

Time Preference and Intergenerational Climate Responsibility: Evidence from a Large-Scale Online Experiment in China

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Abstract

This study investigates the relationship between individual time preferences and intergenerational attitudes toward climate change. We conduct a large-scale online experiment in China (N = 965) using an incentivized multiple price list task to elicit time preferences, and measure climate attitudes through a 14-item scale capturing perceived threat, scientific knowledge, policy support, and intergenerational responsibility. We find that more impatient individuals are significantly less willing to assume responsibility for climate change on behalf of future generations and report lower willingness to engage in mitigation actions. These associations survive Bonferroni multiple testing correction and are robust to alternative specifications. Importantly, impatience is not associated with perceived climate threat or scientific knowledge about climate change, suggesting that time preferences shape action-oriented and intergenerational dimensions of climate attitudes specifically, rather than climate beliefs in general. In addition, we find no evidence that future-oriented framing exercises (Imaginary Trip to the Future, Future Ahead and Back, Letter to Future Generations) shift climate attitudes. This study contributes cross-cultural evidence on the psychological underpinnings of climate inaction but highlights the need for future research linking elicited preferences to actual behavior.

Categories: Climate Change, Social systems (economies, governments, industry), Sustainable Economic Development

Keywords: time preference, intergenerational attitudes, climate change, online experiment, money earlier or later

JEL Classifications: Q56, C91, D64

Introduction

Climate change has become a global crisis. The year 2024 was the warmest on record, and the World Meteorological Organization predicts a 70% chance that average temperatures over 2025-2029 will exceed 1.5°C above pre-industrial levels (WMO, 2025). Despite this urgency, mitigation efforts remain insufficient. One barrier is the intergenerational dilemma: the costs of mitigation fall on the current generation, while the benefits accrue primarily to future generations.

Standard economic theory predicts that individuals who place less value on future outcomes - those with higher discount rates - will be less willing to incur current costs for future benefits. This prediction is well-established in the literature on intertemporal choice (Cohen et al., 2020) (Frederick et al., 2002). However, empirical evidence linking individual time preferences to intergenerational climate attitudes remains limited, particularly in non-Western contexts. Most existing studies focus on health behaviors, savings, or crime (Sutter et al., 2013) (Chabris et al., 2008), with only a few examining environmental decisions (Alpizar et al., 2023) (Newell and Siikamäki, 2015). To our knowledge, no large-scale, incentivized study has directly tested the relationship between time preferences and intergenerational responsibility for climate change in China.

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This paper addresses this gap by conducting a large-scale national online experiment in China. We elicit time preferences using an incentivized multiple price list (MPL) task (“Money Earlier or Later”) and measure climate attitudes across 14 items capturing perceived threat, scientific knowledge, policy support, and intergenerational responsibility. Our primary contribution is empirical: we test whether the well-established theoretical relationship between impatience and future-oriented behavior holds in a novel context - a large, non-Western, general population sample with real incentives.

A secondary aim of this study is to test whether future-oriented framing exercises can shift climate attitudes. We include three treatments drawn from the literature on intergenerational sustainability: the Imaginary Trip to the Future (ITF) (Qin et al., 2024) (Shaw et al., 2025), the Future Ahead and Back (FAB) mechanism (Shahrier et al., 2017a), and a Letter to Future Generations (LFG) (Shrum, 2021). Prior studies have found mixed results for such interventions (Hara et al., 2019) (Nishimura et al., 2020). Our large sample allows us to assess whether these framing exercises influence climate attitudes in a general population setting. Even if null, these results are informative: they suggest that such interventions may have limited effectiveness outside controlled lab environments or when participants already hold strong pro-climate views.

Our results show that more impatient individuals are significantly less willing to assume intergenerational responsibility for climate change and less willing to engage in mitigation actions. These associations are robust to controlling for socioeconomic characteristics. However, we find no evidence that the future-oriented framing treatments shift climate attitudes. This null finding suggests that climate attitudes may be deeply rooted and resistant to short-term manipulations - a possibility consistent with prior work on the stability of environmental values (Leiserowitz, 2006).

This study contributes cross-cultural evidence on the psychological underpinnings of climate inaction. It also provides a benchmark for the effectiveness (or lack thereof) of imagination-based framing interventions in a large, general population sample. We hope these findings inform both behavioral science and climate policy by highlighting the role of time preferences - and the difficulty of shifting them - in addressing intergenerational challenges.

Literature review and hypothesis formulation

In this section, we review prior research on time preferences and environmental decision-making. On this basis, we develop our hypotheses.

Time Preferences and Behavior

A substantial literature examines the predictive power of patience - typically measured using incentivized tasks such as the MPL method - on real-world outcomes. These studies generally find that patience correlates with a range of behaviors (Cohen et al., 2020). Some research links patience with cognitive ability. Burks et al. (Burks et al., 2009) found that individuals with better cognitive skills are more patient among trainee truckers. Dohmen et al. (Dohmen et al., 2010) found that lower cognitive ability is associated with more pronounced impatience in a German sample. Benjamin et al. (Benjamin et al., 2013) reported that short-term discounting is less common among Chilean high school students with higher test scores.

Other studies link patience with health and social behaviors. Chabris et al. (Chabris et al., 2008) found small but significant correlations between discount rates and exercise, BMI, and smoking. Ida and Goto (Ida and Goto, 2009) found that higher time preference rates are associated with more smoking, drinking, and gambling in Japan. Sutter et al. (Sutter et al., 2013) showed that more impatient adolescents spend more on alcohol and cigarettes, save less, and perform worse in school. Golsteyn et al. (Golsteyn et al., 2014), using Swedish longitudinal data, found that children's time preferences at age 13 predict later outcomes in school performance, health, and lifetime income. Patience also has macroeconomic implications: Falk et al. (Falk et al., 2018), using data from 80,000 people across 76 countries, found that patience is significantly correlated with saving behavior and GDP per capita.

Time Preferences and Environmental Decisions

Although there is extensive work on choosing social discount rates for environmental policy (Goulder and Williams, 2012), fewer studies examine how individual discount rates shape environmental behavior. Alpizar et al. (Alpizar et al., 2023) studied private discount rates and climate adaptation in Costa Rica, finding that higher discount rates were negatively associated with purchasing water storage tanks. Newell and Siikamäki (Newell and Siikamäki, 2015) used a large US

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household survey to show that discount rates systematically affect willingness to invest in energy efficiency. Wang et al. (Wang et al., 2016) conducted a large-scale international survey covering 53 countries and found that time discounting correlates with innovation and environmental protection. Gazmararian (Gazmararian, 2025) used three-wave panel data to show that becoming a parent increases climate change concern, partly by extending individuals' time horizons. Drawing on these studies, we propose Hypothesis 1.

Hypothesis 1: An individual's discount rate is negatively associated with climate change attitudes, particularly regarding intergenerational responsibility and willingness to take action.

Future-Oriented Framing and Intergenerational Attitudes

A separate strand of literature explores whether future-oriented framing can increase concern for future generations. Hauser et al. (Hauser et al., 2014) used an intergenerational goods game and found that a voting mechanism helped sustain resource contributions across generations. Japanese researchers developed an "Imaginary Future Generation" (IFG) method, asking participants to role-play as future generations in negotiations; this increased sustainability in intergenerational dilemma games (Kamijo et al., 2017). This mechanism has been tested in various field contexts with mixed success (Nishimura et al., 2020), (Hara et al., 2019), and (Shahrier et al., 2017b).

Shahrier et al. (Shahrier et al., 2017a) proposed the FAB mechanism, where participants imagine traveling to the future and making a request to the present generation before returning to act as the current generation. They found this increased sustainable decisions. Shrum (Shrum, 2021) tested a "Letter to Future Generations" (LFG) intervention, where participants wrote a letter to future descendants about climate risks and their mitigation efforts; LFG significantly increased donations to a climate initiative. However, other studies have found no significant effects for similar interventions (Qin et al., 2024) (Shaw et al., 2025). Drawing on these studies, we propose Hypothesis 2.

Hypothesis 2: Future framing treatments such as FAB, ITF, and LFG positively influence participants' climate change attitudes.

While prior research has extensively documented the role of time preferences in shaping cognitive ability, health behaviors, education, and financial decisions, relatively little attention has been paid to how individual discount rates influence environmental attitudes, particularly intergenerational responsibility. This study addresses that gap by investigating whether individuals with higher discount rates are less willing to take responsibility for mitigating climate change on behalf of future generations, and whether future-oriented framing can shift these attitudes.

Hypothesis 1 is tested by examining the relationship between participants' discount rates and their attitudes toward future generations, measured across four dimensions. Hypothesis 2 is tested using the three future-oriented framing treatments.

Research Method

Experimental design

Sample and Recruitment

We conducted the experiment in December 2023 using Wenjuanxing, one of the largest survey platforms in China. Wenjuanxing maintains a national subject pool of over 6.2 million registered participants. Similar to Amazon Mechanical Turk, participants complete surveys and experiments in exchange for monetary rewards. We conducted a pilot study with 200 participants (50 per treatment) to estimate statistical power. The main experiment included 1,157 participants, who were randomly assigned to one of four groups: FAB (279), ITF (309), LFG (308), and the control group (306). Balance checks across treatment arms confirm no statistically significant differences in key observables (gender, age, education, income).

Procedure

The experiment consisted of five stages, administered sequentially.

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Stage 1: Climate change introduction. Participants first read and signed a consent form. They then watched a 2-minute video produced by the National Weather Forecasting Agency, which described the causes and impacts of climate change (https://www.bilibili.com/video/BV1184y1x78G/?share_source=copy_web). This video served to ensure a common baseline of information across all participants.

Stage 2: Future-oriented framing treatments. Participants were randomly assigned to one of four conditions:

- Imaginary Trip to the Future (ITF): Participants imagined themselves living in the year 2060 and wrote a short essay about their lives based on guiding questions (e.g., daily activities, environment, and concerns).
- Future Ahead and Back (FAB): Participants imagined traveling to 2060, wrote a request to the current generation about climate action, then returned to the present.
- Letter to Future Generations (LFG): Participants wrote a letter to their future offspring (or a hypothetical future generation) about the risks of climate change and the actions they had taken to mitigate it.
- Control: Participants wrote a short essay about their daily routine.

All essays were reviewed for engagement; participants who submitted non-substantive responses (e.g., gibberish, repeated text) were excluded. The final sample size after all exclusions was 965.

Stage 3: Donation decision (incentivized). Participants were asked how much of a hypothetical 50 yuan lottery win they would donate to a climate change mitigation initiative launched by an NGO. One out of every 100 participants was randomly selected to have their donation implemented: they received 50 yuan minus their pledged donation, and the donation amount was transferred to the NGO. This provided an incentive-compatible measure of actual giving. The analysis of donation decisions is the focus of a separate paper.

Stage 4: Time preference elicitation. Participants completed a discount rate elicitation task using the standard MPL method, referred to as “Money Earlier or Later” (MEL). In each of 20 binary choices, participants chose between receiving 50 yuan in 1 week (Option 1) and a larger amount (X yuan) in 1 month (Option 2), where X increased from 101 to 120 yuan in 1-yuan increments.

Participants were informed that one of the 20 choices would be randomly selected for real payment, with a 1/100 probability. This incentive structure aligns with established practice; Brañas-Garza et al. (Brañas-Garza et al., 2022) found that paid and hypothetical time preferences do not differ systematically.

Stage 5: Climate attitude survey. The final stage consisted of a survey measuring participants’ attitudes toward climate change and intergenerational responsibility. The survey included 14 items rated on a 7-point Likert scale, covering perceived threat, scientific knowledge, policy support, and intergenerational responsibility. The full survey instrument is provided in the Online Appendix.

Payment and Exclusions

After the experiment, 11 participants were randomly selected from the full sample of 1,157 to receive payment: they received 50 yuan minus their pledged donation (if any), and we transferred the donation amount to the NGO on their behalf. For the time preference task, one round was randomly selected for payment, and participants were paid accordingly.

We excluded participants whose responses in the MEL task exhibited logical errors - specifically, switching from the larger delayed reward back to the smaller sooner reward, or switching more than once. This resulted in 965 valid observations (83.4% of the original sample). Excluded participants did not differ systematically from the retained sample on observable characteristics.

Order of Tasks

We chose the task order deliberately: the climate video and framing exercises preceded the time preference elicitation and attitude survey. This ordering was intended to avoid priming the framing tasks with monetary considerations. However, we acknowledge that time preferences measured after exposure to climate information may be influenced by that

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exposure. Future research could randomize the task order to test for such priming effects.

Statistical analysis plan

After we collected the data, we examined the correlation between participants' time preferences and their attitudes toward climate change. Our statistical analysis will use regression analysis, which will control for subjects' socioeconomic characteristics. The analysis proceeds in three steps. First, we present the main estimation results. Second, we conduct robustness checks to validate these findings. Third, we examine the heterogeneity of the effects.

The dependent variables are 14 survey items, denoted Q_i for $i = 1, 2, \dots, 14$, each measured on a 7-point Likert scale. Given the ordinal nature of the dependent variable, we employ an ordered probit regression model:

$$\Pr(Q_i = k) = \Phi(\alpha + \beta \cdot \text{impatience} + \gamma' \mathbf{X}) + \varepsilon \quad (1)$$

where $k = 1, 2, \dots, 7$; Φ is the cumulative distribution function of the standard normal distribution; α is the intercept; β is the coefficient for time preference (impatience); γ is a vector of coefficients for control variables $\mathbf{X}$ (gender, age, outdoor work, education, income, family size, parental status, and attention to environmental news); and ε is the error term.

Results And Discussion

Results

We used Stata 16 for all the analyses. After applying the exclusion criteria described in the "Research method" section, we obtained a final sample of 965 valid observations. The data cover three main categories: climate change attitudes, time preferences, and socioeconomic characteristics.

Climate Change Attitudes

The climate attitude survey includes 14 items rated on a 7-point Likert scale, ranging from 1 ("strongly disagree") to 7 ("strongly agree"). The overall reliability of the scale is acceptable (Cronbach's $\alpha = 0.76$). Based on their content, we group the items into four dimensions:

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Dimension Item		Measurement item	Reverse coded
PTCC	Q1	Climate change is a major threat to the world.	No
PTCC	Q2	Climate change is a major threat to China.	No
SKCC	Q3	Climate change is caused by human activities.	No
SKCC	Q5	Climate change will reduce the frequency of floods.	Yes
SKCC	Q6	Climate change will increase the frequency of droughts.	No
SKCC	Q7	Climate change will cause sea levels to rise.	No
SKCC	Q8	Climate change will lead to shorter heatwaves.	Yes
PSBI	Q4	It is not important to take action to mitigate climate change.	Yes
PSBI	Q9	I am willing to pay or reduce consumption to mitigate climate change.	No
FOIR	Q10	Climate change will harm future generations.	No
FOIR	Q11	The current generation should not worry; future generations should.	Yes
FOIR	Q12	Intergenerational equity is important in climate policy.	No
FOIR	Q13	I am willing to pay for climate action benefiting future generations.	No

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FOIR	Q14	I prefer enjoying the present rather than worrying about the future.	Yes
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TABLE 1: Measurement items of climate change attitudes by dimension

Notes: PTCC = Perceived Threat of Climate Change; SKCC = Scientific Knowledge of Climate Change; PSBI = Policy Support and Behavioral Intention; FOIR = Future Orientation and Intergenerational responsibility. Reverse-coded items were recoded before constructing dimension-level measures. Source: Author's creation

To evaluate the construct validity of the four proposed dimensions, we conducted exploratory factor analysis (EFA) on the 14 items. EFA (principal component factor, varimax rotation) retained four factors with eigenvalues exceeding 1 (3.88, 1.74, 1.15, 1.05), jointly explaining 55.8% of the total variance. Factor 3 loads primarily on SKCC items (Q3: 0.66, Q6: 0.74, Q7: 0.58) and Factor 4 on PTCC items (Q1: 0.58, Q2: 0.59), supporting the distinctness of these two dimensions. Factors 1 and 2 show substantial cross-loadings between PSBI and FOIR items, suggesting some overlap between policy support and intergenerational responsibility - possibly reflecting a shared action - orientation toward climate change (Table 1).

Table 2 presents summary statistics for the 14 items. Overall, mean scores are above 5 for most items, indicating that participants generally hold strong pro-climate attitudes. The mean scores for Q1 and Q2 are 6.41 and 6.19, respectively, with low standard deviations, suggesting strong consensus on the global and domestic risks of climate change. Regarding scientific knowledge, Q6 (droughts) and Q7 (sea level rise) have high mean scores (5.93 and 6.25), while the reverse-coded items Q5 (floods) and Q8 (heatwaves) have low means (1.82 and 4.74), indicating that participants are generally well-informed about climate science. For policy support, the mean for Q4 (reverse-coded) is 1.82, indicating widespread agreement that action is important, and Q9 (willingness to pay) averages 5.62. For intergenerational responsibility, Q10 has a high mean (6.31), and Q12 and Q13 also average above 5. The reverse-coded items Q11 and Q14 have lower means (2.02 and 2.56), with relatively higher standard deviations, indicating some variation in present orientation and willingness to defer responsibility.

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Category	Variable	Item	N	Mean	SD	Min	Max
PTCC	Q1	Major threat to the world	965	6.41	0.769	2	7
	Q2	Major threat to China	965	6.19	0.929	1	7
SKCC	Q3	Caused by human activities	965	5.632	1.016	1	7
	Q5	Reduce floods (reverse)	965	1.822	1.329	1	7
	Q6	Increase droughts	965	5.929	0.993	1	7
	Q7	Sea level rise	965	6.252	0.841	1	7
	Q8	Shorter heatwaves (reverse)	965	4.738	1.644	1	7
PSBI	Q4	Not important to act (reverse)	965	1.822	1.329	1	7
	Q9	Willing to pay or reduce	965	5.616	1.077	1	7
FOIR	Q10	Harm future generations	965	6.31	0.834	1	7
	Q11	Not current generation's worry (reverse)	965	2.015	1.594	1	7
	Q12	Intergenerational equity important	965	5.393	0.951	1	7
	Q13	Pay for future benefit	965	5.672	1.096	1	7
	Q14	Prefer present	965	2.564	1.566	1	7

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		enjoyment (reverse)					
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TABLE 2: Descriptive Statistics of Climate Change Attitudes

Notes: PTCC = Perceived Threat of Climate Change; SKCC = Scientific Knowledge of Climate Change; PSBI = Policy Support and Behavioral Intentions; FOIR = Future Orientation and Intergenerational Responsibility. All items measured on 1–7 Likert scale (1 = strongly disagree, 7 = strongly agree). Reverse-coded items are indicated. Source: Author’s own calculations

Figure 1 illustrates the distributions of responses across items. The kernel density estimates show that responses are concentrated at the upper end of the scale for pro-climate items and at the lower end for reverse-coded items, consistent with the high baseline level of concern in the sample.

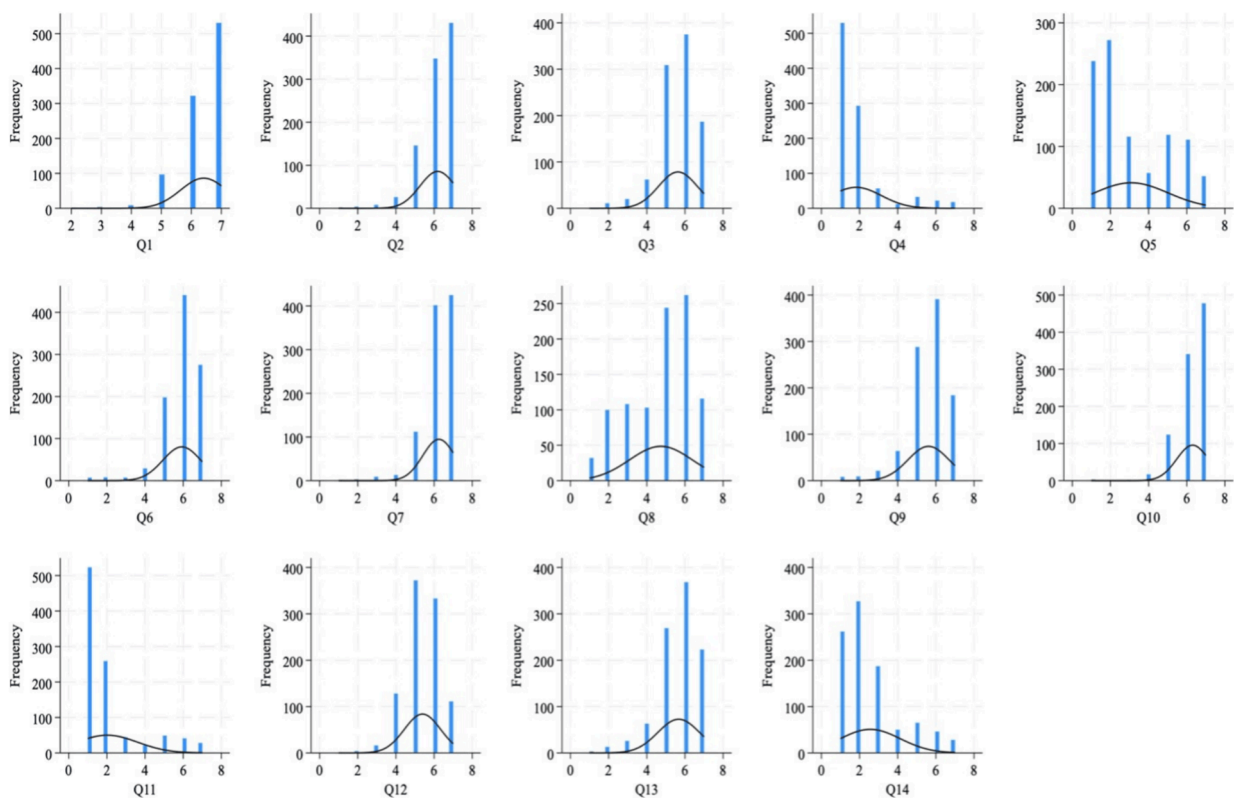


FIGURE 1: Distribution of Climate Change Attitudes

Source: Author’s creation. The black line represents a kernel density estimate

Time Preferences

Time preferences were elicited using the MEL task. For each participant, we identified the switching point - the first choice in which they selected the larger, delayed reward (X yuan in 1 month) over the fixed 50 yuan in 1 week. Let X^* denote the midpoint of the monetary amount at the switching point. Under exponential discounting, the weekly discount rate d is derived as:

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$$d = \left(\frac{X^*}{50} \right)^{\frac{1}{3}} - 1 \quad (2)$$

A higher d indicates greater impatience (equation 2). Figure 2 shows the distribution of discount rates. There is substantial heterogeneity: while some participants exhibit low impatience, a considerable proportion cluster near the upper bound (approximately 0.06), indicating strong discounting of future rewards.

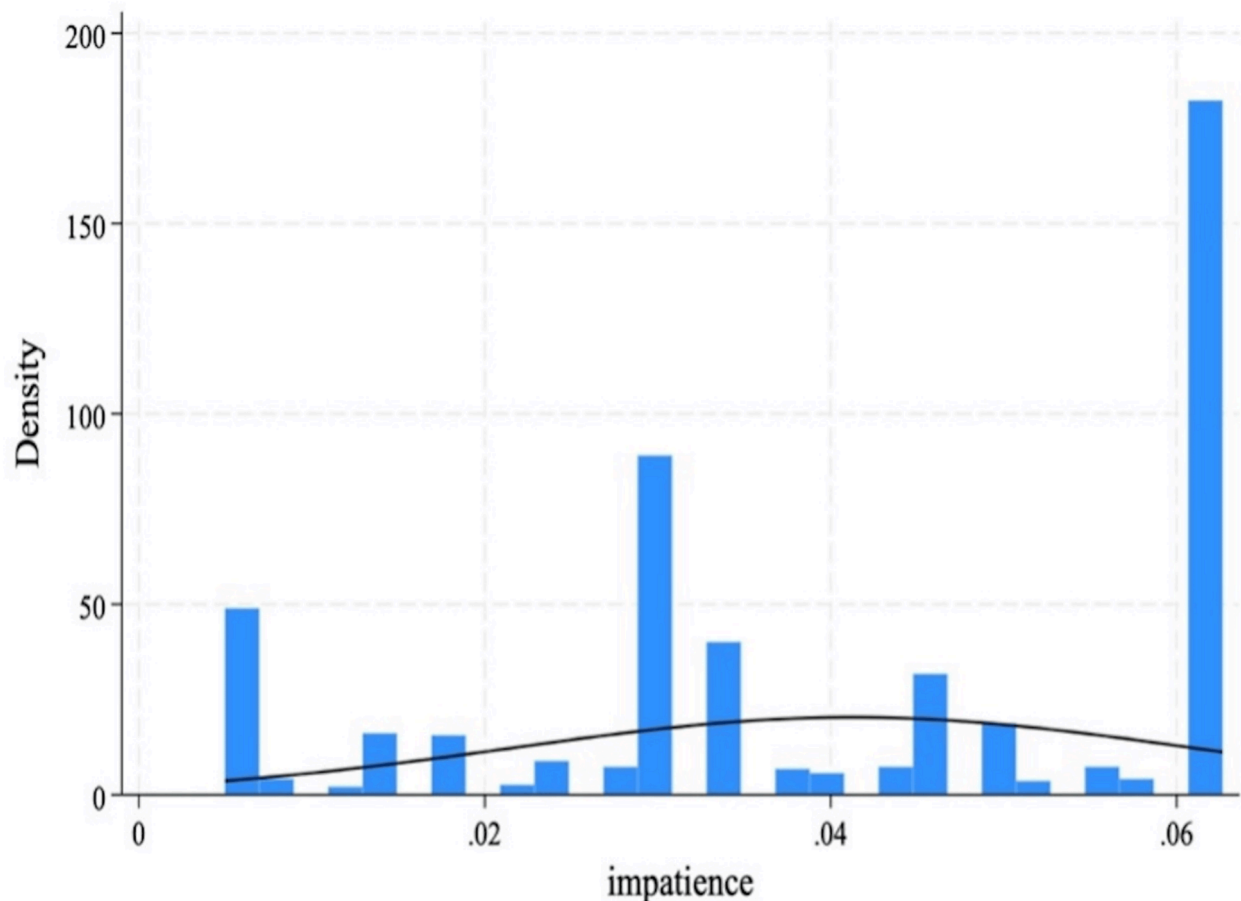


FIGURE 2: Distribution of Time Preferences

Source: Author's creation. The black line represents a kernel density estimate

Socioeconomic Characteristics

We collected the following control variables to account for potential confounding factors:

- Gender: binary indicator (1 = male, 0 = female)
- Age: years (continuous)
- Outdoor: whether the participant's job involves outdoor work (1 = yes, 0 = no)
- Education: 5-point scale (1 = junior high or below; 5 = master's degree or above)
- Income: monthly income on a 6-point scale (1 = below 3,000 RMB; 6 = above 20,000 RMB)

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- Family: household size (1 to 6 or more)
- Kid: whether the participant has children (1 = yes, 0 = no)
- News: attention to environmental news (1 = not at all concerned; 4 = very concerned)

Table 3 presents summary statistics. The sample is balanced by gender (46.3% male). The average age is 32.9 years. Approximately 40% of participants work outdoors. The average education level is 3.93, indicating that most participants have at least a college degree. Mean monthly income falls within the 5,000-10,000 RMB range. Average household size is 3.67, and 75% of participants have children. The mean attention to environmental news is 3.44 (on a 1-4 scale), indicating generally high concern.

Variable	N	Mean	SD	Min	Max
Gender	965	0.463	0.499	0	1
Age	965	32.927	7.742	17	77
Outdoor	965	0.399	0.490	0	1
Education	965	3.933	0.556	1	5
Income	965	3.468	1.204	1	6
Family	965	3.673	1.020	1	6
Kid	965	0.750	0.433	0	1
News	965	3.439	0.569	1	4

TABLE 3: Descriptive Statistics of Socioeconomic Characteristics

Source: Author's own calculations

Tables 4-7 present the regression results from equation (1) for the four dimensions: Perceived Threat of Climate Change (PTCC), Scientific Knowledge of Climate Change (SKCC), Policy Support and Behavioral Intention (PSBI), and Future Orientation and Intergenerational Responsibility (FOIR).

Perceived Threat and Scientific Knowledge

In the PTCC dimension (Table 4), impatience has no statistically significant effect on perceptions of climate threats, whether global (Q1) or domestic (Q2). In the SKCC dimension (Table 5), impatience does not significantly affect any of the scientific knowledge items. These results suggest that time preferences are not systematically associated with beliefs about the existence or science of climate change.

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Variable	Q1	Q2
Impatience	-2.601	0.845
	-1.949	-1.788
FAB	-0.168	-0.192*
	-0.11	-0.106
IFT	-0.142	-0.008
	-0.109	-0.102
LFG	0.02	0.07
	-0.107	-0.101
Gender	-0.223***	0.055
	-0.077	-0.074
Age	0.004	-0.002
	-0.006	-0.006
Outdoor	0.109	0.048
	-0.079	-0.076
Education	0.084	0.174**
	-0.071	-0.069
Income	-0.008	-0.037
	-0.037	-0.036
Family	0.080**	-0.016
	-0.039	-0.036
Kid	-0.076	0.179*
	-0.108	-0.103
News	0.492***	0.393***
	-0.069	-0.068

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N	965	965
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TABLE 4: Baseline Model Regression Results for PTCC

Notes: Impatience derived from MEL task. FAB, IFT, LFG are dummies for each treatment group; Control is the omitted category. Control variables: gender (1 = male), age, outdoor work (1 = yes), education (1–5), income (1–6), household size (1–6+), parental status (1 = has children), environmental news attention (1–4). Robust standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01. FAB = Forward and Backward; IFT = Imaginary Future Trip; LFG = Letter to Future Generation

Variable	Q3	Q5	Q6	Q7	Q8
Impatience	-0.964	2.311	-2.06	-3.592*	1.927
	-1.798	-1.772	-1.888	-1.905	-1.66
FAB	-0.208**	0.144	-0.152	-0.135	0.022
	-0.095	-0.098	-0.099	-0.104	-0.089
IFT	-0.157*	-0.041	0	-0.113	-0.158
	-0.095	-0.101	-0.104	-0.104	-0.096
LFG	-0.079	-0.044	-0.121	-0.114	-0.099
	-0.098	-0.098	-0.102	-0.101	-0.095
Gender	0.08	-0.049	0.165**	0.149**	0.026
	-0.071	-0.07	-0.072	-0.075	-0.069
Age	-0.001	-0.006	-0.006	-0.008	-0.003
	-0.005	-0.005	-0.006	-0.006	-0.006
Outdoor	0.075	0.128*	0.026	-0.08	0.102
	-0.073	-0.073	-0.074	-0.078	-0.071
Education	-0.046	-0.104*	0.116*	0.051	-0.048
	-0.073	-0.063	-0.066	-0.074	-0.062
Income	0.04	-0.002	-0.032	0.036	0.032
	-0.033	-0.035	-0.035	-0.036	-0.034
Family	0.02	0.029	-0.014	0.071**	0.05
	-0.036	-0.035	-0.034	-0.036	-0.034
Kid	-0.11	0.07	0.092	-0.190*	0.087
	-0.101	-0.094	-0.102	-0.102	-0.097
News	0.215***	-0.031	0.363***	0.329***	-0.072
	-0.065	-0.061	-0.065	-0.066	-0.061

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N	965	965	965	965	965
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TABLE 5: Baseline Model Regression Results for SKCC

Notes: Impatience derived from MEL task. FAB, IFT, LFG are dummies for each treatment group; Control is the omitted category. Control variables: gender (1 = male), age, outdoor work (1 = yes), education (1–5), income (1–6), household size (1–6+), parental status (1 = has children), environmental news attention (1–4). Robust standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01. FAB = Forward and Backward; IFT = Imaginary Future Trip; LFG = Letter to Future Generation. Author's own calculations

Policy Support and Behavioral Intention

In the PSBI dimension (Table 6), impatience shows a significant effect on one of the two items. For Q4 (reverse-coded: “It is not important to take action”), the coefficient is positive and statistically significant ($\beta = 6.865$, $p = 0.001$), indicating that more impatient individuals are more likely to downplay the importance of climate action. For Q9 (willingness to pay), the coefficient is not statistically significant ($p > 0.10$). These results provide partial support for Hypothesis 1: impatience is associated with lower policy support, though not with stated willingness to pay.

How to cite this article:

Variable	Q4	Q9
Impatience	6.865***	-2.307
	-2.048	-1.765
FAB	0.112	-0.058
	-0.104	-0.1
IFT	0.053	0.077
	-0.107	-0.097
LFG	-0.04	-0.022
	-0.105	-0.093
Gender	0.261***	-0.082
	-0.077	-0.071
Age	0.002	0.001
	-0.006	-0.005
Outdoor	0.151*	0.066
	-0.08	-0.072
Education	-0.091	0.069
	-0.077	-0.071
Income	0.01	-0.011
	-0.038	-0.033
Family	0.019	0.052
	-0.038	-0.034
Kid	0.051	0.164*
	-0.105	-0.099
News	-0.499***	0.616***
	-0.069	-0.066

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N	965	965
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TABLE 6: Baseline Model Regression Results for PSBI

Notes: Impatience derived from MEL task. FAB, IFT, LFG are dummies for each treatment group; Control is the omitted category. Control variables: gender (1 = male), age, outdoor work (1 = yes), education (1–5), income (1–6), household size (1–6+), parental status (1 = has children), environmental news attention (1–4). Robust standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01. FAB = Forward and Backward; IFT = Imaginary Future Trip; LFG = Letter to Future Generation. Author's own calculations

Intergenerational Responsibility

In the FOIR dimension (Table 7), impatience has significant positive effects on two reverse-coded items. For Q11 (“The current generation should not worry; future generations should”), the coefficient is positive and significant ($\beta = 5.952$, $p = 0.002$). For Q14 (“I prefer enjoying the present”), the coefficient is also positive and significant ($\beta = 5.182$, $p = 0.004$). These results indicate that more impatient individuals are more likely to defer responsibility to future generations and to focus on present enjoyment. No significant effects are observed for the other FOIR items (Q10, Q12, and Q13). These findings support Hypothesis 1 for dimensions directly capturing intergenerational trade-offs.

How to cite this article:

Variable	Q10	Q11	Q12	Q13	Q14
Impatience	-0.999	5.952***	0.527	-1.528	5.182***
	(1.918)	(1.899)	(1.848)	(1.763)	(1.798)
FAB	-0.002	0.300***	0.077	0.078	0.234**
	(0.103)	(0.102)	(0.096)	(0.099)	(0.099)
IFT	-0.074	0.136	-0.064	0.143	0.079
	(0.107)	(0.107)	(0.096)	(0.097)	(0.096)
LFG	0.124	-0.013	-0.080	0.096	0.036
	(0.103)	(0.109)	(0.099)	(0.094)	(0.095)
Gender	-0.003	0.081	0.139**	-0.126*	0.029
	(0.075)	(0.076)	(0.071)	(0.071)	(0.070)
Age	-0.020***	-0.003	-0.022***	0.001	0.013**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Outdoor	-0.041	0.150*	-0.099	0.053	0.062
	(0.078)	(0.079)	(0.071)	(0.073)	(0.073)
Education	0.119	-0.144*	0.029	0.022	-0.017
	(0.077)	(0.074)	(0.069)	(0.065)	(0.074)
Income	-0.022	0.027	0.020	0.044	0.008
	(0.036)	(0.037)	(0.036)	(0.035)	(0.034)
Family	-0.039	-0.028	-0.016	0.019	0.034
	(0.038)	(0.037)	(0.035)	(0.035)	(0.035)
Kid	0.326***	-0.036	0.192*	0.260***	-0.315***
	(0.107)	(0.108)	(0.102)	(0.097)	(0.088)
News	0.330***	-0.367***	0.325***	0.632***	-0.581***
	(0.067)	(0.066)	(0.059)	(0.065)	(0.066)

How to cite this article:

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N	965	965	965	965	965
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TABLE 7: Baseline Model Regression Results for FOIR

Notes: Impatience derived from MEL task. FAB, IFT, LFG are dummies for each treatment group; Control is the omitted category. Control variables: gender (1 = male), age, outdoor work (1 = yes), education (1–5), income (1–6), household size (1–6+), parental status (1 = has children), environmental news attention (1–4). Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. FAB = Forward and Backward; IFT = Imaginary Future Trip; LFG = Letter to Future Generation. Q11 and Q14 are reverse-coded: higher scores = greater deferral/present-orientation. Source: Author's own calculations

Treatment Effects

We find no evidence that the future-oriented framing treatments such as ITF and LFG affect any of the 14 climate attitude items at conventional significance levels. However, we find that FAB has a positive and significant effect on Q11 ($\beta = 0.300$, $p = 0.003$) and Q14 ($\beta = 0.234$, $p = 0.018$). After applying Bonferroni correction (adjusted $\alpha = 0.05/14 = 0.0036$), only the coefficient for Q11 remains significant. This indicates that the FAB treatment increased participants' tendency to defer responsibility to future generations, which is the opposite of the intended direction. However, the result is not robust (see Table 8). Overall, we find no support for Hypothesis 2. A likely contributor to these null findings is a ceiling effect. Mean scores for climate threat (Q1: 6.41, Q2: 6.19) and intergenerational concern (Q10: 6.31) are close to the scale maximum (7), leaving little room for the treatments to produce upward shifts. The framing treatments may be more effective in populations with lower baseline climate concern. Another possible explanation is that climate attitudes are formed over long horizons and are resistant to short-term manipulations, particularly given the high baseline pro-climate attitudes in our sample (Leiserowitz, 2006).

Control Variables

Several control variables exhibit consistent associations. Female respondents are more likely to perceive global climate threats (Q1) and express stronger policy support (Q4). Older respondents show less concern for future generations (Q10, Q12). Higher education is associated with greater perceived threat (Q2). Having children is associated with greater concern for future generations (Q10, Q13) and less present orientation (Q14), consistent with Gazmararian (Gazmararian, 2025). Attention to environmental news is the most consistently significant predictor, positively associated with pro-climate attitudes across multiple dimensions. These associations are correlational and should not be interpreted as causal.

Multiple Testing Correction

To address the risk of Type I errors arising from 14 simultaneous hypothesis tests, we applied Bonferroni correction (adjusted $\alpha = 0.05/14 = 0.0036$) and Benjamini-Hochberg (BH) false discovery rate (FDR) correction to the impatience coefficients across all 14 models. Under Bonferroni correction, the associations for Q4 ($p_{\text{adj}} = 0.011$) and Q11 ($p_{\text{adj}} = 0.026$) remain statistically significant. Under the less conservative BH-FDR correction, Q14 ($p_{\text{adj}} = 0.020$) also remains significant. These results confirm that the core findings - that impatience predicts lower policy support (Q4) and greater intergenerational responsibility deferral (Q11) - are robust to multiple testing correction.

Robustness Checks

To assess the robustness of our findings, we conducted additional regressions using two alternative specifications. First, we aggregated items within each dimension to create dimension-level averages. Second, we substituted the impatience measure with the behavioral switch point X^* as an alternative indicator of time preference.

As shown in Table 8, the pattern of results is consistent. For the PSBI dimension, impatience is negatively associated with pro-climate attitudes ($\beta = -5.053$, $p = 0.004$), and the switch point shows a similar negative association ($\beta = -0.016$, $p = 0.004$). For the FOIR dimension, impatience is negatively associated with pro-climate attitudes ($\beta = -3.848$, $p = 0.024$), as is

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the switch point ($\beta = -0.012$, $p = 0.023$). No significant associations are observed for PTCC or SKCC. These robustness checks confirm that the main results are not artifacts of measurement choice. Although the FAB treatment reduces PTCC and SKCC scores, after applying Bonferroni correction, the effects are not significant.

PTCC		SKCC		PSBI		FOIR		
	PTCC Model 1	PTCC Model 2	SKCC Model 1	SKCC Model 2	PSBI Model 1	PSBI Model 2	FOIR Model 1	FOIR Model 2
Impatience	-0.14		-3.049*		-5.053***		-3.848**	
	-1.725		-1.714		-1.745		-1.701	
Switch point		0		-0.010*		-0.016***		-0.012**
		-0.005		-0.005		-0.005		-0.005
FAB	-0.223**	-0.223**	-0.187**	-0.187**	-0.075	-0.075	-0.105	-0.105
	-0.1	-0.1	-0.09	-0.09	-0.094	-0.094	-0.093	-0.093
IFT	-0.081	-0.081	0.044	0.043	0.041	0.041	-0.045	-0.045
	-0.1	-0.1	-0.094	-0.094	-0.095	-0.095	-0.091	-0.091
LFG	0.032	0.032	0.027	0.027	0.02	0.02	0.02	0.02
	-0.096	-0.096	-0.094	-0.094	-0.091	-0.091	-0.088	-0.089
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	965	965	965	965	965	965	965	965
Pseudo R ²	0.028	0.028	0.008	0.008	0.039	0.039	0.029	0.029

TABLE 8: Robustness Check Regression Results

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Model 1 uses impatience; Model 2 uses switch point. FAB, IFT, LFG are dummies for each treatment group; Control is omitted. Control variables included in all models (gender, age, outdoor, education, income, family, kid, news). Composite dimension scores: PTCC = $(Q1 + Q2)/2$; SKCC = $(Q3 + (8 - Q5) + Q6 + Q7 + (8 - Q8))/5$; PSBI = $((8 - Q4) + Q9)/2$; FOIR = $(Q10 + (8 - Q11) + Q12 + Q13 + (8 - Q14))/5$. Source: Author's own calculations

Heterogeneous effects

To explore whether the effect of impatience varies across subgroups, we estimated interaction models for outcome variables for which impatience showed significant effects (Q4, Q11, Q14). The specification is:

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$$\Pr(Q_i = k) = \Phi(\alpha + \beta_1 \text{impatience} + \beta_2 \text{characteristic} + \beta_3 (\text{impatience} \times \text{characteristic}) + \gamma' \mathbf{X}) + \varepsilon \quad (3)$$

where characteristic is one of the following: treatment assignment, gender, outdoor work, education, or income (equation 3). The interaction term between impatience and treatment is not statistically significant, indicating that the future-oriented interventions do not meaningfully moderate the relationship between time preferences and climate attitudes. Most interactions with individual characteristics are also statistically insignificant. The exception is income: the interaction term for Q11 is positive and significant ($\beta = 3.404$, $p = 0.017$), suggesting that highly impatient individuals with higher income are more likely to defer environmental responsibility to future generations. However, after applying a Bonferroni correction for multiple hypothesis testing (multiplying p-values by 5), this interaction is no longer significant at conventional levels (Gerber and Green, 2012). We therefore conclude that there is no robust evidence of heterogeneous effects.

Discussion

Our finding that more impatient individuals are significantly less willing to assume responsibility for climate change on behalf of future generations and less willing to engage in mitigation is consistent with Wang et al. (Wang et al., 2016), who used a large-scale international survey in 53 countries found that the tendency to delay gratification is correlated with environmental protection at the country level. However, the literature in this area is limited. A few studies such as Alpizar et al. (Alpizar et al., 2023) and Newell and Siikamaki (Newell and Siikamaki, 2015) focus on time preference and climate adaptation investment and energy efficiency investment. They all found that impatient individuals are less willing to invest in climate adaptation and energy efficiency. Our study focuses on climate change, which is a public good.

Implications

Our findings suggest that impatient individuals may be less responsive to climate messaging, highlighting the importance of considering individual differences in time preferences when designing climate communication strategies. One policy-relevant approach is to lower the immediate costs of mitigation, such as through subsidies or tax credits for energy-efficient consumption (Alpizar et al., 2023). Another is to explore interventions that lengthen time horizons, though evidence on the malleability of time preferences is mixed (Lempert et al., 2024) (Chen and He, 2021).

The positive association between having children and climate concern - consistent with Alexander Gazmararian (Gazmararian, 2025) - is intriguing, but we caution against interpreting this as a policy recommendation given the correlational nature of our data. Fertility policies are complex and have far-reaching implications beyond climate change.

Limitations

Several limitations warrant consideration. First, our findings are correlational, not causal. While we control for a range of socioeconomic factors, we cannot rule out omitted variable bias (e.g., social preferences, political ideology) or reverse causality. Second, we use self-reported climate attitude measures collected in a single survey session. This may be susceptible to social desirability bias and common method variance. Third, ceiling effects substantially limit the statistical power to detect treatment effects. Participants in our sample exhibit unusually high pro-climate attitudes at baseline, with several items approaching the scale maximum. This restricts the observable range of the dependent variable and may explain the null treatment effects even if the interventions have genuine psychological effects in less concerned populations. Fourth, the ordering of tasks - time preferences elicited after the framing exercises and climate video - may have influenced responses. We chose this ordering to avoid priming the framing tasks with monetary considerations, but future research could randomize the task order to test for such effects. Fifth, the generalizability of our findings is limited by the characteristics of the sample. Our participants were recruited through an online platform and are relatively educated and environmentally engaged. Finally, all climate attitude outcomes are self-reported on a Likert scale. Self-reported attitudes may diverge substantially from actual climate-relevant behaviors. Our study demonstrates that time preferences are associated with attitudinal dimensions of intergenerational responsibility, but whether this translates into behavioral differences remains an open question. We also collect an incentivized donation decision as part of the study; the analysis of that behavioral outcome is the focus of a separate paper.

Future Research

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Future research could address the limitations of this study in several ways. First, studies linking elicited time preferences to actual climate-relevant behaviors (rather than attitudes) would strengthen the policy relevance of these findings. Second, experimental designs that randomize task order could help isolate whether priming affects time preference measures. Third, exploring whether the relationship between impatience and climate attitudes varies across populations with different baseline levels of concern would inform the generalizability.

Conclusions

This paper examines how individuals' time preferences relate to their intergenerational attitudes toward climate change. We conducted a large-scale national online experiment in China, eliciting time preferences using an incentivized MPL task and measuring climate attitudes across 14 items capturing perceived threat, scientific knowledge, policy support, and intergenerational responsibility.

Our results show that impatience is associated with specific action-oriented and intergenerational dimensions of climate attitudes. Specifically, more impatient individuals are significantly more likely to downplay the importance of taking climate action (Q4) and to defer environmental responsibility to future generations (Q11); these findings survive Bonferroni correction. Crucially, impatience is not associated with perceived climate threat or scientific knowledge about climate change, indicating that time preferences selectively affect the behavioral and intergenerational dimensions of climate attitudes rather than factual beliefs.

We find no evidence that future-oriented framing exercises (ITF, FAB, LFG) shift climate attitudes. This null finding suggests that such interventions may have limited effectiveness in general population settings, particularly when participants already hold strong pro-climate views. The stability of climate attitudes is consistent with prior work suggesting that environmental values are deeply rooted and resistant to short-term manipulations.

This study contributes cross-cultural evidence on the psychological underpinnings of climate inaction. It also provides a benchmark for the effectiveness (or lack thereof) of imagination-based framing interventions in a large, general population sample. Understanding how individual differences in time preferences shape intergenerational responsibility is essential for addressing the collective action challenges posed by climate change.

Appendices

The complete survey instrument and experimental instructions are reproduced in Tables 9-11 of the Appendix.

Welcome to the experiment. Please read the following instructions carefully before starting.

Today's experiment consists of four parts:

A short written task.

A donation decision to an environmental project (all donations will be collected and submitted after the experiment).

A time preference task involving 20 rounds of choices between smaller-sooner and larger-later payments.

A brief questionnaire.

Part I: Climate Change Background

Video source: National Weather Forecasting Agency

The following section outlines the tasks for each treatment group (FAB, ITF, LFG, and the control group). Participants are only required to complete the task corresponding to their assigned treatment group and do not need to complete tasks for the other groups.

A: FAB Group

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Please imagine that you have traveled via time machine to the year 2060. Reflect on the following questions and write a paragraph describing what life is like in 2060 based on your imagination. Be as detailed as possible.

Where are you geographically located?

What is the weather like? Has it been affected by climate change?

How does the air feel when you take a deep breath?

What is the surrounding environment like?

What powers the transportation people use?

What is trending on the internet today?

What expressions do people on the street have?

Please spend at least 5 minutes writing this letter. (Eligible entries will receive a bonus of 1 yuan.)

B: ITF Group

Please imagine you have traveled via time machine to the year 2060. Think carefully about the questions (identical to those used in the FAB group) and write a paragraph describing what your life might look like in 2060. Try to provide as many specific details as possible.

Please spend at least 5 minutes writing this letter. (Eligible entries will receive a bonus of 1 yuan.)

C: LFG Group

Do you have any of the following? (Multiple choice)

- ☐ Yes, I have children ☐ Yes, I have grandchildren
☐ Yes, I have nieces/nephews ☐ No, I have none of the above

How old is your youngest child/grandchild/niece/nephew? Age:

If you answered yes above:

Imagine it is now the year 2060. Your child/grandchild/niece/nephew is now (current age + 37) years old, working hard to support their family. One day, they open their mailbox and find a letter you wrote to them back in 2023. In this letter, you describe your understanding of the risks and challenges of climate change, how it may affect their life in 2060, and what actions you have taken-or plan to take-to address climate change.

Please spend at least 5 minutes writing this letter. (Eligible entries will receive a bonus of 1 yuan.)

If you answered "No" above:

Imagine it is the year 2060. A child born today is now 37 years old, working hard to support their family. One day, they open their mailbox and find a letter you wrote to them in 2023. In the letter, explain what you believe about the risks and consequences of climate change, how it may affect their life in 2060, and what actions you have taken-or plan to take-to mitigate these effects.

Please spend at least 5 minutes writing this letter. (Eligible entries will receive a bonus of 1 yuan.)

D: Control Group

Please describe what a typical day in your life looks like. (Eligible entries will receive a bonus of 1 yuan.)

Part II: Donation Decision

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The following section outlines the tasks for each treatment group (FAB, ITF, LFG, and the control group). Participants are only required to complete the task corresponding to their assigned treatment group and do not need to complete tasks for the other groups.

A. FAB Group

- Perspective from 2060

Imagine someone in 2023 received 50 yuan for participating in a survey. From the perspective of a person living in 2060, how much would you recommend they donate to Blue Map (also known as the Institute of Public & Environmental Affairs, IPE), a nonprofit environmental research institute registered in Beijing. Your donation will support one of its climate-related projects-specifically, the Corporate Climate Action CATI Index.

- Back to 2023

Now, imagine you have returned to the year 2023.

From every 100 participants, one will be randomly selected to receive a 50-yuan reward. You must decide how much of this amount you would donate to Blue Map.

The CATI Index is one of four climate initiatives by IPE. Using publicly disclosed corporate information, this index evaluates companies' and supply chains' climate governance, highlights key emission sources, promotes energy-saving and emissions-reduction actions, and increases carbon data transparency. Since 2018, IPE has published annual reports on climate actions in corporate supply chains.

More info:

http://wwwwoa.ipe.org.cn/Plugin/KindEditor/Upload/file/20220325/20220325111652_0373.pdf

How much would you choose to donate from the 50 yuan?

B: ITF Group

Now imagine you return to the year 2023. One participant out of every 100 will be randomly selected to receive a 50-yuan reward. You are asked to decide how much of this amount you would like to donate to Blue Map (also known as the Institute of Public & Environmental Affairs, IPE), a nonprofit environmental research institute registered in Beijing. Your donation will support one of its climate-related projects-specifically, the Corporate Climate Action CATI Index.

The CATI Index is one of four climate initiatives by IPE. Using publicly disclosed corporate information, this index evaluates companies' and supply chains' climate governance, highlights key emission sources, promotes energy-saving and emissions-reduction actions, and increases carbon data transparency. Since 2018, IPE has published annual reports on climate actions in corporate supply chains.

More info:

http://wwwwoa.ipe.org.cn/Plugin/KindEditor/Upload/file/20220325/20220325111652_0373.pdf

How much of your 50 yuan would you like to donate?

C: LFG Group

One participant out of every 100 will be randomly selected to receive a 50-yuan reward. You are asked to decide how much of this amount you would like to donate to Blue Map (also known as the Institute of Public & Environmental Affairs, IPE), a nonprofit environmental research institute registered in Beijing. Your donation will support one of its climate-related projects-specifically, the Corporate Climate Action CATI Index.

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More info:

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How much of your 50 yuan would you like to donate?

D: control Group

One participant out of every 100 will be randomly selected to receive a 50-yuan reward. You are asked to decide how much of this amount you would like to donate to Blue Map (also known as the Institute of Public & Environmental Affairs, IPE), a nonprofit environmental research institute registered in Beijing. Your donation will support one of its climate-related projects-specifically, the Corporate Climate Action CATI Index.

The CATI Index is one of four climate initiatives by IPE. Using publicly disclosed corporate information, this index evaluates companies' and supply chains' climate governance, highlights key emission sources, promotes energy-saving and emissions-reduction actions, and increases carbon data transparency. Since 2018, IPE has published annual reports on climate actions in corporate supply chains.

More info:

http://wwwwoa.ipe.org.cn/Plugin/KindEditor/Upload/file/20220325/20220325111652_0373.pdf

How much of your 50 yuan would you like to donate?

Part III: Time Preference Task

You will be asked to make 20 choices between receiving a smaller amount of money sooner or a larger amount later. In each round, the delayed amount increases gradually. Starting from Round 2, the delayed payment continues to rise until it reaches a maximum of 120 yuan by Round 20.

Please consider your preferences carefully. For example, if you choose to wait one month for 115 yuan instead of receiving 50 yuan in one week, you would likely prefer 116 yuan after a month over 50 yuan in a week as well.

At the end of the experiment, one participant out of every 100 will be randomly selected. One of the 20 choices will also be randomly selected and paid out accordingly.

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Round	Option A: X yuan in 1 week	Option B: Y yuan in 1 month	Your Choice
Example	100	101	A
1	100	101	
2	100	102	
3	100	103	
4	100	104	
5	100	105	
6	100	106	
7	100	107	
8	100	108	
9	100	109	
10	100	110	
11	100	111	
12	100	112	
13	100	113	
14	100	114	
15	100	115	
16	100	116	
17	100	117	
18	100	118	
19	100	119	
20	100	120	

TABLE 9: Time Preference Elicitation
Source: Author's creation

Part IV: A brief questionnaire

A. Demographic Questions

Variable	Response format
Gender	Male/Female
Age	Open response
Occupation	Marketing/Sales/Business Staff; Procurement Specialist; Administrative Staff; Human Resources Personnel; Product/Operations Staff; Self-employed; Finance/Accounting/Cashier/Auditor; Business Executive/Manager; Lawyer/Legal Professional; Service Industry Worker; Agricultural/Forestry/Fishery Worker; Manual Worker/Laborer; Designer/Creative Professional; Freelancer; Technical Developer/Engineer; Retired; Full-time Homemaker; Student; Teacher; Government Official; Medical and Healthcare Worker; Researcher
Outdoor work	Yes/No
Education	Middle school or below; High school; Associate degree; Bachelor's degree; Graduate degree or above
Monthly income	Below 3,000 yuan; 3,000–5,000 yuan; 5,000–10,000 yuan; 10,000–15,000 yuan; 15,000–20,000 yuan; Over 20,000 yuan
Household size	1 person; 2 persons; 3 persons; 4 persons; 4 persons; 6 persons or more
Children	Yes/No
Place of origin	Open response
Environmental news attention	Not at all; Indifferent; Somewhat concerned; Very concerned

TABLE 10: Demographic Questionnaire

Source: Author's creation

B. Climate Change Attitudes Questions

(7-point Likert scale: 1 = Strongly Disagree, 7 = Strongly Agree)

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Item	Question	Scale
Q1	Climate change is a major threat to the world.	1–7 Likert
Q2	Climate change is a major threat to China.	1–7 Likert
Q3	Climate change is caused by human activities such as burning fossil fuels.	1–7 Likert
Q4	It is not important to take action to mitigate climate change.	1–7 Likert
Q5	Climate change will reduce the frequency of floods.	1–7 Likert
Q6	Climate change will increase the frequency of droughts.	1–7 Likert
Q7	Climate change will cause sea levels to rise.	1–7 Likert
Q8	Climate change will lead to shorter heatwaves.	1–7 Likert
Q9	I am willing to pay or reduce consumption to mitigate climate change.	1–7 Likert
Q10	Climate change will harm the health and well-being of future generations.	1–7 Likert
Q11	The current generation should not worry about protecting the environment; future generations should.	1–7 Likert
Q12	Intergenerational equality is an important consideration in formulating climate change policies.	1–7 Likert
Q13	I am willing to pay money to support actions that mitigate climate change, even if benefits are received by future generations.	1–7 Likert
Q14	I prefer enjoying the present rather than spending a lot of time worrying about the future.	1–7 Likert

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TABLE 11: Climate Change Attitudes Questions
Source: Adapted from Shaw et al. (Shaw et al., 2025) with permission

Thank you for your participation. If you are selected for a reward, our staff will contact you.
Phone number (optional, for prize notification):

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Botao Qin

Acquisition, analysis, or interpretation of data: Botao Qin, Xiaoqing Que, Junjia Zeng

Drafting of the manuscript: Botao Qin, Junjia Zeng

Critical review of the manuscript for important intellectual content: Botao Qin, Xiaoqing Que

Supervision: Botao Qin

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Data Availability Statements

The data used in this article are available in Mendeley Data at <https://doi.org/10.17632/vfv2kgh98d.1>

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