Collective responsibility framing also leads to mitigation behavior in East Asia: a replication study in Taiwan

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Abstract

Mitigating climate change will require the participation of citizens and consumers. A recent study in *Climatic Change* by Obradovich and Guenther reported that framing responsibility for climate change in terms of collective—as opposed to personal—behaviors generated greater donations to environmental groups as well as higher self-reported levels of willingness to adopt environmentally-friendly behaviors. As East Asia is the leading emitter of greenhouse gases globally, these findings are or clear relevance to the region. Nonetheless, recent findings in cultural psychology suggest that this framing intervention may not have the same results in an East Asian cultural context. We therefore sought to determine whether these findings could be replicated in East Asia. For this study, 2085 university students in Taiwan were randomly assigned to receive either a collective responsibility priming task, a personal responsibility priming task, or a daily routine priming task (control). They were then given the opportunity to donate to a climate-related cause and asked to report on their likelihood of changing their personal behaviors to reduce carbon emissions. Participants in the collective and personal conditions donated significantly more than those in the control condition and those in the personal responsibility condition reported significantly lower probabilities of changing their behaviors than those in both the control and collective responsibility conditions. Our study provides a partial replication with a different demographic group and in a different cultural setting, strengthening the argument for collective responsibility framing and setting the stage for research into practical implementations.

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1 Introduction

Recent reports have argued that the climate is likely changing more quickly than anticipated (IPCC 2018) and mitigation efforts are progressing more slowly than projected based on the Paris agreements and far more slowly than needed to prevent dangerous levels of change (UNEP 2018). To prevent global climate change from reaching catastrophic levels, identifying ways to encourage consumers to reduce their carbon footprints appears essential; yet, progress to date has been disappointing.

Ever since early experimental demonstrations that people make different choices based on the same information when it is presented or 'framed' in different ways (Tversky and Kahneman 1981; McNeill et al. 1982), the possibility of using framing to 'nudge' people towards more environmentally-friendly decisions has been seen as promising. However, results in terms of encouraging pro-environmental behavior have been mixed. In a review of co-benefits framing, Bernauer and McGrath (2016) found no consistent positive effect. Similarly, Li and Su (2018) found a generally positive effect in their meta-analysis of framing studies involving environmental, economic, and moral frames, but failed to find differences based on public health or geographic identity frames.

While these studies have focused on different *topic* frames, a recent study by Obradovich and Guenther (2016) has added a new dimension to the research on framing. Starting with the observation that much environmental messaging addresses personal responsibility, the authors note that such framing may elicit demotivating sentiments and therefore evaluated an approach that focuses instead on *collective* responsibility for climate change to encourage sustainable behavior. In their study, they used a short writing exercise asking participants to describe either how they were *personally* responsible for greenhouse gas emissions *or* how society as a whole was *collectively* responsible. Across three experiments, they found that collective responsibility framing was more successful than personal responsibility framing at encouraging pro-environmental donations and willingness to reduce future emissions. The authors suggested that personal responsibility framing induced feelings of guilt and cognitive dissonance, leading participants, through 'reactance motivation,' to actually *reduce* the perceived significance of environmentally destructive behaviors and thus to feel less motivated to donate to environmental causes or change their own behavior.

The possibility, suggested by the authors, that guilt and subsequent 'reactance motivation' was the mechanism underlying these results is in line with recent assertions of the importance of the emotional content of environmental messages (Tauber et al. 2015; Truelove et al. 2014). Guilt and pride as a pair have received particular attention. Bissing-Olson et al. (2016), for example, found that pride is a more effective motivator than guilt for environmentally related behavior. Similarly, Schneider et al. (2017) found that anticipated pride elicited greater pro-environmental decision making and behavioral intentions than did anticipated guilt, with the latter eliciting a negative 'reactance' effect. Taken together, these studies suggest the further possibility that, in the Obradovich and Guenther study, it was not only guilt that was involved, but also pride. The personal responsibility framing may have induced guilt and reactance avoidance. The collective responsibility frame may have diluted the feeling of guilt by assigning responsibility to the population as a whole, while also offering the participants the chance to appear *relatively* virtuous and thus possibly inducing a sense of 'anticipated pride' at the prospect of donating more or agreeing to reduce their emissions.

In short, Obradovich and Guenther's findings are consistent with a growing body of research showing that framing that induces positive emotions (such as pride) is more effective

in encouraging mitigation behavior than is negative framing. However, all of these results were found in studies in Western countries. Would these results hold for other, non-Western parts of the world?

This is a critical question as this region is currently responsible for about 34% of global CO_2 emissions, a higher level than that of the US and EU combined (Di Giusto et al. 2018). China, Japan, South Korea, and Taiwan are all struggling in their efforts to reduce emissions, receiving grades of "poor" or "very poor" in the 2018 annual Climate Performance Indexes (Burck et al. 2017). East Asia will clearly need to implement more effective strategies for reducing greenhouse gas emissions. If collective responsibility framing is one such strategy, then it represents an important potential tool for East Asian policy makers.

Yet, an extensive body of research documenting cultural differences in psychological traits and cognitive processing warns against the assumption that results generalize across cultural settings (Henrich et al. 2010; Kitayama and Park 2013). In fact, based on the very different nature of the 'self-concept' in Western and East Asian cultures, we suspect that personal and collective responsibility frames, operating through mechanisms involving guilt and pride, might actually generate the *opposite* results in East Asian societies. People raised in more individualistic Western cultures have been shown to have more independent self-concepts, centered on an autonomous agent seeking to pursue individual goals and desires. By contrast, people raised in more collectivistic East Asian cultures present more 'interdependent' self-concepts, in which the self is inherently connected to other people and where relational harmony is prioritized (Markus and Kitayama 1991, 1994). Critically, responses to such emotions as guilt and pride are fundamentally linked to the maintenance of one's self-concept in such a way that different self-concepts are associated with different responses to these emotions.

In Western, individualistic societies, the emotion of pride offers an appraisal of a situation that is focused on personal achievement and recognition, and this is supportive of an independent sense of self. The emotions of guilt and shame, by contrast, offer an appraisal focused on failure to meet one's expectations for oneself, to abide by a norm or to meet social expectations, and this failure represents a threat to the independent self (Tracy and Robins 2004). In contrast, for collectivistic societies in which the self is experienced as interdependent, these emotions take on very different meanings (Mesquita and Karasawa 2004).

Where the self is interdependent, identity goals are collective and not individual. Failing to meet expectations thus threatens not only one's own identity but also that of other group members. Within this context, avoiding feelings of guilt or shame and failing to change one's behavior is problematic because the behavior in question threatens the social face of one's ingroup members. Acknowledging and responding to feelings of guilt or shame, on the other hand, signal that the individual accepts and will behave according to the group's norms. Instead of being a threat to self-esteem, as in Western societies, these feelings are important for group cohesion and the development of the interdependent self (Mascolo et al. 2003; Wallbott and Scherer 1995). This implies that *reform* and not *avoidance* is the culturally appropriate response (Mesquita and Karasawa 2004).

Conversely, pride based on one's own accomplishments is inconsistent with the interdependent self since individual pride (as opposed to pride in a group's achievements) threatens group cohesion (Mesquita and Karasawa 2004; Stipek 1998). Consequently, in East Asian societies, displays of self-effacement and explicit external attributions (acknowledgment of the contributions of others to one's successes) are culturally appropriate responses to being recognized for one's personal achievements (Mascolo et al. 2003; Kitayama et al. 1997). In

line with these assertions, East Asians have been shown to experience guilt more frequently and more intensely and pride less frequently and less intensely than Westerners (Kitayama et al. 2006). Finally, and critically, East Asians have been shown to be motivated to act in response to these feelings of guilt or shame (Mascolo et al. 2003).

We thus anticipated that East Asian respondents would respond differently to the personal and collective responsibility framing conditions. Specifically, if a "reactance avoidance" response to guilt induced by the individual responsibility condition was the mechanism responsible for the lower donations and reported likelihoods to change in the Obradovich study, we argue that such a mechanism would not play this role in an East Asian context, where guilt signals the need for self-improvement. Similarly, while the experience of pride may motivate Westerners to increase donations or change their behavior, we expect that this mechanism would be inoperative in East Asia, given that distinguishing oneself from others is culturally discouraged. In short, East Asians may respond to guilt and pride in precisely the opposite fashion from Westerners.

Thus, in this study, we attempt to determine whether Obradovich and Guenther's findings can be replicated in Taiwan. Taiwan is a relevant setting for this replication for a number of reasons. First, the mitigation challenges faced by East Asian countries are well represented in Taiwan. As of 2014, Taiwan had the highest level of per capita emissions in East Asia (EIA 2013; Boden et al. 2017). Taiwan has announced ambitious goals for reducing emissions but has struggled in its efforts (Burck et al. 2015). Taiwan is also a highly relevant setting in that it is culturally similar to the other countries of East Asia, providing a critical population outside of the Western cultures overrepresented in the field of psychology (Arnett 2008; Henrich et al. 2010).

As noted, Obradovich and Guenther found collective responsibility framing to produce better results than personal responsibility framing across three experiments. In their first experiment using 1215 members of the Audubon Society (a pro-environmental not-for-profit organization), participants in the collective responsibility condition donated significantly more to environmental organizations than did participants in the control condition ($p = .028$; and more than participants in the personal responsibility condition, significant only at the 0.10 level with $p = .076$). This was replicated in a second experiment with 304 paid workers from the general population on the online crowdsourcing platform MTurk. Collective responsibility framing significantly increased donations of MTurk workers compared to those in the personal responsibility condition ($p = .036$) and to those in the control condition ($p = 0.054$). In a meta-analysis of the Audubon and MTurk worker samples, participants in the collective treatment donated significantly more than those in the personal ($p = 0.018$) and control ($p = 0.007$) conditions. In a follow-up study, 78% of the original MTurk participants were again asked, approximately 2 days later, how much they would be willing to donate to environmental organizations. Participants from the original collective condition again gave significantly more than those in the personal condition ($p = 0.031$). Finally, in a third experiment, a new sample of 451 MTurk participants was given the priming task and then asked *How likely are you to reduce your own climate-change-causing behaviors in the future*? The participants in the collective responsibility framing group reported significantly higher likelihoods of reducing their own future emissions than did those in the personal responsibility group ($p = 0.022$).

The current experiment was conducted as part of a broader investigation of attitudes towards climate change among Taiwanese university students. To date, the attitudes of university students towards climate change remain relatively understudied (Wachholz et al. 2014). As students represent the next generation of consumers, interventions that positively

influence their habits are likely to have the greatest impact. Here, we seek to replicate the findings that collective responsibility framing leads to higher donations and higher likelihood of behavioral change in a different sample.

2 Method

Our study was carried out in a set of three experiments with three different samples ($n = 412$, 843, and 830) of university students attending a private university located in Taipei, Taiwan. We did the initial exploratory study with a sample size of 412 (experiment 1). As the results did not suggest a clear replication of the original findings, it was determined that we needed a larger sample. Current best practice in terms of replications call for a sample size of at least 2.5 times that of the original study (Simonsohn 2015). Our aim was to replicate by a minimum of 2.5 times the sample size in Obradovich and Guenther's final experiment of 451 participants. We thus gathered a new sample of 843 participants (experiment 2) to add to our original sample size for a pooled sample of 1255. Finally, to further extend the study, we decided to run the survey on a digital platform (Survey Monkey) to determine whether the results would remain the same. This final sample of 830 participants (experiment 3) was intended to be comparable in size to the second sample of 843 participants. Our pooled total of 2085 students across the three experiments allowed us to replicate both Mturk samples ($n = 304$ and $n = 451$) from the original study. Our sample was also larger than the Audubon sample from the original study ($n = 1215$), but not by 2.5 times. In experiments 2 and 3, participants were asked to indicate age and gender. Ages ranged from 18 to 43, with a mean age of 20.3 (SD = 1.54). As for gender, 64.8% ($n = 1062$) of the participants were female and 35.2% were male. Participants who did not report being both students and Taiwanese citizens were excluded from the study ($n = 3$ for experiment 2; $n = 98$ for experiment 3) and are not included in the sample sizes above. There were no additional studies or conditions not reported here. The participants in this study were not involved in any other part of the broader investigation mentioned above.

In the original experiments (Obradovich and Guenther 2016), participants were randomly assigned to one of three conditions involving a short priming task, all of which asked them to write about one paragraph of text in response to a cue. Participants in the personal responsibility condition described ways in which they, as individuals, contributed to climate change, while participants in the collective responsibility condition wrote about how members of society collectively caused climate change. Participants in the control condition were simply asked to describe their daily routine, with no mention of climate change. In three of the experiments, the participants were then told that they had a chance to win a lottery prize of USD 100 and were asked how much of this they would be willing to contribute to an environmental organization. In a fourth experiment, participants were instead asked to state the likelihood that they would reduce their climate-change-causing behaviors, using a percentage scale from 0 to 100.

For the present study, the original instructions for the task (Obradovich and Guenther 2016) were translated through an iterative back-translation process, resulting in Chinese (traditional script) prompts (see English and Chinese versions in supplementary file ESM 1). For the donation, instead of USD 100, we used 1000 New Taiwan Dollars (equivalent to about USD 66 using a purchasing power parity conversion factor or USD 31 by direct conversion (Economy Watch 2016)). As the participants were university students, the magnitude of the lottery prize was arguably comparable to the USD 100 offered to the participants in the original

study, many of whom were not university students. In the present study, all participants were asked both the donation question and the likelihood-to-change question. Finally, while participants in the original study were asked about their belief in climate change, we did not ask this, as climate change denial is nearly non-existent in Taiwan (Di Giusto et al. 2018).

Experiment 1 In our first study in March and April 2017, we randomly assigned 412 university students to receive one of three writing tasks on a paper handout: the personal responsibility priming task, the collective responsibility priming task, or the 'daily routine' task, which served as the control. Participants were then told that they would be included in a lottery and asked how much of the NTD 1000 prize they would be willing to donate to an environmental organization if they won. Finally, they were asked "On a scale of 0 to 100, how likely are you to reduce your own climate change causing behaviors in the future?"

Experiment 2 A second paper-and-pencil experiment was administered to 843 students between September and November 2017. The design was identical to that of experiment 1 except that we randomly assigned students to one of two versions differing in the order of the "donation" and "likelihood of reducing future emissions" questions, in order to test for order effects. In Version A, the donation question was asked first, followed by the question on the likelihood of changing future behaviors. In Version B, this order was reversed. Four demographic items were also added, asking participants to include their gender, age, occupational status, and country of origin.

Experiment 3 To facilitate data acquisition, we repeated experiment 2 using an online survey on the Survey Monkey platform. A total of 830 students responded to our online survey between October 2017 and January 2018. After finding that the order of the questions (experiments 2A and 2B) did not significantly affect our outcomes (see results for experiment 2 below and ESM Table S1 for full results), we reverted to the single version used in experiment 1. The four demographic items from experiment 2 were retained.

For both the donations and self-reported probabilities of behavioral change, Shapiro-Wilk's tests indicated that the distributions were not normally distributed ($p < .05$). Therefore, subsequent analyses were performed using Kruskal-Wallis H tests (a KW test is similar to an ANOVA but for non-parametric data), after non-parametric Levene's tests verified the equality of variances in the samples ($p > .05$). These analyses were performed using SPSS v. 20 (IBM Corp. 2011) and R (R Core Team 2013). Following the analyses of the individual experiments, we pooled the data from the three experiments and performed a retrospective 'individual participant data' (IPD) pooled analysis, the preferred method when all individual participant data is available (Cooper and Patall 2009; Thomas et al. 2014). As in the original Obradovich and Guenther (2016) study, we used ordinary least square regression with a fixed effect to control for the characteristics specific to the individual experiments (Riley et al. 2010). The Sandwich package (Zeileis 2004) was used to estimate robust standard errors.

3 Results

Results with all means and standard deviations for each experiment are displayed in Table 1 and for the pooled results in Table 2.

Table 1 Means and standard deviations for essay length, donations, and likelihood of behavioral change across treatment groups, all experiments

	N	Number of Chinese characters in writing task Mean (SD)	Donation to climate efforts Mean (SD)	Likelihood of reducing future emissions Mean (SD)
Experiment 1				
Personal	137	22.5 (13.8)[b]	516.4 (315.4)	64.3 (20.8)
Collective	136	28.1 (17.9)[a]	536.1 (337.7)	66.4 (21.8)[a]
Control	139	37.2 (18.8)	484.4 (313.8)	67.7 (19.6)[c]
Total	412	29.3 (18.0)	512.1 (322.3)	66.2 (20.7)
Experiment 2				
Personal	292	25.8 (16.5)	524.2 (338.1)[d]	59.5 (23.0)[e]
Collective	273	35.6 (22.9)	561.6 (343.0)[f]	63.4 (23.2)[g]
Control	278	41.9 (21.6)	522.5 (336.2)[h]	64.0 (24.0)[i]
Total	843	34.3 (21.5)	545.5 (334.4)	62.2 (23.4)
Experiment 3				
Personal	297	17.3 (16.7)	564.0(325.0)	61.1 (21.9)
Collective	249	23.9 (22.6)	540.0 (335.0)	63.6 (22.1)
Control	284	36.3 (28.2)	498.0 (320.0)	62.1 (21.9)
Total	830	25.8 (24.3)	534.5 (327.2)	62.2 (21.9)

[a] $n = 135$, with one incomplete response

[b] $n = 136$, with one incomplete response

[c] $n = 137$, with two incomplete responses

[d] $n = 289$, with three incomplete responses

[e] $n = 288$, with four incomplete responses

[f] $n = 266$, with six incomplete responses

[g] $n = 268$, with five incomplete responses

[h] $n = 273$, with five incomplete responses

[i] $n = 274$, with four incomplete responses

Experiment 1 Donations did not differ significantly across collective, personal, and control groups, Kruskal-Wallis $\chi^2(2) = 1.75$, $p = .42$ (see Table 1). Likewise, no significant difference was found in the likelihood of reducing future emissions across the three groups, KW $\chi^2(2) = 2.40$, $p = .30$.

Experiment 2 The order of the questions (donations/likelihood-to-change in Version A; likelihood to change/donations in Version B) did not significantly affect the donation amount

Table 2 Pooled analysis: means and standard deviations for donations and likelihood of behavioral change across treatment groups

	Dependent variables		
	Number of Chinese characters in writing task Mean (SD)	Donations to climate efforts Mean (SD)	Likelihood of reducing future emissions Mean (SD)
Personal	21.7 (16.5) $n = 725$	542 (327) $n = 725$	61.1 (22.2) $n = 722$
Collective	29.6 (22.5) $n = 657$	554 (335) $n = 651$	64.1 (22.5) $n = 652$
Control	38.7 (24.2) $n = 701$	508 (324) $n = 696$	64.0 (22.4) $n = 695$
Total	29.9 (22.4) $n = 2083$	534 (329) $n = 2070$	63.0 (22.4) $n = 2069$

(Mann-Whitney test, $W = 87,930$, $p = 0.50$) or the likelihood of reducing future emissions ($W = 91,704$, $p = 0.10$) (for full results, see ESM 1, Supplementary Table S1). Therefore, both versions were pooled for the subsequent analysis.

Again, no significant difference was found in donations across the three groups (Kruskal-Wallis test, $\chi^2(2) = 3.77$, $p = .15$; see Table 1). For the likelihood of reducing future emissions, a significant difference across groups was found (KW $\chi^2(2) = 6.32$, $p = .042$) that was not, however, confirmed by pairwise Wilcoxon test comparisons (collective vs. control: $p = 0.69$, personal vs. collective: $p = 0.07$, personal vs. control: $p = 0.06$).

Experiment 3 Framing had a significant effect on donations (Kruskal-Wallis test, ($\chi^2(2) = 6.23$, $p = .04$) but the differences were not in the expected direction. Participants in the personal responsibility condition donated the highest amount, significantly more than the control group (pairwise Wilcoxon tests: collective vs. control: $p = 0.21$, personal vs. collective: $p = 0.41$, personal vs. control: $p = 0.04$). For likelihood of reducing future emissions, no significant difference was found across the three conditions (KW, $\chi^2(2) = 2.22$, $p = .33$).

Pooled analysis Donations in both the personal and collective framing conditions were significantly higher than those in the control condition (heteroskedasticity robust OLS $t = -2.58$, $p = 0.01$; see Tables 2 and 3, and Fig. 1a). For likelihood to change, self-reported probabilities were significantly *lower* in the personal framing condition than in both the personal and collective framing conditions (heteroskedasticity robust OLS $t = -2.42$, $p = 0.02$) (see Tables 2 and 3 and Fig. 2a).

As can be seen in the kernel density curves (Fig. 1b), the distribution of donations was essentially tri-modal: a large number opted to give between NT$100–300 ($n = 485$, 23.3%), while the greatest number of participants ($n = 724$, 34.7%) opted to donate half of their winnings and a third group chose to donate all the winnings ($n = 516$, 24.7%). This distribution was found across all three experiments as well but

Table 3 Fixed-effect regression results for the pooled sample

	Dependent variables			
	Donation		Likelihood-to-change	
	Collective as reference	Personal as reference	Collective as reference	Personal as reference
Personal	− 0.70 (19.41)		− 2.42* (0.58)	
Control	− 2.59** (2.03)	− 1.94* (17.81)	− 0.10 (0.86)	2.35* (0.88)
Collective		0.70 (19.41)		2.42* (0.58)
Degrees of freedom	2064		2063	
R^2	0.003		0.004	
Adjusted R^2	0.001		0.001	
F	3.64		3.83	
p value	0.026		0.022	

Notes: $*p < 0.05$; $**p < 0.01$, $***p < 0.001$

Results from ordinary least square regressions with Huber-White heteroskedasticity robust standard errors (White 1980) and fixed effects (Riley et al. 2010) for the separate experiments (1, 2, and 3). 'Collective as Reference' and 'Personal as Reference' refer to the group used as the reference category for comparison with the other two groups. This analysis includes the framing effects within experiments for the whole pooled sample (2085 students). Within each cell, the first value is the t score; the second value (below, in parentheses) is the robust standard error
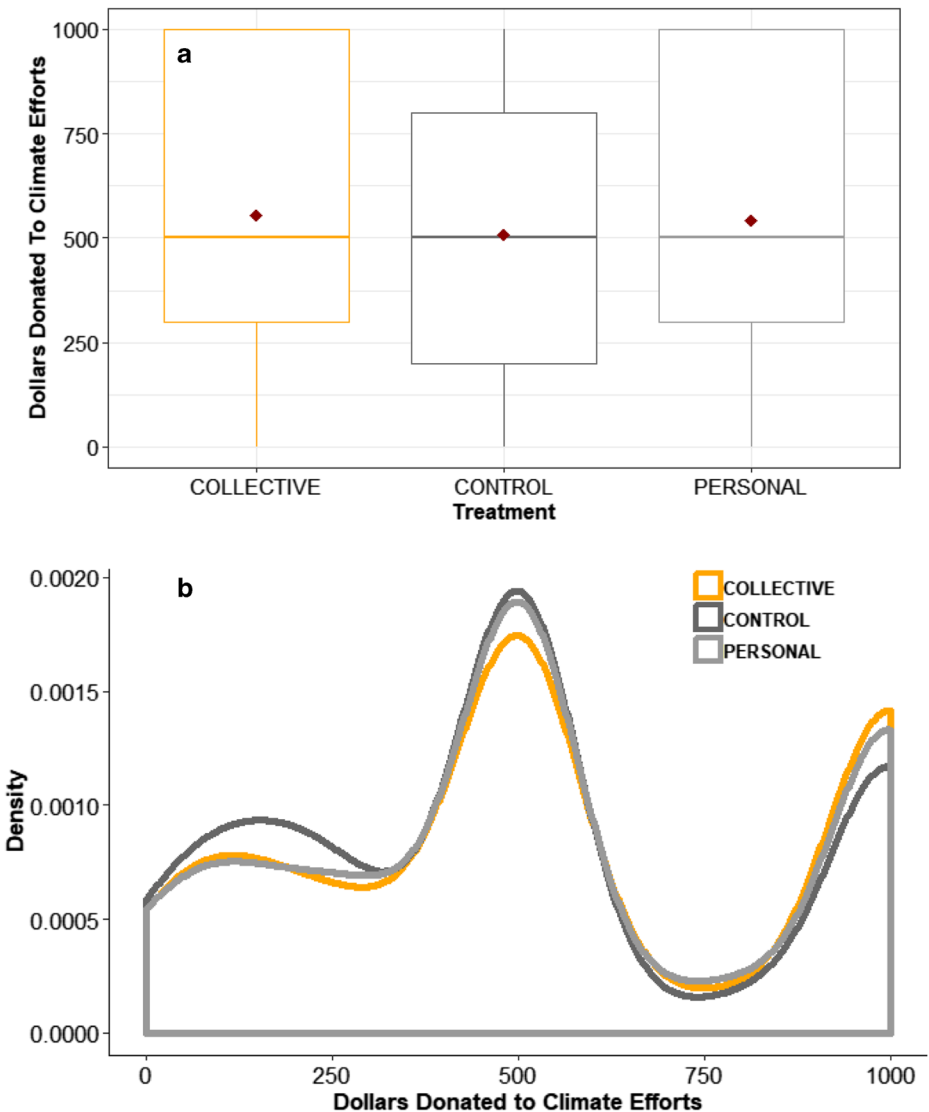
Fig. 1 Collective and personal responsibility framing increased donations compared to the control among Taiwanese university students. **a** Boxplots with mean (black diamond), median, first and third quartiles and min-max across treatment groups ($n = 2085$). **b** Kernel density plots of donations for each of the three experimental groups

differs markedly from those in the original study. The kernel density curves for likelihood of reducing future emissions across all conditions (Fig. 2b) were bimodal, with peaks at 50% ($n = 529$, 25.4%) and 70–80% ($n = 629$, 30.2%). Only a small number of participants indicated likelihood to reduce future emissions below 50% ($n = 290$; 13.9%).

Across all experiments, participants in the control group wrote significantly more than those in the collective framing group, who in turn wrote significantly more than those in the personal framing group (Exp. 1: Kruskal-Wallis test, $\chi^2(2) = 50.72$, $p < 9.7 \times 10^{-12}$; Exp. 2: KW test,
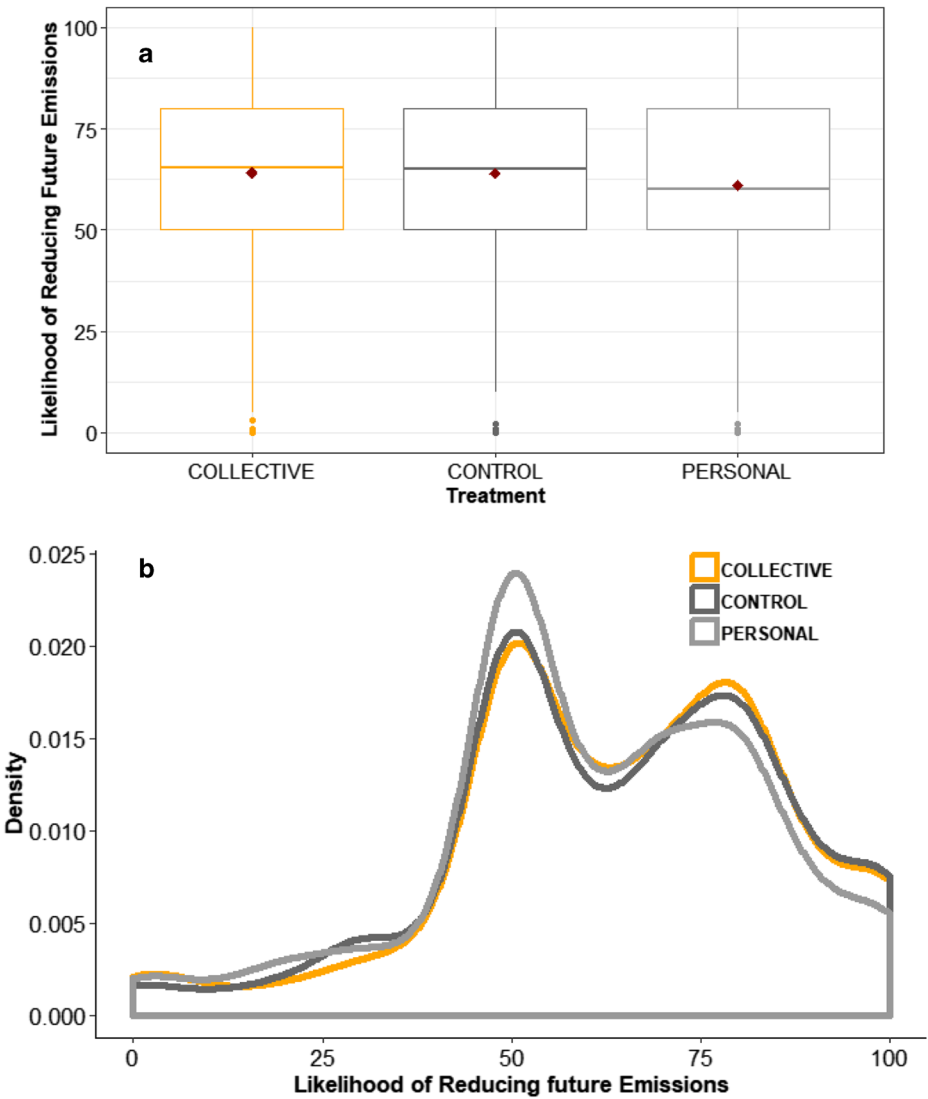
Fig. 2 Personal responsibility framing decreased willingness to reduce climate-causing behaviors among Taiwanese university students. **a** Boxplots with mean (black diamond), median, first and third quartiles and min-max across treatment groups ($n = 2085$). **b** Kernel density plots of donations for each of the three experimental groups

$\chi^2(2) = 98.56$, $p < 2.2 \times 10^{-16}$; Exp. 3: KW test, $\chi^2(2) = 118.15$, $p < 2.2 \times 10^{-16}$; pairwise Wilcoxon test comparisons all at $p < 0.01$).

We then ran a regression model using only the data from experiments 2 and 3 that included character count, age, and gender as control variables. Within each framing condition, people who wrote more characters also donated significantly more and were significantly more likely to reduce their emissions. Although in experiments 2 and 3, gender did not affect the amount donated nor the reported likelihood to reduce emissions, in the pooled analysis, male students reported significantly lower probabilities of reducing their emissions. In terms of age, there

was a significant positive relationship between years of age and amount donated. In this model, donations remained significantly higher in the collective versus the control condition ($t = -2.41$, $p = 0.02$), but the difference in the reported likelihood to change of participants in the personal responsibility and those in the collective responsibility condition was no longer significant at the .05 level ($t = -1.81$, $p = 0.07$) (for full results, see ESM 1, Supplementary Table S2).

4 Discussion

Our replication study, conducted in a different language and in a culturally and demographically distinct population, offers robust support for the overall patterns found in the original study and thus justifies continued interest in the potential of collective responsibility framing. At the same time, the results were not precisely the same as those of the original study. In our pooled analysis, participants in both the collective and personal responsibility framing conditioned donated significantly more than those in the control group. In terms of willingness to reduce future emissions, both our study and the original study found that participants in the personal responsibility condition reported the lowest likelihoods of future behavioral change. Where the two studies differ is that, in the original study, the likelihoods reported in the control condition appear to split the difference between the collective and the personal conditions, whereas in our study, the likelihoods for the collective and control conditions are nearly identical while those for the personal condition are lower than both. Finally, women reported significantly higher likelihoods of reducing future emissions than male participants (consistent with earlier findings; see Xiao and McCright 2015; Vicente-Molina et al. 2018).

Surprisingly, cultural differences do not appear to have influenced the results in all of the ways anticipated. In the Introduction, we started with Obradovich and Guenther's suggestion that Western participants reacted with avoidance to the feelings of guilt induced in the personal responsibility condition. We then expanded their argument to suggest that their participants donated more in the collective responsibility condition due to a sense of anticipated pride induced by the possibility of behaving more virtuously than other members of the general public. Next, referring to a large body of research from the field of cultural psychology, we argued that East Asian participants would respond in precisely the opposite fashion. That is, they would be *less* averse to feelings of guilt and *less* motivated by feelings of pride. Therefore, we predicted, they would be likely to respond *more* positively to personal framing than to collective framing. Some of our results, however, would seem to be at odds with these predictions.

For donations, the personal and collective conditions did not differ and participants in both conditions donated significantly more than those in the control condition. It is possible that writing tasks in both the collective and personal conditions primed participants to engage with environmental issues, increasing donations above those of the control group. At the same time, it is also consistent with our hypothesis that East Asians, unlike Westerners, would not respond to guilt with reactance avoidance. However, our hypothesis that pride would not play a motivating role in East Asia and that, therefore, donations in the collective responsibility condition would actually be *lower* than those in the personal responsibility condition, was not borne out. We propose that anticipated pride might simply not be relevant here and that participants instead experienced a sense of "collective guilt". That is, East Asians participants

may have identified with the collective, experienced guilt and responded *positively* to this sense of guilt. Thus, in both conditions, their donations were higher than those of the control group.

In contrast, for likelihood to reduce future emissions, participants in the collective and control conditions did not differ but participants in the personal responsibility condition reported significantly lower likelihoods than participants in both other conditions. This is the opposite of our suggestion that East Asian participants would respond to an awareness of their own faults by seeking to amend their behaviors. The reasons for this are unclear. One possibility is that another mechanism is at play. That is, the better performance of collective compared to personal responsibility framing for reducing emissions may not be related to guilt or pride. In the original study, the authors suggested construal theory as a second possible mechanism explaining their results. Construal theory holds that objects that are more distant (in time, space, or otherwise) are viewed in a more abstract and decontextualized way while closer objects are viewed with more concreteness, detail, and context (Trope and Liberman 2010). In both studies, the personal responsibility writing task might have led participants to view the required changes more 'proximally.'

This possibility seems well suited to explain our pattern of findings. Donations in the collective condition did not significantly differ from those in the personal responsibility condition. Where the two groups did differ significantly was in their reported willingness to reduce emissions, with students in the personal responsibility group reporting a lower likelihood. In line with construal theory, it may be that participants in the personal responsibility condition, primed to view their behaviors more proximally by the writing task, realized that changes would not be easy to implement. Our participants were, after all, students, often living at home, with a relatively limited number of changes that could easily be implemented to reduce their personal carbon footprints. Viewing the question more proximally may have simply led to more realistic appraisals and reported probabilities. Thus, it may be that *both* East Asian responses to guilt and construal theory together explain our results. Our participants may have donated more out of a sense of both personal and collective guilt, while reporting a lower likelihood to reduce emissions due to their construal of what change would entail. In other words, our suggestion is that the two questions required different types of cognitive processing: the donation question called for a relatively simple, 'one-off' decision whereas the likelihood to reduce emissions question required more careful consideration.

Unfortunately, we are not able to untangle these mechanisms here and must leave it for future research. We would like to emphasize the importance of this: cultural psychology has uncovered a variety of clear differences between East Asian and Western cultures, but showing that they are operative in particular situations and applying this knowledge remains a challenge.

We turn next to intriguing differences in the distributions for both donations and reported likelihoods to reduce future emissions. The most prominent differences are not between psychological conditions (framing) but between demographic groups. The original study found that the median donation of the Audubon sample participants was at the highest possible amount (100%). Audubon society members seem likely to be older, more well-off and donation-oriented, possibly explaining this pattern. Further, their self-identity as environmentalists may well have explained their higher contributions (Brick and Lai 2018). In contrast, the median donation for the MTurk participants fell at nearly the lowest possible (10%).[1] MTurk

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[1] Existing reviews of the validity of data from MTurk participants, such as Buhrmester et al. 2011 and Berinsky et al. 2012, fail to consider experiments involving rewards or donations.

participants are younger than the general public (modally at college age) and are compensated (albeit at low rates) for their participation (Berinsky et al. 2012). Thus, they may have been likely to view participation as 'part-time employment' making them less prone to donate possible winnings. The median donation in our samples fell between those in the original study. The university students in Taiwan, although demographically closer to the MTurk participants in terms of age, gender, and education, displayed a pattern of responses that was intermediate between the MTurk and Audubon participants, with a median donation closer to 50% and a clear tri-modal distribution containing two lower peaks at 10–30% and at 100%. Indeed, the characteristic feature of the distribution curves for both donations and reported probabilities of changing in our study was a 'central peak.' This is consistent with research reporting an aversion to extreme responses in East Asian cultures (Chen et al. 1995; Lee et al. 2002), generally explained as a preference for interpersonal harmony over individual opinions (Triandis et al. 2001; Johnson et al. 2005).

Turning to limitations of our replication study, we note two differences in our design compared to that of the original study. First, the amount offered was less than in the original experiments, even in terms of purchasing power parity. However, students can be expected to have more modest economic needs and the amount offered would seem to be of a subjectively comparable magnitude. Second, Obradovich and Guenther measured donations and likelihood of change in separate experiments with different samples, while in the current study they were measured together across all experiments. One might argue, for example, that moral licensing and moral cleansing effects (Merritt et al. 2010; Blanken et al. 2014), may have influenced responses to the second question. However, we explicitly tested for this in experiment 2 and found no significant differences based on order.

A further limitation is that our sample size did not meet the standard for replication studies of being 2.5 times larger than the Audubon sample in the original study. In the original study, the donation effect emerged most clearly only in the meta-analysis. Likewise, in our three individual experiments with samples of similar size as those in the original study, the results were not replicated, while in the pooled analysis, the overall patterns were demonstrably similar. All of this highlights the need to use samples of adequate size (Simonsohn 2015) in future research on collective responsibility framing.

In conclusion, the replication of the original findings in an East Asian setting offers a powerful demonstration of the relevance of collective responsibility framing. Our replication, even if partial, strengthens the original findings and shows that they deserve future research into practical applications. Replication of the original findings is particularly impressive given the considerable differences between our samples. Although the differences found were small in our study, it is nonetheless true that even individually small differences would yield large differences in the aggregate (Obradovich and Guenther 2016). Our findings are of clear practical significance as East Asia is the most important region in the world in terms of total greenhouse gas emissions (EIA 2013). In terms of both threat and opportunity, the importance of this region cannot be overstated, and yet, East Asia is underrepresented in the existing research on climate change and framing. To our knowledge, our study is the first to examine environmental framing in this cultural context.

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