: Participant advocacy toward their teammate and the participant's perception of their teammate's advocacy toward them, i.e., teammate advocacy, see Table 2.

Table 2

Means and Standard Deviations for Participant Advocacy and Teammate Advocacy Across Timepoints

Timepoint	Participant Advocacy		Teammate Advocacy	
	M	*SD*	*M*	*SD*
T1	2.72	1.23	2.89	1.37
T2	2.61	1.13	2.67	1.24
T3	2.67	1.33	2.53	1.25
T4	2.56	1.21	2.64	1.07
T5	2.69	1.35	2.50	1.16
T6	2.67	1.37	2.47	1.21

For participant advocacy, the question was asked, "*You performed this study with a teammate. This question is about being an advocate, toward your teammate, for pro-environmental behaviour. By being an advocate, we mean doing things such as setting an example for others, motivating others to act on climate change, and raising the issue of climate change in conversations. How frequently did you try to encourage your teammate to engage in behaviour(s) friendly toward the environment?*". For teammate advocacy, the question was asked, "*How frequently did your teammate encourage you to engage in behaviour(s) friendly toward the environment?*". Participants could respond via a 5-point Likert scale from *Never* to *Very often* (see Appendix G).

Attention Check

To assess participant attentiveness and to better ensure the validity of the collected data, an attention check was incorporated into each wave of the experiment. "*Answer 'Seldom' for this question*" was placed, in a randomized order, within the pro-environmental behavior items matrix (see Appendix F). The correct response "*Seldom*" option. 99.6% of participants correctly responded to the attention check in T0–T6, indicating a high degree of attentiveness. Failing the check did not lead to the omission of participants from analyses.

Manipulation Check

A manipulation check regarding the environmental and monetary rewards were included during the pre-measure survey to assess the effectiveness of the experimental manipulation. The manipulation check assessed participants' understanding of the reward by asking them, "*What reward can you earn*?" to which they could respond via a text input box. The monetary reward was a maximum of two payments of 25 euros (50 euros total) via two lotteries. Thus, correct responses included "*money*', "*euros*", "*cash*", and "[earn] *50*". The environmental reward was up to two occurrences of 5 trees planted (10 trees total) via two lotteries. Thus, the correct response examples included "*trees*" and "*planting*". Participants who correctly identified the reward were scored as 1, incorrect as 0. 100% of the monetary rewards participants (n = 8) passed the manipulation check, while 85.7% of the environmental rewards participants (n = 14) passed the manipulation check. These results indicate that the majority of participants correctly identified the rewards being offered, providing evidence for the validity of the experimental manipulation. Failing the check did not lead to the omission of participants from analyses.

Social Desirability Check

To measure the effect of participants responding in a way that they perceive as socially desirable rather than as an accurate self-report of their behavior, a social desirability check was performed on the final wave (T6) of the study. Participants were asked, "*To ensure the accuracy of our survey results and* [while] *respect*[ing] *your anonymity, we kindly request your honesty in responding to the following question: Did you provide truthful responses to the questions regarding your pro-environmental behavior?*". An empty input textbox was provided to capture the participant's response. Responses were coded as *honest* when answering in the affirmative, e.g., "*yes*", "*ya*", "*of course*", and "*I tried*". 97.2% of the participants passed the social desirability check. The results of the social desirability check reveal a low risk that social desirability responding drove the results. Thus, the responses can be considered reliable, and the quality of the data collected can be considered high. However, these results do not completely rule out the risk of social desirability responding. Failing the check did not lead to the omission of participants from analyses.

Analysis

This study was pre-registered with the Open Science Framework (https://osf.io/z6dnc). The repeated measures multivariate mixed two-way ANOVA was deemed as the most suitable analysis method due to its higher ecological validity in considering multiple variables simultaneously (Field, 2018) to explore hypotheses 1 and 2. Despite the dependency of the dyads, multilevel analysis was not used as this analysis is not expected of master students. Pillai's trace was used for the multivariate analysis due to its high reliability and protection against Type I errors for small sample sizes (Field, 2018). Contrasts were used to investigate significant interaction effects. Assumption checks were performed for all repeated measures multivariate mixed two-way ANOVA outcome variables for all timepoints. Assumption checks include linearity via mean comparisons, Levene's Tests for homogeneity, and normality via frequency histograms (Field, 2018). Alpha values at or below .05 were deemed significant for all hypothesis testing.

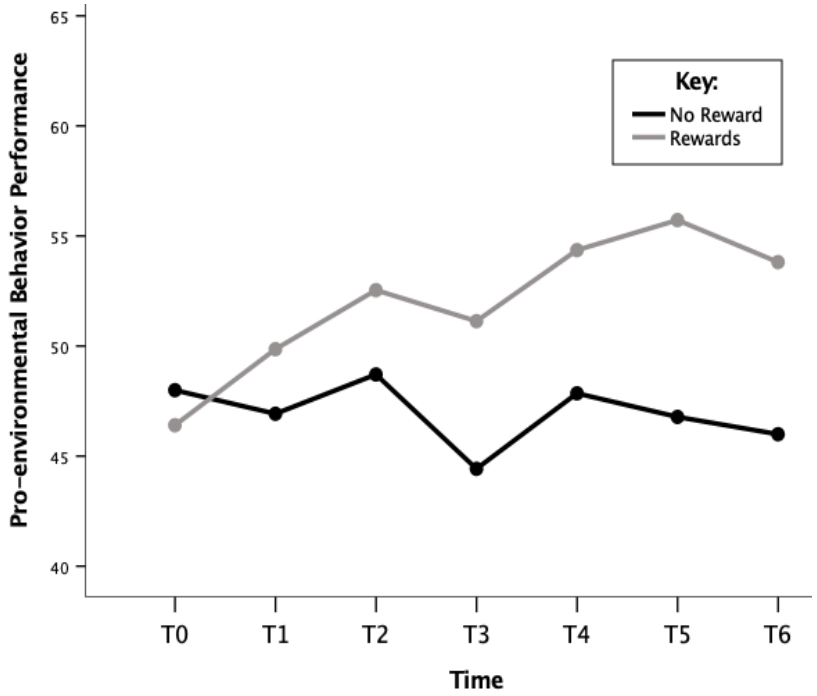
Results

Hypothesis 1: Reward vs No Reward Impact on Behavior

According to Table 3, consistent violations of homogeneity for participant advocacy and teammate advocacy (see Appendix H, Table 3), while no further assumption violations were detected. I first tested the hypothesis that predicted that participants receiving hybrid rewards would lead to more pro-environmental behavior (PEB) and advocacy compared to participants receiving no rewards. A repeated measures multivariate mixed two-way ANOVA for PEB yielded a significant main effect for time for reward conditions (reward compared to no reward), $V = .59$, $F(6, 29) = 6.10$, $p < .001$, $\eta^2 = .56$, a non-significant main effect for reward conditions, $F(1, 34) = 2.98$, $p = .094$, and a significant interaction effect between time and reward conditions, $V = .39$, $F(6, 29) = 3.10$, $p = .018$, $\eta^2 = .39$, see Figure 1.

Figure 1

Pro-environmental Behavior Performance Between Reward and No Reward Conditions Across Time



Note. The maximum possible pro-environmental score was 72, while the minimum possible score was 0.

Contrast analysis was performed to investigate the source of the interaction effect. Table 4 shows the results of contrasting the two conditions (reward to no reward) at T0 to all other time

points (T1–T6). It reveals a significant interaction between reward conditions across all time measures. Participants who received a reward after T0 increased their PEB, while those who did not receive a reward did not increase their PEB. This evidence supports hypothesis 1, that rewards lead to higher PEB while no rewards do not.

Table 4

Pro-environmental Behavior Comparison of Reward to No Reward Conditions Between Timepoints

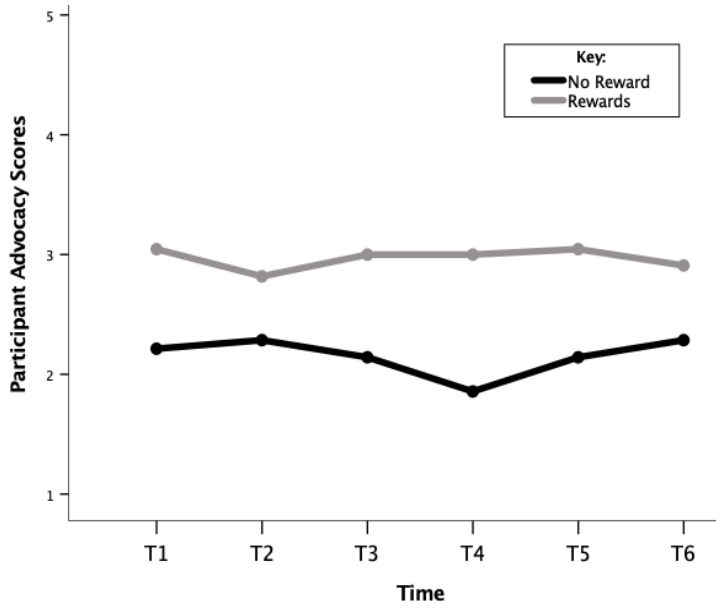
Time	$F(1, 34)$	p	η2
T0 vs. T1	4.93	**.033**	.13
T0 vs. T2	6.87	**.013**	.17
T0 vs. T3	11.31	**.002**	.25
T0 vs. T4	7.63	**.009**	.18
T0 vs. T5	14.05	**<.001**	.29
T0 vs. T6	11.09	**.002**	.25

Note. Reward consists of participants who received an environmental or monetary reward.

A repeated measures multivariate mixed two-way ANOVA for participant advocacy yielded a non-significant main effect for time for reward conditions (reward compared to no reward), $V = .07$, $F(5, 30) = 0.48$, $p = .79$, a significant main effect for reward conditions, $F(1, 34) = 5.25$, $p = .028$, $\eta^2 = .13$, and a non-significant interaction effect between time and reward conditions, $V = .16$, $F(5, 30) = 1.12$, $p = .37$, see Figure 2. This evidence does not support hypothesis 1, that stated rewards would lead to higher participant advocacy while no rewards would not.

Figure 2

Participant Advocacy Scores Between Reward and No Reward Conditions Across Time

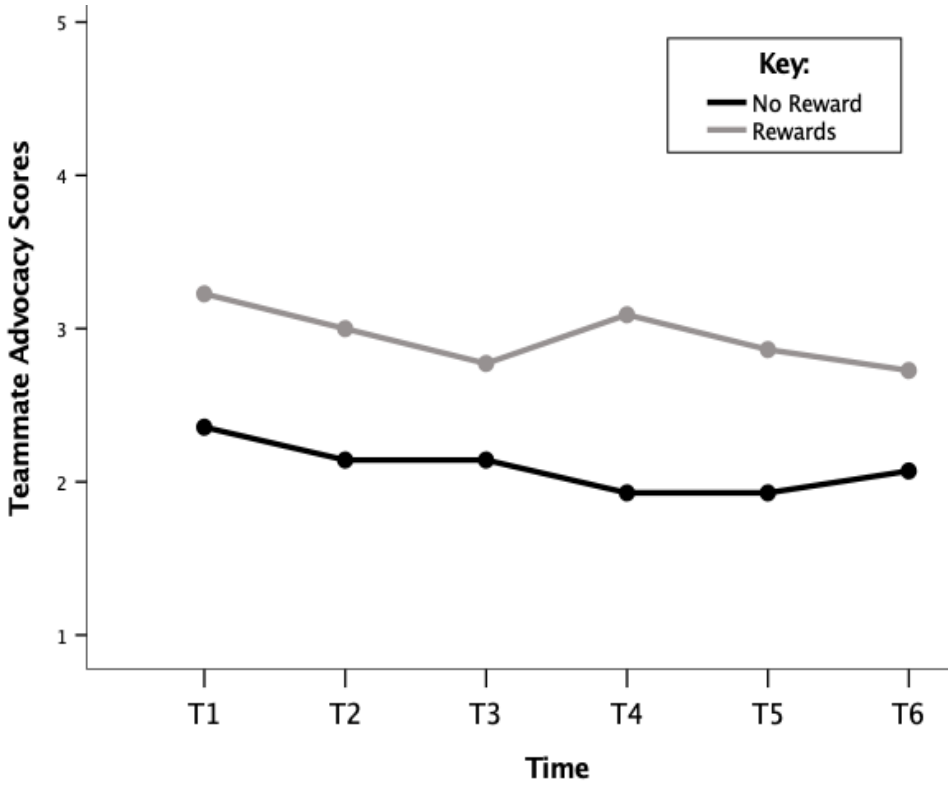


Note. The maximum possible participant advocacy score was 5, while the minimum possible score was 1.

A repeated measures multivariate mixed two-way ANOVA for teammate advocacy yielded a non-significant main effect for time for reward conditions (reward compared to no reward), $V = .10$, $F(5, 30) = 0.65$, $p = .67$, a significant main effect for reward conditions, $F(1, 34) = 6.84$, $p = .013$, $\eta^2 = .17$, and a non-significant interaction effect between time and reward conditions, $V = .16$, $F(5, 30) = 1.12$, $p = .37$, see Figure 3. This evidence does not support hypothesis 1, that stated rewards would lead to higher teammate advocacy while no rewards would not.

Figure 3

Teammate Advocacy Scores Between Reward and No Reward Conditions Across Time



Note. The maximum possible teammate advocacy score was 5, while the minimum possible score was 1.

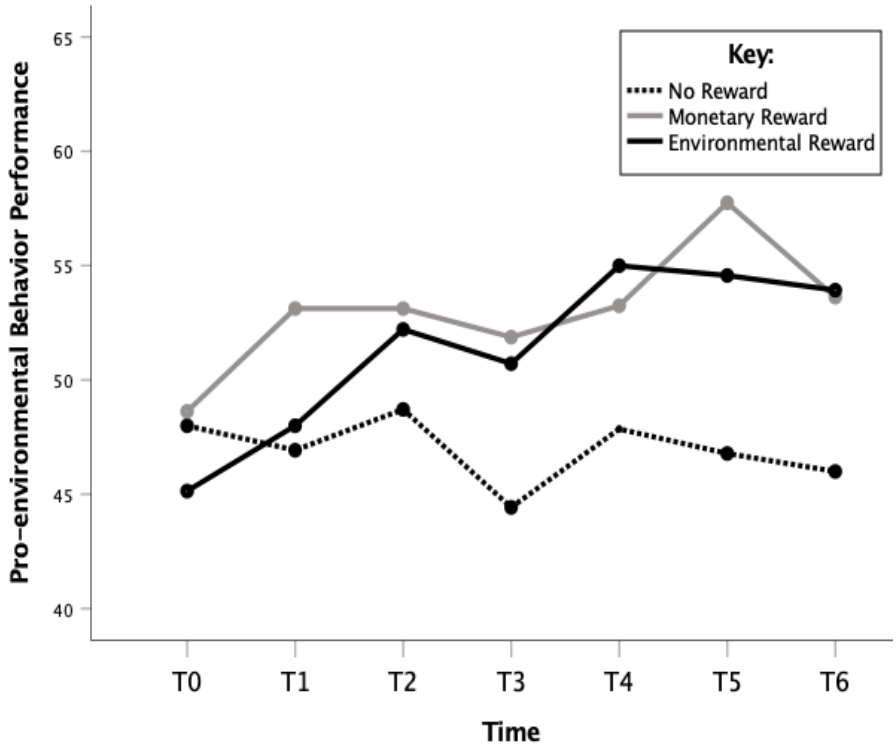
Hypothesis 2: Environmental and Monetary Rewards Impact on Behavior

According to Table 3, participant advocacy and teammate advocacy were found to violate homogeneity (see Appendix H, Table 3), while no violations of normality were found. According to Table 4, the assumption check for linearity revealed major violations of linearity for teammate advocacy and a minor violation for PEB and participant advocacy (see Appendix I, Table 4). I next tested the hypothesis that predicted that environmental rewards would lead to the highest participant PEB and advocacy, followed by monetary incentive rewards, while no reward would lead to the lowest. A repeated measures multivariate mixed two-way ANOVA for PEB yielded a significant main effect for time, $V = .56$, $F(6, 28) = 5.92$, $p < .001$, $\eta^2 = .56$, a non-significant main effect for reward conditions (environmental reward, monetary reward, and no reward), $F(2,$

33) = 1.55, p = .086, and a significant interaction effect between time and reward conditions, V = .61, $F(12, 58) = 2.12$, p = .03, η^2 = .30, see Figure 4.

Figure 4

Pro-environmental Behavior Performance Between Environmental Reward, Monetary Reward, and No Reward Conditions Across Time



Note. The maximum possible pro-environmental score was 72, while the minimum possible score was 0.

Table 5 consists of the results of the contrast analysis I used to investigate the source of the PEB interaction effect. Contrasting the three conditions (environmental reward, monetary reward, no reward), regarding PEB, at T0 to all other timepoints (T1–T6), revealed significant interactions between participants in the environmental reward and no reward conditions and between the monetary reward and no reward conditions across time. Meaning that participants in the environmental rewards and those in the monetary rewards conditions increased their PEB performance after T0, while those in the no reward condition did not increase their PEB. This

supports hypothesis 2. There were no significant findings between participants in the environmental reward and monetary reward conditions across time, meaning both conditions performed approximately the same in regard to increased PEB performance, which does not support hypothesis 2. With these findings, hypothesis 2, regarding PEB, is partially supported.

Table 5

Pro-environmental Behavior Comparison of Environmental Reward, Monetary Reward, and No Reward Conditions Between Timepoints

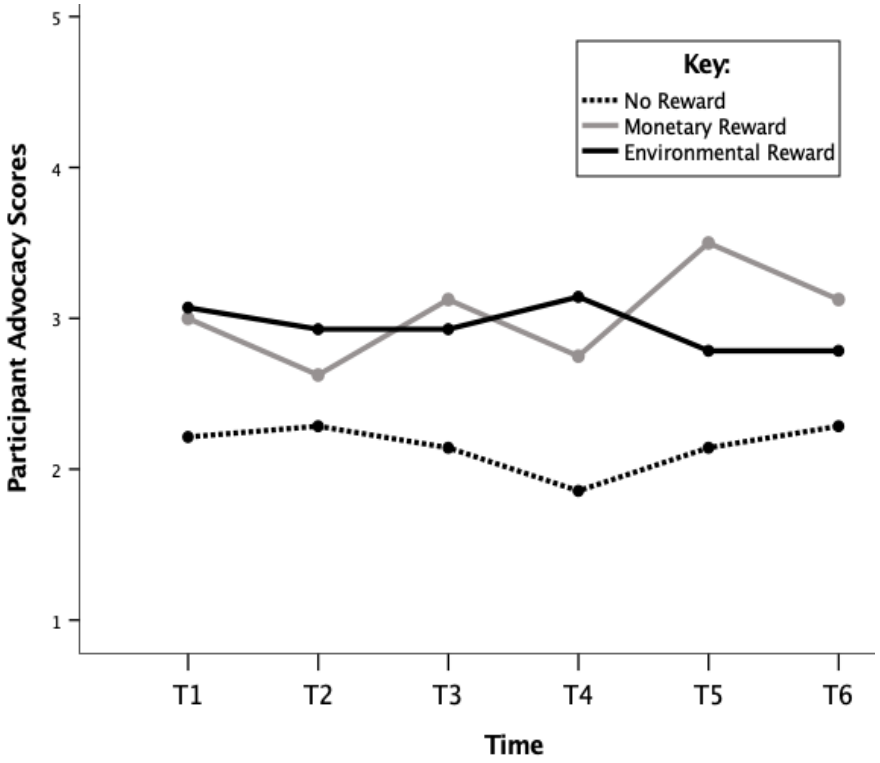
Conditions Comparison	Time	*dfNum*	*dfDem*	*F*	*p*	η2
Control and Environmental	T0 vs. T1	1	26	2.56	.112	.09
	T0 vs. T2	1	26	8.86	**.006**	.25
	T0 vs. T3	1	26	10.74	**.003**	.29
	T0 vs. T4	1	26	12.75	**.001**	.33
	T0 vs. T5	1	26	10.30	**.004**	.28
	T0 vs. T6	1	26	10.55	**.003**	.29
Control and Monetary	T0 vs. T1	1	20	5.98	**.024**	.23
	T0 vs. T2	1	20	1.72	.204	.08
	T0 vs. T3	1	20	3.82	.065	.16
	T0 vs. T4	1	20	1.41	.249	.07
	T0 vs. T5	1	20	10.60	**.004**	.35
	T0 vs. T6	1	20	4.86	**.039**	.20
Environmental and Monetary	T0 vs. T1	1	20	0.36	.56	.02
	T0 vs. T2	1	20	0.90	.35	.04
	T0 vs. T3	1	20	0.66	.43	.03
	T0 vs. T4	1	20	1.68	.21	.08
	T0 vs. T5	1	20	0.01	.94	.00
	T0 vs. T6	1	20	1.00	.33	.05

A repeated measures multivariate mixed two-way ANOVA for participant advocacy yielded a non-significant main effect for time, $V = .14$, $F(5, 29) = 0.93$, $p = .48$, a non-significant main effect for reward condition (environmental reward, monetary reward, and no reward), $F(2, 32) = 5.57$, $p = .09$, and a non-significant interaction effect for time * reward condition, $V = .48$,

$F(10, 60) = 1.87$, $p = .07$, see Figure 5. This evidence does not support hypothesis 2, that environmental rewards will yield the highest participant advocacy, followed by monetary incentive rewards, while no reward will yield the lowest.

Figure 5

Participant Advocacy Scores Between Environmental Reward, Monetary Reward, and No Reward Conditions Across Time

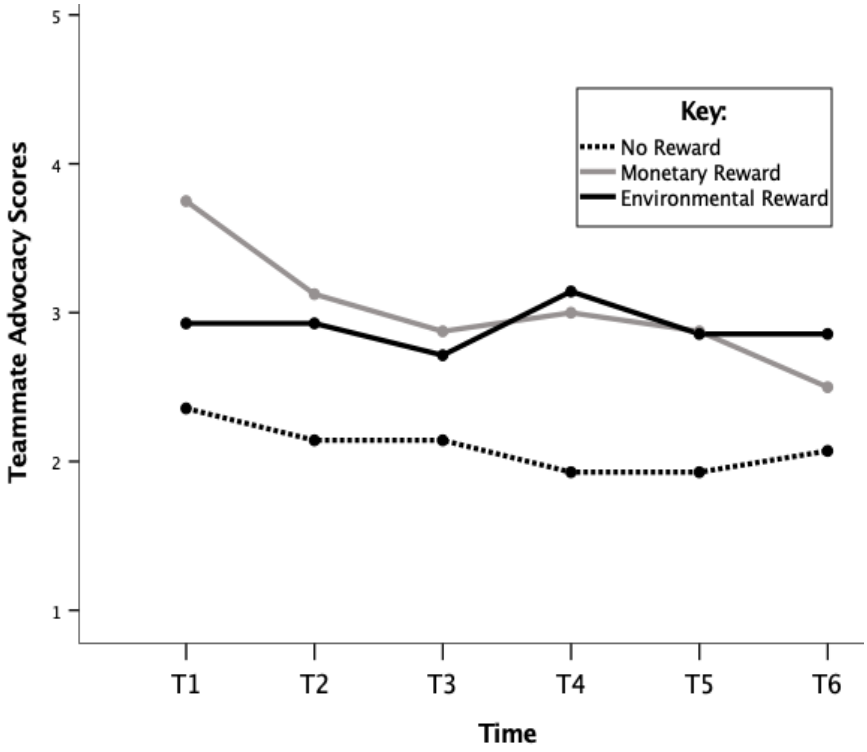


Note. The maximum possible participant advocacy score was 5, while the minimum possible score was 1.

A repeated measures multivariate mixed two-way ANOVA for teammate advocacy yielded a non-significant main effect for time, $V = .17$, $F(5, 29) = 1.14$, $p = .36$, a significant main effect for reward conditions (environmental reward, monetary reward, and no reward), $F(2, 33) = 3.37$, $p = .047$, $\eta^2 = .17$, and a non-significant interaction effect between time and reward conditions, $V = .31$, $F(10, 60) = 1.09$, $p = .39$, see Figure 6. This evidence does not support hypothesis 2, that environmental rewards will yield the highest teammate advocacy, followed by monetary incentive rewards, while no reward will yield the lowest.

Figure 6

Teammate Advocacy Scores Between Environmental Reward, Monetary Reward, and No Reward Conditions Across Time



Note. The maximum possible teammate advocacy score was 5, while the minimum possible score was 1.

Discussion

This study investigates the effect of hybrid rewards, e.g., rewarding participants for their individual and team performance. Three reward conditions were utilized. The first was an environmental reward consisting of trees planted locally, which was intended to appeal to biospheric values. The second reward was a monetary cash reward, which was meant to appeal to egoistic values. The third condition was no reward. These reward conditions were utilized to examine how rewards impact pro-environmental behavior (PEB), participant advocacy, and teammate advocacy, i.e., advocacy.

The following findings should be interpreted with care as they are based on a small sample, $n = 36$. I hypothesized that any reward (environmental or monetary) that rewards individual and team PEB performance, i.e., hybrid reward, would result in more PEB and advocacy compared to no reward. Additionally, I hypothesized that hybrid environmental rewards meant to target biospheric values would result in more PEB and advocacy compared to hybrid monetary rewards (meant to target egoistic values), as existing research reveals that biospheric values are strongest held by the EU public, while egoistic values are the least strongly held. Participants/teams that received a hybrid reward (environmental or monetary reward) resulted in higher PEB performance compared to individuals/teams that received no reward, supporting hypothesis 1, while no effect was found on advocacy. Specifically, comparing the first PEB measure to the other six timepoint measures found a significant difference in PEB score between reward participants and no reward participants but not so for advocacy. The hypothesis was partially confirmed.

The finding that environmental and monetary rewards in a hybrid orientation (i.e., that rewards individual and team performance) increases PEB can be interpreted in a few ways. First, it may demonstrate that the participants who received rewards perceived those rewards as lining up with their personally held values, which Stern and Dietz (1994) explain leads to stronger participant behavior within interventions. Hypothesis 2 explores this further.

Second, these results may be confirmatory evidence for the multilevel theory of team motivation (Chen & Kanfer, 2006; Pearsall et al., 2010) that rewarding individual effort and team effort leads to stronger overall performance. That it is less about the type of the reward, so long that there is some value associated with it, but more about the reward orientation. However, further research should explicitly compare individual-only, team-only, and hybrid (individual/team) rewards to one another.

Third, it may demonstrate that the reward-feedback mechanism, utilized with environmental and monetary reward participants (but not for the no reward participants), made the participant goal explicit and thus increased overall performance for those receiving a reward. In the future, the no rewards group should also be presented with a feedback mechanism that elicits their PEB individual and team goal, and reports their progress across the timepoints of the study. Finally, these results may be confirmatory evidence that the rewards themselves based on matching the values participants care about, not the orientation, are driving participants to

increase their PEB, similar to Maki et al. (2012), Sloot and Scheibehenne (2022), and Rajapaksa et al. (2019). To better understand the drivers of the performance outcomes with higher fidelity, I turn to hypothesis 2.

I hypothesized that environmental rewards would yield the highest PEB and advocacy, followed by the monetary reward and that no reward would yield the lowest performance. Participants and their teammate that received a hybrid reward (environmental or monetary) performed significantly more PEB than the no reward participants and teammates, supporting hypothesis 2, while no such effect was found on advocacy. Furthermore, environmental rewards were slightly better than monetary rewards in that they led to more PEB participant performance across more timepoints when comparing each (environmental rewards and monetary rewards) to no rewards. Environmental rewards, however, were not found to lead to more PEB when directly compared to monetary rewards, even though the participants held biospheric values in higher regard than egoistic values, matching previous research findings (Bouman & Steg, 2019; European Social Survey, 2016). The lack of PEB difference in environmental compared to monetary rewards may point to a situation where the reward itself acts as a sort of on/off switch for PEB. So, similar to a light switch, there is no controlling of the strength of power, but rather the rewards given turn the switch to the *on* position (while no reward participants stay in the off position). And thus, results for environmental rewards and monetary rewards lead to identical PEB performance, while the absolute biospheric and egoistic values held by the participants play no part. Further research utilizing an altruistic and hedonic reward, in addition to a biospheric (environmental) and an egoistic (monetary) reward, while asking explicitly if the participant finds the reward appealing, may shed more light on whether higher PEB would result from any reward type instead of values. If all rewards lead to the same level of PEB it would indicate that rewards are acting like an on/off switch. In summary, the hypothesis was partially confirmed.

These results are in alignment with the previous research that consistently finds that monetary rewards increase PEB (Maki et al., 2012; Rajapaksa et al., 2019; Sloot & Scheibehenne, 2022). More importantly, these results are the first demonstration, to my knowledge, that environmental rewards may be just as effective at increasing PEB as monetary rewards. While I chose the planting of trees at the environmental reward, these results should encourage additional research comparing environmental reward categories such as types that can be consumed (e.g., green restaurant cards, green transportation cards) and non-consumption

types (e.g., local trees planted or local re-wilding efforts) to conventional rewards used in intervention, e.g., monetary. Next, a replication of this study should be performed with a representative sample, as my sample consisted largely of people within my network who may be uniquely driven to perform PEB for any reward or treat PEB differently than the general population. Additionally, more work should be done regarding how exactly reward orientation (individual rewards, team rewards) impact PEB.

Finally, contrary to hypotheses 1 and 2, no effect was found for participant advocacy and teammate advocacy for time, nor was there an interaction effect between the reward conditions and time, while the groups (environmental, monetary, and no reward) of participants were significantly different in their advocacy scores overall. These findings may be due to a confound in the design. This study had a pre-measure (T0) where PEB was measured, and afterward, reward conditions were communicated to the participants where the environmental and monetary participants learned of the possibility of reward. However, only at T1 were advocacy scores collected for the first time after participants had already learned of the rewards. So at T1, participants who could receive rewards had already learned of them. This participant knowledge may have changed advocacy behavior between the pre-measure (T0) and the first survey (T1). And it may explain the advocacy finding that, for both measures, the participants across all reward groups do not all begin at approximately the same level of advocacy. Instead, participants who were told of potential rewards scored significantly higher than participants in the no reward group who were unaware of rewards. Thus, the lack of interaction effect between reward condition and time could be explained due to the lack of a proper advocacy pre-measure prior to announcing the possibility of receiving rewards to the environmental and monetary groups. A replication of this aspect of the study should be performed with a proper baseline pre-measure for advocacy prior to making any announcement to participants regarding rewards.

Limitations

General limitations include (a) skipping the pilot which could have worked out methodological issues, e.g., avoiding the posting of the incorrect PEB threshold in the reward-feedback section for T1–T3, the removal of the problematic questions "*I am intentional in consuming less meat products*" after the pre-measure due to participant response confusion of how to answer on the Likert scale used, participants providing feedback regarding their confusion around how to accurately respond to a question such as *'Over the last two days, I have*

used a car for short trips' via a Likert scale, including disagreement with their teammate on how to accurately respond; such confusion could have increased the randomness of responses that is not representative of actual difference between conditions but problems with the measurement device itself; according to Kaiser and Wilson (2000), a yes/no response option would be a better format due to less arbitrary responses and more reliability; (b) as the environmental and monetary rewards groups were provided with feedback, it may have made their goal explicit while the no reward condition was not provided with feedback and thus their goal was not made explicitly serving as a possible confound; such may have contributed to the finding of a significant difference of PEB between reward and no reward rather than the reward manipulation itself; (c) asking PEB questions every few days while using PEB questions that are more ecologically valid to be asked weekly or every few weeks; this may have contributed to a weaker signal to noise ratio specifically for the advocacy items; and (d) the sample size is small, with only 36 individuals, which does not provide enough data for making generalizations about the broader population.

Conclusion

As the need for effective pro-environmental interventions intensifies, it remains crucial that such interventions utilize rewards that move people to action. Specifically, interventions could target the biospheric values of individuals to maximize PEB performance. The aim of this study was to investigate the effect of hybrid rewards, e.g., rewarding participants for both their individual and team performance, utilizing biospheric environmental rewards of trees planted locally or egoistic monetary rewards of cash, on pro-environmental behavior (PEB), participant advocacy, and teammate advocacy. This study demonstrates that rewards compared to no rewards elicit greater PEB while failing to demonstrate such for participant advocacy and teammate advocacy performance when compared to no rewards. It further demonstrates that environmental rewards and monetary rewards, compared to no reward, elicit greater PEB but not so for participant and teammate advocacy. It was demonstrated that there are no differences in PEB performance when comparing environmental rewards to monetary rewards. Crucially, this study finds that rewarding people with environmental rewards is just as motivating for encouraging PEBs as providing monetary rewards. This study provides a clear justification for

further investigation into the benefit of environmental rewards in encouraging pro-environmental behavior and how people’s own values factor into the effectiveness of such rewards.

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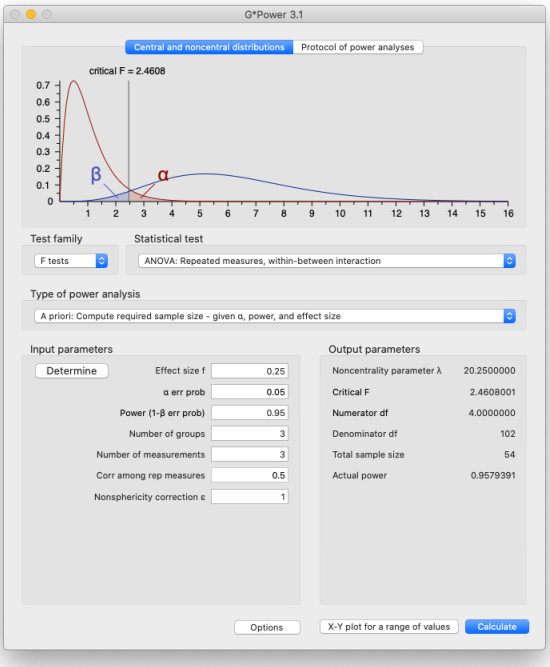
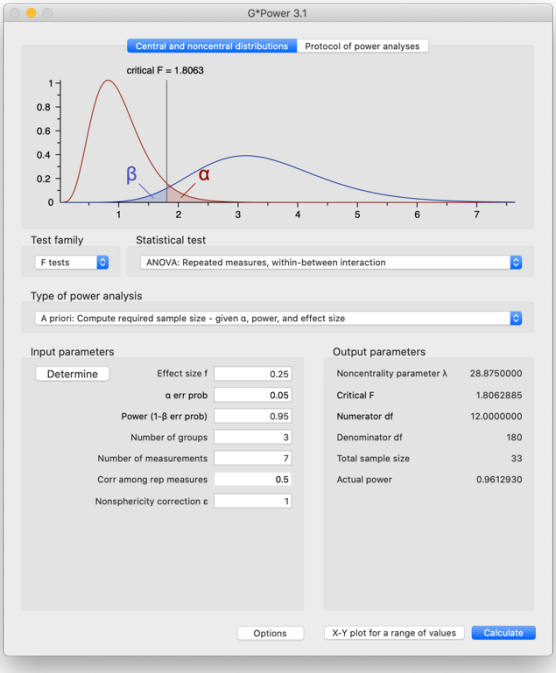
Appendix A. Power Analysis





Appendix B. Pitch Recruitment Text

"Hello [name]. I am recruiting participants for my study."
"Okay, here is how it works."
"I need you to do the study with someone you know (it must be somebody you already know). For example, this person can be a friend, colleague, family member, life-partner, etc. You will be on the team together with this person.

You provide the email address of yourself, and your teammate (to receive survey email links). The study's focus is on team behaviour, about your own behaviour over the past few days. And whether you communicate with your teammate about theirs or your behaviour over the course of the survey.

Behaviours are considered non-sensitive. For example, did you cycle into the city?, did you buy eco-label produce?, responding with "never, sometimes, often, etc."

You (and your teammate) will receive two short surveys (3 minutes per survey) via email, per week for three weeks."
"[Qualtrics-link]"
"[Sunflower emoji]"

Appendix C. Email Wave Distribution Timeline

* Reminders were only sent to participants who the system indicated had not filled out the current open survey

Wave1.0 email announcement sent @ Apr 24, 2023 3:21 PM CEST
Wave1.1 reminder email sent @ Apr 25, 2023 12:07 PM CEST
Wave1.2 reminder email sent @ Apr 25, 2023 8:35 PM CEST
Wave1.3 reminder email sent @ Apr 25, 2023 8:55 PM CEST
Wave1.4 reminder email sent @ Apr 25, 2023 9:04 PM CEST
Wave1.5 reminder email sent @ Apr 26, 2023 9:49 PM CEST
Wave2.0 email announcement sent @ Apr 28, 2023 12:21AM CEST
Wave2.1 email reminder sent @ Apr 28, 2023 1:08AM CEST
Wave2.2 email reminder sent @ Apr 29, 2023 11:03AM CEST
Wave3.0 email announcement sent @ May 1, 2023 5:30AM CEST
Wave3.1 email reminder sent @ May 2, 2023 7:59AM CEST
Wave4.0 email announcement sent @ May 4, 2023 7:59AM CEST
Wave4.1 email reminder sent @ May 5, 2023 8:35AM CEST
Wave5.0 email announcement sent @ May 8, 2023 6:03AM CEST
Wave5.1 email reminder sent @ May 9, 2023 7:14AM CEST
Wave6.0 email announcement sent @ May 11, 2023 3:00AM CEST
Wave6.1 email reminder sent @ May 12, 2023 9:37AM CEST
Wave6.2 email reminder sent @ May 12, 2023 11:20PM CEST

Appendix D. Survey Feedback for Environmental Participants and Monetary Participants

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English

Below is your and your teammate's score, and the reward information.

EARN A REWARD: *10 TREES PLANTED in the Netherlands (by NGO Trees for All)

These native trees species (e.g., European alder) planted (outside of Zwolle) attract/support various plants and animals, expanding biodiversity.

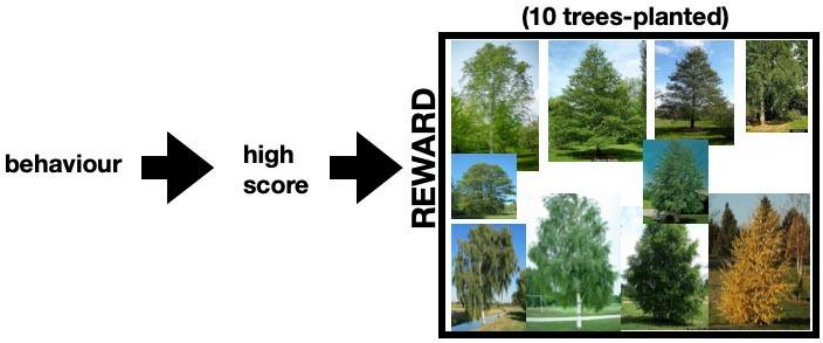
FEEDBACK:
Your latest individual score = 70
A score of 55 or above earns you an entry into the reward lottery.

Your latest team score (you and your teammate) = 99
A team-score of 110 or above earns you, and teammate, an entry into the reward lottery.

HOW: A hybrid of your individual environmentally friendly behaviour and your team's collective high behavior is rewarded with 5 trees planted for individual performance, and 5 trees planted for team performance (per person). You can earn the planting of 10 trees total.

Per behaviour survey, when you score **55 or above** individually, you earn another entry into the reward lottery (5 trees planted), and when your team score is **110 or above**, you each earn another entry into the reward lottery (5 trees planted). You can earn a total of 10 trees planted by NGO Trees for All.

* For each survey you reach the individual and/or team minimum score, you are entered into the lottery, held at the end of the study, for the trees-planted reward.



university of groningen

English

Below, is your and your teammate's score, and the reward information.

EARN A REWARD: TOTALLING *€50

With euros, as a reward, you can shop, attend an event, or eat at a restaurant.

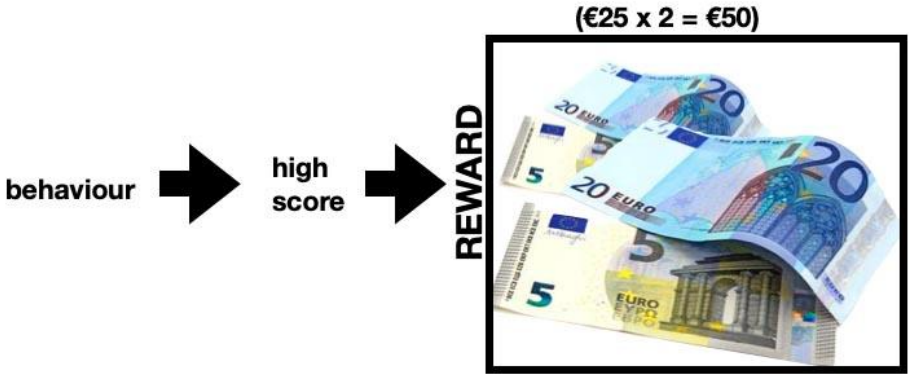
FEEDBACK:
Your latest individual score = 68
A score of 55 or above earns you an entry into the reward lottery.

Your latest team score (you and your teammate) = 135
A team-score of 110 or above earns you, and teammate, an entry into the reward lottery.

HOW: A hybrid of your individual environmentally friendly behaviour, and your team's collective high behavior, is rewarded with €25 for individual performance, and €25 for team performance (per person). You can earn €50 total.

Per behaviour survey, when you score **55 or above** individually, you earn another entry into the reward lottery (€25), and your team score is **110 or above**, you each earn another entry into the reward lottery (another €25). You can earn €50 total.

* For each survey you reach the individual and/or team minimum score, you are entered into the lottery, held at the end of the study, for the cash reward.



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Appendix E. Schwartz's Value Scale Material

Below you will find 16 values. Behind each value there is a short explanation concerning the meaning of the value. Could you please rate how important each value is for you **AS A GUIDING PRINCIPLE IN YOUR LIFE**?

The rating scale is as follows:

0 means the value is *not important at all;* it is not relevant as a guiding principle in your life
3 means the value is *important*
6 means the value is *very important*

-1 means the value is *opposed to the principles that guide you*
7 means the value is of *supreme importance* as a guiding principle in your life; ordinarily there are no more than two such values

Your scores can vary from -1 up to 7. The higher the number (-1, 0, 1, 2, 3, 4, 5, 6, 7), the more important the value is as a guiding principle in YOUR life. Try to distinguish as much as possible between your ratings of the values by using different numbers.

	Opposed to my values -1	Not important 0	1	2	Important 3	4	5	Very important 6	Of supreme importance 7
HELPFUL: working for the welfare of others	○	○	○	○	○	○	○	○	○
PREVENTING POLLUTION: protecting natural resources	○	○	○	○	○	○	○	○	○
SELF-INDULGENT: doing pleasant things	○	○	○	○	○	○	○	○	○
AMBITIOUS: hard working, aspiring	○	○	○	○	○	○	○	○	○

	Opposed to my values -1	Not important 0	1	2	Important 3	4	5	Very important 6	Of supreme importance 7
EQUALITY: equal opportunities for all	○	○	○	○	○	○	○	○	○
RESPECTING THE EARTH: harmony with other species	○	○	○	○	○	○	○	○	○
SOCIAL POWER: control over others, dominance	○	○	○	○	○	○	○	○	○
PLEASURE: joy, gratification of desires	○	○	○	○	○	○	○	○	○
UNITY WITH NATURE: fitting into nature	○	○	○	○	○	○	○	○	○
A WORLD AT PEACE: free of war and conflict	○	○	○	○	○	○	○	○	○

	Opposed to my values -1	Not important 0	1	2	Important 3	4	5	Very important 6	Of supreme importance 7
WEALTH: material possessions, money	○	○	○	○	○	○	○	○	○
AUTHORITY: the right to lead or command	○	○	○	○	○	○	○	○	○
SOCIAL JUSTICE: correcting injustice, care for the weak	○	○	○	○	○	○	○	○	○
ENJOYING LIFE: enjoying food, sex, leisure, etc.	○	○	○	○	○	○	○	○	○
PROTECTING THE ENVIRONMENT: preserving nature	○	○	○	○	○	○	○	○	○
INFLUENTIAL: having an impact on people and events	○	○	○	○	○	○	○	○	○

Appendix F. Pro-environmental Behavior (PEB) Materials

The following are a series of statements about behavior; please read each statement carefully.

Indicate the extent the statement applies to you **regarding the past two days**.

There are no right or wrong answers. If you simply did not perform a behavior, just put no/never (regarding the last 2 days).

Over the past 2 days...

	No/Never	Seldom	Occassionally	Often	Very Often/Always
Answer "Seldom" for this question ===>	○	○	○	○	○
...I refrain from doing the laundry until I have a full load of clothing.	○	○	○	○	○
...I avoided pre-washing (before washing dirty dishes).	○	○	○	○	○
...I have used a clothes dryer.	○	○	○	○	○
...I have aired rooms while keeping on the heat and leaving the windows open, simultaneously.	○	○	○	○	○
...I have turned down the heat (or do not heat) when I leave my apartment for more than 4 hours.	○	○	○	○	○
...I have used a car for short trips.	○	○	○	○	○
...I have used public transportation, or a bicycle, or walked, to reach nearby areas (30 km).	○	○	○	○	○
...I have ridden a bike, or used public transportation, or walked to get to work or school.	○	○	○	○	○
...when I was in a store I bought a new plastic bag.	○	○	○	○	○
...I bought beverages and other liquids in returnable bottles.	○	○	○	○	○
...I bought products in refillable packages.	○	○	○	○	○
...I bought produce with eco-labels.	○	○	○	○	○
...I consumed meat.	○	○	○	○	○
...I collected used paper for recycling.	○	○	○	○	○
...I collected empty bottles, or brought empty bottles to a recycling bin.	○	○	○	○	○
...I read about an environmental issue.	○	○	○	○	○
...I talked with friends about environmental pollution, climate change, and/or energy consumption.	○	○	○	○	○
...I pointed out un-ecological behavior to someone.	○	○	○	○	○

Appendix G. Advocacy Materials

You performed this study with a teammate. This question is about being an advocate, toward your teammate, for pro-environmental behaviour. By being an advocate, we mean doing things such as setting an example for others, motivating others to act on climate change, and raising the issue of climate change in conversations.

How frequently did **you encourage your teammate** to engage in behaviour(s) friendly toward the environment?

- ○ Never
- ○ Sometimes
- ○ Regularly
- ○ Often
- ○ Very often

How frequently **did your teammate encourage you** to engage in behaviour(s) friendly toward the environment?

- ○ Never
- ○ Sometimes
- ○ Regularly
- ○ Often
- ○ Very often

Appendix H. Homogeneity of Variance Violations Across Timepoints When Comparing Reward Conditions

Table 3

Homogeneity of Variance Violations Across Timepoints When Comparing Reward Conditions

		Rewards, No Rewards		Environmental, Monetary, No Reward	
Dependent Variables	Timepoint	$F(1, 34)$	p	$F(2, 33)$	p
PEB	T1	-	-	3.78	.033
Participant Advocacy	T2	5.30	.028	-	-
	T4	5.28	.028	4.37	.021
	T5	4.45	.042	3.43	.044
	T6	7.78	.009	4.94	.013
Teammate Advocacy	T2	5.48	.025	3.81	.033
	T3	8.01	.008	6.79	.003
	T4	5.29	.028	-	-
	T5	4.05	.052	3.79	.033
	T6	9.59	.004	5.41	.009

Note. Non-significant results are not included.

Appendix I. Linearity Violations Across Timepoints When Comparing Environmental, Monetary, and No Rewards

Table 4

Linearity Violations Across Timepoints When Comparing Environmental, Monetary, and No Rewards

Dependent Variables	Timepoint	$F(1, 33)$	p
PEB	T6	4.58	.040
Participant Advocacy	T4	9.81	.004
Teammate Advocacy	T1	4.52	.041
	T4	11.89	.002
	T5	5.04	.032

Note. Only significant results are included while non-significant results are not included.

Appendix J. Step-1 Pre-registration Process

English

Welcome to a Groningen University study.

Purpose: This study investigates how people behave when on a team. This study will focus on the behavior information of you, and your teammate.

How: You will be asked to recruit your teammate, to this study, on the next screen. It must be somebody you already know. For example, this person can be a friend, colleague, family member, life-partner, etc. You will be on the team together with this person.

Duration: You (and your teammate) will receive two short surveys (3 minutes per survey) per week, via email, for three weeks.

→

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English

Please secure the consent of your teammate partner before entering their email address below.

Please enter your email address, and the email address of your teammate below. A confirmation email will send to both of you, and a few more questions will be answered via the confirmation link.

What is your email address (the email address we will send the survey link to)?

What is the email address of your teammate partner?

Is consent, from your partner teammate, given to submit their email on this form?

- Yes
- No

→

An email has been sent to you, and your teammate. Follow the emailed link to complete your registration.

Your teammate will also need to follow their emailed link to complete their registration, for the team.

Appendix K. Step-2 Pre-registration

English

Thank you for confirming your email address.

Please check on your teammate to be certain they also followed the link in their email inbox, to complete their registration.

You will now be taken through the study details, and asked some questions, to complete your registration.

→

Appendix L. Demographics

What is your status regarding being a student?

- ○ I am currently an enrolled student.
- ○ I am currently not enrolled and/or not a student.

What is your gender?

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer not to say

What is your highest level of completed formal education?

- ○ Pre-high school
- ○ High school
- ○ Pre-university
- ○ Bachelor's degree
- ○ Master's degree
- ○ PhD or equivalent
- ○ Other

What is your main association with your teammate (i.e., how do you know them)?

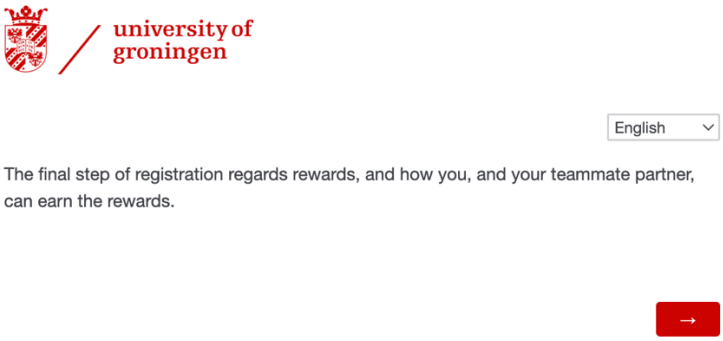
- ○ Family
- ○ Friend
- ○ Work colleague
- ○ Other
- ○ Spouse/Partner/Mate

What is your primary nationality?

What is your current age?

Appendix M. Pre-registration Rewards Explanation

* No-rewards group skips this page.



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English

Summary: This study is about team behaviour.

WHAT: Performing environmentally friendly behaviors earns points.

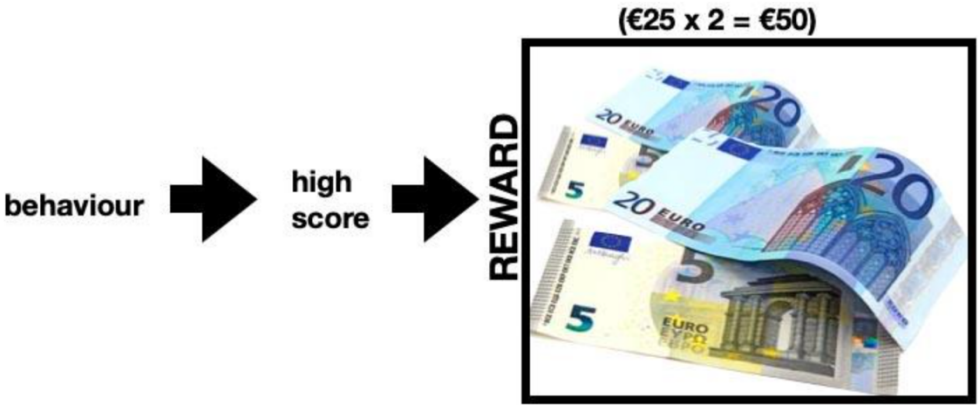
EARN A REWARD: TOTALLING *€50

HOW: A hybrid of your individual, and your collective team's high environmentally friendly behaviour is rewarded with €25 for individual performance, and €25 for team performance (per person). You can earn €50 total.

Per behaviour survey, when you score certain amount of points individually you *earn the reward (€25), and when you score a certain amount of points as a team you each *earn the reward (another €25). You can earn €50 total.

With euros, as a reward, you can shop, attend an event, or eat at a restaurant.

* For each biweekly survey where you reach the minimum points, you will be entered into the lottery at the end of the study for the cash reward. More information will be provided in the next survey.



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English

Summary: This study is about team behaviour.

WHAT: Performing environmentally friendly behaviors earns points.

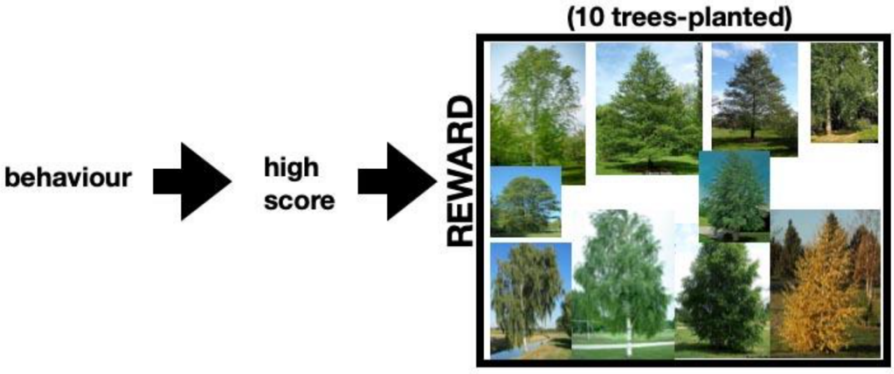
EARN A REWARD: *10 TREES PLANTED in the Netherlands (by NGO Trees for All)

HOW: A hybrid of your individual, and your collective team's high environmentally friendly behaviour is rewarded with 5 trees planted for your individual performance, and 5 trees planted for your team's performance (5 trees per person). You can earn the planting of 10 trees total.

Per behaviour survey, when you score a certain amount of points individually you *earn the reward (5 trees planted), and when you score a certain amount of points as a team you each *earn the reward (5 trees planted). You can earn a total of 10 trees planted by NGO Trees for All, and your teammate can do the same.

These trees planted (outside of Zwolle) aid in attracting and supporting various plants and animals returning to the area which expands biodiversity. The variety of trees planted will consist of native species (e.g., European alder, European birch).

* For each biweekly survey where you reach the minimum points, you will be entered into the lottery at the end of the study for the trees-planted reward. More information will be provided in the next survey.



Appendix N. Reward Manipulation Check

English

What reward can you earn?

Appendix O. User Feedback Form Page

English

Thank you for completing the registration :)

You and your teammate will begin to receive two emails per week (Monday, Thursday), for three weeks, very soon.

Finally, do you have any feedback so far? Please feel free to share.

Appendix P. Debrief

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English

🎉 **Hurray! You have completed the experiment. Now is the explanation of what this experiment was all about...**

DEBRIEFING ABOUT THE RESEARCH

"Motivation of Behaviour when on a Team"
PSY-2223-S-0216

Debriefing about the research
Thank you for your participation in this study!
Please read the following information carefully.

Why do I receive this information?
You are receiving this debriefing information because some of the information regarding the purpose of this research has been withheld from you. The researchers chose not to fully disclose the aim of this study to you beforehand, in order to prevent socially desirable responses and participant bias (i.e. answering in a way that you think the researchers would want you to). Now that you have completed the study, we would like to tell you the actual purpose of this study.

The actual purpose of the study
While we are genuinely interested in behaviour of teams, as mentioned earlier, the actual aim of this study was to test whether different incentive rewards (monetary, sustainable), and/or incentive reward structure (individual vs team) affected pro-environmental behavior, and/or ambassadorship behavior (trying to convince/persuade/assist others to be more pro-environmental).

Specifically, do monetary incentives (cash) or sustainable incentives (trees planted outside Zwolle, Netherlands, by an NGO Trees for All), coupled with individual and/or team incentives, work better, compared to no rewards, to elicit pro-environmental and

ambassadorship behaviour.

Lottery mechanics?

This study consisted of three groups: monetary, sustainable, and control (no reward).

Six lotteries will be held. Two lotteries per group. A lottery for the individual and a lottery for the team. The lotteries will be held on May 15th. An email will be sent to all participant explaining whether you won or lost the lotteries.

All participants in the monetary and sustainable groups were able to be entered into their lotteries per the weekly surveys, based on whether they reach/surpassed the score threshold as stated in the survey (one as an individual entry, and another as a team entry). The monetary lottery winners award is 25 euros per win, whereas the sustainable winners reward is the planting of 5 trees per win (a 25 euro value).

All participants in the control group, who were offered no incentives during the study, are by default entered in to their two lotteries, for all all six surveys (one as an individual, and another as a team). Those who win the lottery are allowed to choose either the monetary reward (25 euros per win) or sustainable reward (5 trees planted per win). This is done to achieve a level of fairness amongst all participants.

All participants in the study will received an email announcing whether you won or lost the lotteries. The odds of winning, for all participants, are better than 1 out of 36.

Drop-outs and Non-response

In regards to the lottery, when a partner (the other participant of the team) drops out or is non-responsive (for any of the six surveys) then your score will be duplicated and used, as if it was generated by the other team member. This ensures you are still given 100% opportunity in the lottery, as if your partner was an active participant for the entire study. This method will be used for all dropouts and for all non-responses for you and your teammate.

What else do you need to know?

The results from this study could be important as they provide insight into how best to design societal interventions that are aimed to get individuals to act more pro-environmentally and to perform ambassadorship behaviour.

If you want to withdraw from our study (or be in contact for any other reason), after reading about its true purpose, you can send an email to t.g.tuttle@student.rug.nl to ask for your data to be removed. You do not need to explain why, and there will be no negative consequences for you if you decide to withdraw. You must make the request on or before August 31st, 2023.

Do you have questions/concerns about your rights as a research participant or about the conduct of the research? You may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: ec-bss@rug.nl.

As a research participant, you have the right to a copy of this research information. Please feel free to make a screenshot or use you browser's print-screen function.

Appendix Q. Feedback Form Page

English

Do you have any feedback so far? Please feel free to share.