

Article

From Values to Policy Understanding: Linking Pro-Environmental Worldviews, Self-Efficacy, and Climate Risk Perceptions to Sustainability Policy in China

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Abstract

Previous research has primarily examined pro-environmental behaviors, yet how citizens understand the policies that shape such actions remains underexplored. Guided by Protection Motivation Theory, this study investigates the relationship between pro-environmental worldviews and environmental policy understanding in China. Using nationally representative data from the 2021 Chinese General Social Survey (N = 1855), regression analyses revealed that pro-environmental worldviews were positively associated with policy understanding ($\beta = 0.114, p < 0.01$), and this link was partially mediated by environmental self-efficacy ($\beta = 0.063, p < 0.001$). The positive association between worldviews and self-efficacy was stronger among respondents who perceived climate change as highly severe (interaction $\beta = 0.083, p < 0.05$). These findings highlight the cognitive pathways connecting environmental values and policy literacy, positioning policy understanding as an important aspect of sustainable citizenship alongside behavioral engagement. Practically, they suggest that enhancing citizens' understanding of sustainability policies requires communication that resonates with values, strengthens confidence, and conveys credible information about climate risks.



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1. Introduction

Environmental governance rises or falls not only on the policy design but on the public's ability and acceptability to grasp what those policies ask of them [1]. Across many countries, efforts to mitigate climate change, protect biodiversity, and control pollution have increasingly recognized that the success of everyday implementation hinges on individuals' ability to interpret policy goals, understand instruments, and navigate compliance contexts [2,3]. Research highlights that individuals' support for environmental policy is shaped by how they perceive the effectiveness, fairness, and feasibility of policy instruments, rather than by general environmental concern alone [4]. In addition, communication strategies and public engagement efforts are frequently identified as key factors shaping public comprehension of environmental governance frameworks [5]. Comparative evidence from Europe further shows that, when citizens understand how policy tools operate, they are more likely to endorse and comply with environmental governance measures [6]. These global findings suggest that citizens' comprehension of policy content and intent is

a critical link between ecological values and real-world sustainability outcomes. Turning to China, the large and multilayered governance system, national environmental targets cascade through province- and city-level policy documents, sectoral standards, and pilots; navigating this layered architecture is essential for effective public comprehension [7]. This raises the informational demands on citizens, making policy comprehension a practical requirement for effective implementation; without basic literacy in goals and instruments, favorable attitudes struggle to translate into aligned action at scale [3,8]. From a sustainability perspective, such comprehension represents not merely administrative awareness but an emerging dimension of “sustainability literacy” [9], which is the cognitive capacity that enables citizens to connect personal pro-environmental values with collective policy frameworks supporting sustainable transitions. Strengthening this literacy helps bridge the micro-level motivations (referring to the motivations of individuals or small groups to engage in pro-environmental actions) of individuals with macro-level policy architectures, thereby turning sustainability goals from abstract ideals into an actionable understanding within daily governance contexts [10]. Research in environmental psychology has produced rich evidence on why and how individuals recycle [11], conserve energy [12], or choose sustainable products [13]. Yet this literature has tended to treat policy as context rather than content. Public understanding and acceptance of environmental policy, what it is, how it works, and what it requires, warrants further empirical exploration, given its distinct role in shaping how people evaluate trade-offs, recognize incentives and sanctions, and coordinate with institutions [3,14]. Weak policy literacy can open implementation gaps: citizens may support “the environment” while misreading or overlooking the specific rules that structure collective action [15–17].

To address this, the study positions policy understanding within Protection Motivation Theory (PMT) [18]. PMT explains how people appraise threats and their capacity to respond, and how those appraisals mobilize protective action [19]. In environmental governance, policy comprehension can be viewed as a motivated coping response: when global environmental problems are perceived as severe, the cost of inattention rises; when people feel capable of engaging with environmental challenges, they are more willing to invest the effort that policy learning requires [20,21]. PMT thus offers a parsimonious account of why individuals attend to, seek out, and retain policy information. Within the broader framework of sustainability transitions, PMT also helps explain how individuals translate pro-environmental concern into informed participation in collective governance. Policy understanding, in this sense, represents a cognitive form of adaptive response that enables citizens to align their personal actions with sustainability-oriented institutional goals. By emphasizing perceived efficacy and risk appraisal, PMT provides a theoretical bridge between micro-level motivational processes and macro-level sustainability governance structures [22,23]. PMT has primarily been applied to examine how perceptions of threat and efficacy shape protective behaviors [20]. However, much less is known about how more enduring environmental worldviews provide the motivational foundation for these processes. Environmental worldviews provide the motivational backdrop for this process [24]. Enduring beliefs about human–nature relations can dispose individuals to take environmental risks seriously and to invest in understanding policy [25]. While such worldviews are conceptually distinct from the situational appraisals emphasized in PMT, they are likely to operate as background dispositions that make threat and coping information more salient and consequential [25]. A sense of efficacy operates as a proximal cognitive resource that facilitates the interpretation of policy aims and instruments, while perceived global severity cues the urgency of acquiring such knowledge [25]. This integrated perspective links values, motivation, and cognition in the service of environmental governance.

This study extends PMT by incorporating pro-environmental worldviews as a distal factor. In doing so, it bridges the gap between enduring ecological values and the cognitive appraisals of threat and efficacy, shifting attention from pro-environmental behaviors to the relatively underexplored outcome of policy understanding. Conceptually, stable ecological values are linked with how citizens perceive environmental threats and their self-efficacy regarding environmental actions. These proximal appraisals form part of the overall pattern through which individual differences in worldviews are associated with variations in policy understanding. By integrating distal and proximal constructs in this manner, the study highlights a potentially meaningful association pattern between enduring values and situational cognitive appraisals. This approach addresses a gap in the literature concerning the role of stable ecological values in shaping citizens' comprehension of environmental policies, which is a necessary condition for effective policy engagement in contexts such as China. Specifically, this study aims to integrate pro-environmental worldviews as a distal factor into the PMT framework, highlighting their association with threat and efficacy appraisals; to examine the mediating role of environmental self-efficacy and the moderating role of perceived severity of global climate change in the relationship between pro-environmental worldviews and policy understanding; and to explore citizens' comprehension of environmental policies in China, thereby extending the focus of PMT beyond individual behaviors to policy understanding as an outcome of sustainable citizenship. This study makes three potential contributions. First, it integrates pro-environmental worldviews into the PMT framework, showing how stable ecological values provide the motivational basis for threat and coping appraisals. Second, it shifts the focus of PMT from explaining protective behaviors to clarifying policy understanding as a core outcome. Third, it provides evidence from China's policy-driven context, where public comprehension is critical for effective environmental governance. The analysis draws on nationally representative data from the 2021 Chinese General Social Survey (CGSS 2021), which provides robust measures of environmental values, efficacy beliefs, and awareness.

2. Literature Review and Hypothesis Development

2.1. Protection Motivation Theory

Protection Motivation Theory explains how people translate perceptions of risk into adaptive responses through two appraisal processes: threat appraisal and coping appraisal [18]. Threat appraisal concerns the perceived severity of and vulnerability to a threat, offset by any perceived rewards of inaction. Coping appraisal evaluates whether a response is feasible and worthwhile, captured by response efficacy (the belief that the recommended action works), self-efficacy (confidence in one's ability to carry it out), and response costs (time, effort, or resources required) [19]. Together, these appraisals generate "protection motivation," a state that directs attention and effort toward risk-reducing action. Originally developed in health psychology [1], PMT has since been applied to environmental psychology [20]. Studies have shown that efficacy beliefs are reliable predictors of protective engagement, while perceived severity heightens the salience of the issue and catalyzes motivated processing of information [21]. In settings where policy is the primary vehicle for collective risk management, these dynamics naturally extend from behavior to policy cognition [26].

In this study, we treat policy understanding as a motivated cognitive response [27]: citizens invest in learning what policies stipulate when the environmental threat is appraised as serious enough to warrant attention, and they feel capable of engaging with environmental challenges. PMT clarifies why interventions that raise perceived relevance

(threat appraisal) and build efficacy (coping appraisal) should improve not only compliance but also the comprehension that underpins effective implementation [20]. Within this framework, enduring environmental worldviews supply background motivation that disposes individuals to treat environmental risks as consequential and to engage with institutional responses [28]. PMT specifies the catalyst through which those dispositions become sustained, facilitating information seeking and retention. Stronger efficacy supports the effortful processing policy understanding requires, while higher perceived severity increases the opportunity cost of inattention [18]. Although PMT treats threat and coping appraisals as separate processes, studies show they can interact. Research on flood mitigation found that higher perceived severity increases the weight given to efficacy beliefs [29]. Recent experiments on climate change likewise suggest that threat perceptions motivate action when paired with strong efficacy beliefs [30]. This perspective motivates the empirical focus on efficacy and severity in explaining citizens' understanding of environmental policies. The analysis draws on nationally representative data from the CGSS 2021, which provides valid indicators for operationalizing PMT. Specifically, the survey includes measures of pro-environmental worldviews (reflecting ecological values), environmental self-efficacy (capturing coping appraisal), and perceived severity of global climate change (representing threat appraisal), as well as respondents' policy understanding as the cognitive outcome of these motivational processes.

2.2. Pro-Environmental Worldviews and Policy Understanding

Environmental worldviews are relatively stable beliefs about how humans relate to nature and about ecological limits [24]. In the PMT framework, such worldviews work as an upstream orientation that makes environmental threats feel important (stronger threat appraisal) and makes it worthwhile to learn how to respond (more sustained coping effort) [18]. In practice, people with stronger pro-environmental worldviews are more likely to notice government announcements on air, water, and carbon policies, read plain-language summaries, check what the rules require in daily life, and remember the steps for compliance [24,25]. These concrete behaviors of paying attention, seeking information, and retaining key points help convert a general concern for the environment into a better understanding of how policies are structured and implemented. Prior research often links worldviews to actions such as recycling or conserving energy [31,32]. For example, Wu and Zhu [31] demonstrated that a love of nature promotes green consumer behaviors through ecological worldviews and personal norms, while Cai et al. [32] found that cultural worldviews influence the waste sorting behaviors of urban Chinese residents via environmental risk perception. These mechanisms, which guide attention, decision making, and behavioral engagement, suggest that similar cognitive pathways could also enhance policy understanding as a cognitive outcome. Therefore, we hypothesized:

H1. *Stronger pro-environmental worldviews are associated with a greater understanding of environmental policies.*

2.3. The Mediating Role of Environmental Self-Efficacy

Pro-environmental worldviews provide the motivational foundation for treating ecological risks as serious and worth sustained attention [24]. In PTM, such worldviews raise the perceived importance of the threat and orient people toward coping rather than avoidance. Individuals who hold stronger worldviews are more likely to engage with environmental information [33], deepen their understanding of related knowledge, enhance their ability to process relevant situations, and attempt small tasks related to policy guidance or pro-environmental, which in turn reinforces their sense of competence [34]. These experiences gradually build environmental self-efficacy, the belief that one can effec-

tively deal with environmental challenges and understand what environmental policies require [35].

Higher self-efficacy then facilitates policy understanding. Consistent with the coping appraisal in PMT, confident individuals are more inclined to seek out explanations of policy rules, persist when policy documents are complex, and translate abstract aims into concrete actions [18]. In this way, self-efficacy serves as the psychological bridge that channels general ecological values into concrete knowledge of policy [36]. Accordingly, environmental self-efficacy is expected to mediate the positive link between pro-environmental worldviews and understanding of environmental policies. Thus, we hypothesized:

H2. *Environmental self-efficacy mediates the positive association between pro-environmental worldviews and understanding of environmental policies.*

2.4. The Moderating Role of Perceived Severity of Global Climate Change

Perceived severity of global climate change refers to the judged seriousness and likely consequences of climate risks such as rising temperatures and extreme weather [37]. In PMT, it is a core part of threat appraisal that elevates the perceived stakes of inaction and relates to environmental engagement [20]. This appraisal may shape how environmental worldviews translate into environmental self-efficacy [38]. When severity is judged high, people who already hold pro-environmental worldviews tend to allocate more attention and time to climate information, process it more deeply, and monitor their own understanding [39]. For example, Tanveer et al. [39] found that individuals' perceived risk is significantly linked to their engagement with solar PV information, highlighting that heightened perceived severity motivates deeper information processing and active monitoring of understanding. Jung demonstrated that when individuals perceive climate goals as important, they can focus their cognitive resources more effectively [40], so knowledge gains come faster, and uncertainty about one's capability declines. In addition, sustained cognitive engagement creates a sense of mastery as people consolidate terms, rules, and procedures into coherent mental models, which strengthens confidence to handle related requirements [41]. By contrast, when severity is judged low, even strong worldviews are less likely to trigger this level of attention and structure, so opportunities to build self-efficacy are fewer [42]. According to the above discussion, the following hypothesis was proposed:

H3. *Perceived severity of global climate change moderates the relationship between pro-environmental worldviews and environmental self-efficacy, such that the positive association becomes stronger at higher levels of perceived severity.*

The conceptual model is presented in Figure 1.

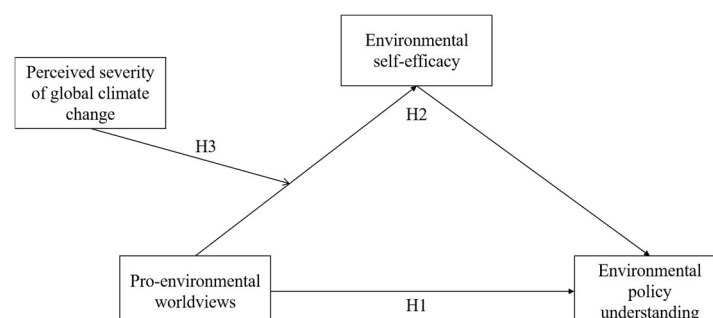


Figure 1. The conceptual model.

3. Methods

3.1. Data and Sample

Analyses used the 2021 Chinese General Social Survey (CGSS 2021), a nationally representative household survey based on multi-stage, stratified probability sampling of adult residents [43]. We excluded cases with missing values on key variables and removed invalid responses such as “do not know,” “refuse to answer,” or obvious nonresponse. The final sample contains 1855 respondents, including 890 men (48%) and 965 women (52%); the average age was 48 years (SD = 17.721).

3.2. Measures

Pro-environmental worldviews (PEW) were measured using the Chinese version of the New Environmental Paradigm (CNEP) scale, which was revised from the original NEP to fit the Chinese context [44]. The NEP scale was originally developed to capture individuals’ environmental beliefs and values [45]. In CGSS 2021, the CNEP contains ten items. Eight items are positively worded (e.g., “The Earth is like a spaceship with very limited room and resources.”), while two are negatively worded and reverse-coded (e.g., “The so-called “ecological crisis” facing humankind has been greatly exaggerated.”). Responses range from 1 = strongly disagree to 5 = strongly agree. After reverse coding, the mean score across all items was calculated, with higher scores indicating stronger pro-environmental worldviews. The internal consistency of the scale is acceptable (Cronbach’s $\alpha = 0.729$).

Building on earlier work that assessed environmental self-efficacy (ESE) with the item “People like me cannot do much for environmental protection” from the CGSS 2021 [43], this study expanded the measurement by incorporating additional conceptually related statements from the same attitudinal domain. Two supplementary items were included: “There are more important things in life than protecting the environment” and “My effort to protect the environment makes little difference unless everyone does the same”. Each item was rated on a five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Responses were averaged to create a composite score after reverse coding, where higher values indicate stronger perceived environmental self-efficacy. The Cronbach’s alpha for this brief scale was 0.474, which is considered acceptable [46]. Following the prior studies, we retained this scale because its average inter-item correlation (0.30) falls within a recommended range [47], and dropping any item did not improve reliability, suggesting acceptable internal consistency for large-scale survey research [48,49].

Building on previous research [50], which assessed environmental policy understanding (EPU) using six policy items from the CGSS 2021, this study expanded the measurement by incorporating all 14 environmental policy indicators available in the same dataset. These items assess respondents’ cognition of key environmental policies (e.g., ecological civilization, ecological compensation) and evaluate the extent to which they understand the core contents of these policies. Each item asked respondents to indicate their level of knowledge: 1 = not familiar, 2 = somewhat familiar, 3 = fairly familiar, 4 = very familiar. The scores were averaged to form an index of policy understanding, with higher values reflecting greater policy understanding. The internal consistency of this 14-item scale was excellent (Cronbach’s $\alpha = 0.933$), indicating good reliability.

Perceived severity of global climate change (PSGC) was measured with the item asking respondents: “Overall, how harmful do you think the global temperature rise caused by climate change is for the environment?” Response options were 1 = not harmful at all, 2 = not very harmful, 3 = somewhat harmful, 4 = very harmful, and 5 = extremely harmful [51]. Higher scores indicate a stronger perception of the severity of global climate change.

Following previous studies, gender, age, education, and socioeconomic status were included as controls [43,51]. Gender was coded as 1 = male and 2 = female. Age was

calculated by subtracting the year of birth from the survey year. For educational attainment, we converted categorical levels into years of education [51]. Respondents without formal schooling were coded as 0 years. Those who completed primary school were coded as 6 years, junior middle school as 9 years, senior high school as 12 years, associate degree as 15 years, bachelor's degree as 16 years, and postgraduate qualifications as 19 years. For economic position, the household income was not used because a considerable number of respondents either left the item blank or chose not to answer. Instead, subjective socioeconomic status (SES) was used. This measure, based on the MacArthur Scale of Subjective Social Status [52], asks respondents to place themselves on a ladder from 1 (lowest standing) to 10 (highest standing). Higher values indicate a higher perceived socioeconomic position. Compared with objective income measures, subjective SES has the advantage of reflecting both the respondent's actual economic conditions and their personal evaluation of social standing [53,54], thereby capturing relative perceptions that are important for attitudes and behaviors.

Not all of the variables in this study were measured using standardized, multi-item questionnaires. This is common in national and cross-national surveys (e.g., CGSS), where space, translation, and measurement invariance constraints often necessitate the use of adapted or single-item indicators [43,51,55].

3.3. Data Analysis

Data analysis was conducted using SPSS 21.0. Descriptive statistics and Pearson correlations were first computed to provide an overview of the variables. To test the proposed mediation and moderation effects, the PROCESS macro 4.1 for SPSS [56] was employed, a widely used computational tool for estimating mediation, moderation, and conditional process models. Specifically, Model 4 was used to examine the simple mediation effect of environmental self-efficacy, and Model 7 was applied to assess the moderated mediation effect involving perceived severity of global climate change. The PROCESS macro provides bias-corrected confidence intervals through bootstrapping, which enhances the robustness of the estimates. The significance of indirect effects was examined using the Bootstrap method with 5000 resamples. Bias-corrected 95% confidence intervals were generated, and an effect was considered statistically significant when the interval did not include zero. A two-tailed significance level of $p \leq 0.05$ was adopted for all analyses.

4. Results

4.1. Test for Common Method Bias

As all key variables were drawn from self-reported survey items, we examined the possibility of common method bias. An exploratory factor analysis using Harman's single-factor approach showed that the first factor accounted for 27.95% of the variance, well below the conventional 50% threshold [57]. This shows that common method variance is unlikely to pose a serious issue to the results.

4.2. Descriptive Statistics and Correlations

Table 1 reports the means, standard deviations, and correlations of the study variables. Respondents showed moderate levels of perceived severity of climate change ($M = 3.51$, $SD = 0.85$) and environmental self-efficacy ($M = 2.81$, $SD = 0.77$). Pro-environmental worldviews were relatively high ($M = 3.61$, $SD = 0.56$). Policy understanding was positively correlated with subjective SES, perceived severity, pro-environmental worldviews, and self-efficacy (all $p < 0.01$). Pro-environmental worldviews were also positively related to severity and self-efficacy, while age showed negative correlations with several key variables.

Education showed positive correlations with key variables. These results are consistent with expectations and provide preliminary support for the hypothesized model.

Table 1. Descriptive statistics and correlations among study variables (N = 1855).

Variable	Mean	SD	1	2	3	4	5	6	7	8
1. Gender	1.520	0.500	1							
2. SSES	4.400	1.803	0.040	1						
3. PSCG	3.510	0.851	0.010	−0.028	1					
4. EPU	1.331	0.399	−0.120 **	0.155 **	0.120 **	1				
5. PEW	3.607	0.561	−0.034	−0.007	0.262 **	0.171 **	1			
6. ESE	2.809	0.774	0.001	0.085 **	0.137 **	0.209 **	0.185 **	1		
7. Age	48.089	17.721	−0.065 **	0.024	−0.066 **	−0.188 **	−0.268 **	−0.175 **	1	
8. Education	10.178	4.633	−0.080 **	0.100 **	0.155 **	0.324 **	0.358 **	0.257 **	−0.551 **	1

Note. Gender (1 = male, 2 = female); SSES = subjective socioeconomic status; PSCG = perceived severity of global climate change; EPU = environmental policy understanding; PEW = pro-environmental worldviews; ESE = environmental self-efficacy; ** $p < 0.01$.

4.3. The Moderated Mediation Model Test

To examine the hypothesized model, we applied PROCESS macro 4.1 for SPSS [56]. A moderated mediation framework was specified in which environmental self-efficacy served as the mediator between pro-environmental worldviews and policy understanding, while perceived severity of global climate change moderated the first stage of this pathway. Gender, age, and subjective SES were included as control variables. We first tested the mediating role of environmental self-efficacy using Model 4 of PROCESS [56]. As shown in Table 2, the mediating role of ESE in the relationship between PEW and EPU was tested while controlling for gender, age, and subjective SES. Results (see Table 2) indicated that PEW was positively associated with EPU ($\beta = 0.046$, $t = 2.786$, $p < 0.01$). Hypothesis 1 was supported. When ESE was included in the model, the association between PEW and EPU was significant ($\beta = 0.037$, $t = 2.240$, $p < 0.05$), showing partial mediation.

Table 2. Mediation effect analysis.

Regression Equation		Match Index			Significance of Regression Coefficient	
Outcome Variables	Predictive Variables	R	R ²	F	β	t
EPU	PEW				0.046	2.786 **
	Age				−0.001	−1.492 ***
	Gender	0.368	0.135	57.713 ***	−0.084	−4.793 ***
	SSES				0.030	6.166 ***
	Education				0.022	9.367 ***
ESE	PEW				0.146	4.398 ***
	Age				−0.002	−1.680
	Gender	0.286	0.082	32.777 ***	0.021	0.069
	SSES				0.029	3.011 **
	Education				0.031	6.648 ***

Table 2. Cont.

Regression Equation		Match Index			Significance of Regression Coefficient	
EPU	PEW				0.037	2.240 *
	ESE				0.063	5.418 ***
	Age	0.386	0.149	53.725 ***	−0.001	−1.291
	Gender				−0.086	−4.906 ***
	SSES				0.028	5.819 ***
	Education				0.020	8.499 ***

Note. Gender (1 = male, 2 = female); SSES = subjective socioeconomic status; EPU = environmental policy understanding; PEW = pro-environmental worldviews; ESE = environmental self-efficacy; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Further analysis showed that PEW was positively associated with ESE ($\beta = 0.146$, $t = 4.398$, $p < 0.001$), and ESE was in turn positively associated with EPU ($\beta = 0.063$, $t = 5.418$, $p < 0.001$). The bootstrap test with 5000 resamples confirmed that the indirect effect was significant ($\beta = 0.009$, $SE = 0.003$, 95% CI [0.004, 0.015]), as the confidence interval did not include zero. The total effect of PEW on EPU was 0.046 ($SE = 0.017$, 95% CI [0.014, 0.079]), with the direct effect of 0.037 ($SE = 0.017$, 95% CI [0.005, 0.070]) accounting for 80.43% of the total effect, and the indirect effect of 0.009 ($SE = 0.003$, 95% CI [0.004, 0.015]) accounting for 19.57% (see Table 3). Taken together, these findings demonstrate that pro-environmental worldviews were not only directly associated with policy understanding but also indirectly related through higher environmental self-efficacy. Hypothesis 2 was supported.

Table 3. Total effect, direct effect and indirect effect.

	Effect Size	Boot SE	Boot CI Lower	Boot CI Upper	Percentage
Total effect	0.046	0.017	0.014	0.079	
Direct effect	0.037	0.017	0.005	0.070	80.43%
Indirect effect	0.009	0.003	0.004	0.015	19.57%

We further tested the moderating role of PSCG using Model 7 of the PROCESS macro [56], with both the independent variable and the moderator mean-centered before analysis [58]. As shown in Table 4, both PEW ($\beta = 0.114$, $t = 3.371$, $p < 0.01$) and PSCG ($\beta = 0.082$, $t = 3.890$, $p < 0.001$) were positively associated with environmental ESE. More importantly, the interaction term PEW $\times$ PSCG was significant ($\beta = 0.083$, $t = 2.551$, $p < 0.05$), indicating that the link between PEW and ESE varied depending on the perceived severity of climate change. Among the control variables, subjective SES ($\beta = 0.031$, $t = 3.225$, $p < 0.01$) and education ($\beta = 0.030$, $t = 6.285$, $p < 0.001$) were positively related to ESE, while age ($\beta = -0.002$, $t = -1.900$) and gender ($\beta = 0.019$, $t = 0.536$) showed non-significant associations. Conditional effect analysis (Table 5) revealed that the association between PEW and ESE was weaker when PSCG was one standard deviation below the mean ($\beta = 0.147$, 95% CI [0.055, 0.244]), moderate at the mean level of PSCG ($\beta = 0.218$, 95% CI [0.151, 0.286]), and strongest when PSCG was one standard deviation above the mean ($\beta = 0.288$, 95% CI [0.196, 0.383]). None of the confidence intervals included zero, which confirmed the robustness of the moderating effect. These findings indicate that individuals with stronger pro-environmental worldviews tend to report higher environmental self-efficacy, and this association becomes more pronounced when global climate change is perceived as highly severe. Thus, Hypothesis 3 was supported.

Table 4. Moderated mediation effect analysis.

Regression Equation		Match Index			Significance of Regression Coefficient	
Outcome Variables	Predictive Variables	<i>R</i>	<i>R</i> ²	<i>F</i>	β	<i>t</i>
ESE	PEW	0.302	0.091	26.499 ***	0.114	3.371 **
	PSCG				0.082	3.890 ***
	PEW $\times$ PSCG				0.083	2.551 *
	Age				−0.002	−1.900
	Gender				0.019	0.536
	SSES				0.031	3.225 **
	Education				0.030	6.285 ***
	PEW				0.037	2.240 *
EPU	ESE	0.386	0.149	53.725 ***	0.063	5.418 ***
	Age				−0.001	−1.291
	Gender				−0.086	−4.906 ***
	SSES				0.028	5.819 ***
	Education				0.020	8.499 ***

Note. Gender (1 = male, 2 = female); SSES = subjective socioeconomic status; PSCG = perceived severity of global climate change; EPU = environmental policy understanding; PEW = pro-environmental worldview; ESE = environmental self-efficacy; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 5. The direct effect value of different levels of perceived severity of global climate change.

PSGC	Effect Size	Boot SE	Bootstrap Lower	Bootstrap Upper
M − SD	0.147	0.048	0.055	0.244
M	0.218	0.035	0.151	0.286
M + SD	0.288	0.047	0.196	0.383

Note. PSGC = perceived severity of global climate change.

To visualize the interaction, Figure 2 presents the simple slopes [59] of PEW on ESE at low (M − SD), medium (M), and high (M + SD) levels of PSCG. The conditional effects were positive and statistically significant at all three levels. The slope of the line increases with higher values of PSCG, showing that the association between PEW and ESE becomes stronger as the perceived severity of climate change increases. To further refine the detection of the boundary of the moderation effect, we conducted a Johnson–Neyman analysis [60], and the results are shown in Figure 3. This diagram provides a continuous view of the conditional effect of PEW on ESE across the full range of PSCG. The analysis identified a significance threshold at approximately 2.82 of PSCG, meaning that, when severity perception exceeded this point, the association between PEW and ESE became statistically significant. This threshold covers about 91.62% of the sample, showing that, for nearly all respondents, stronger pro-environmental worldviews were positively related to higher self-efficacy. The pattern indicates that the effect of ecological values on efficacy beliefs is not limited to extreme perceptions but emerges across a broad range of climate risk awareness. Both figures converge on the conclusion that the positive association between pro-environmental worldviews and environmental self-efficacy is amplified when global climate change is perceived as highly severe.

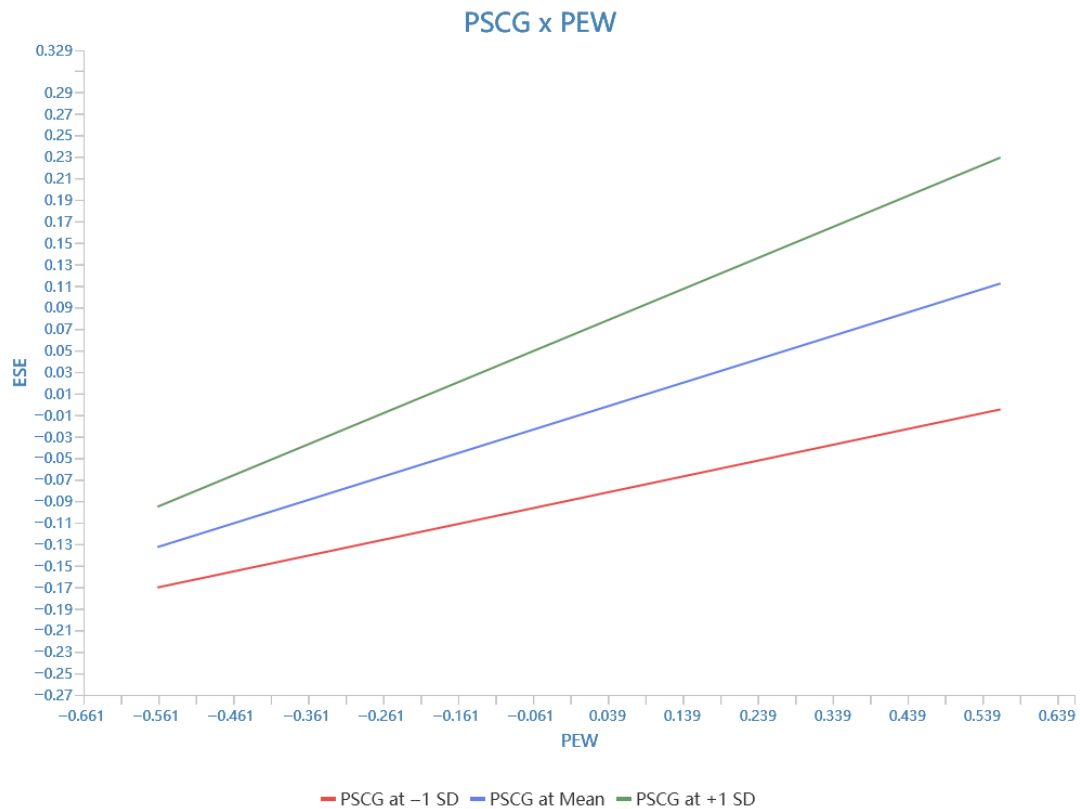


Figure 2. The simple slope plot.

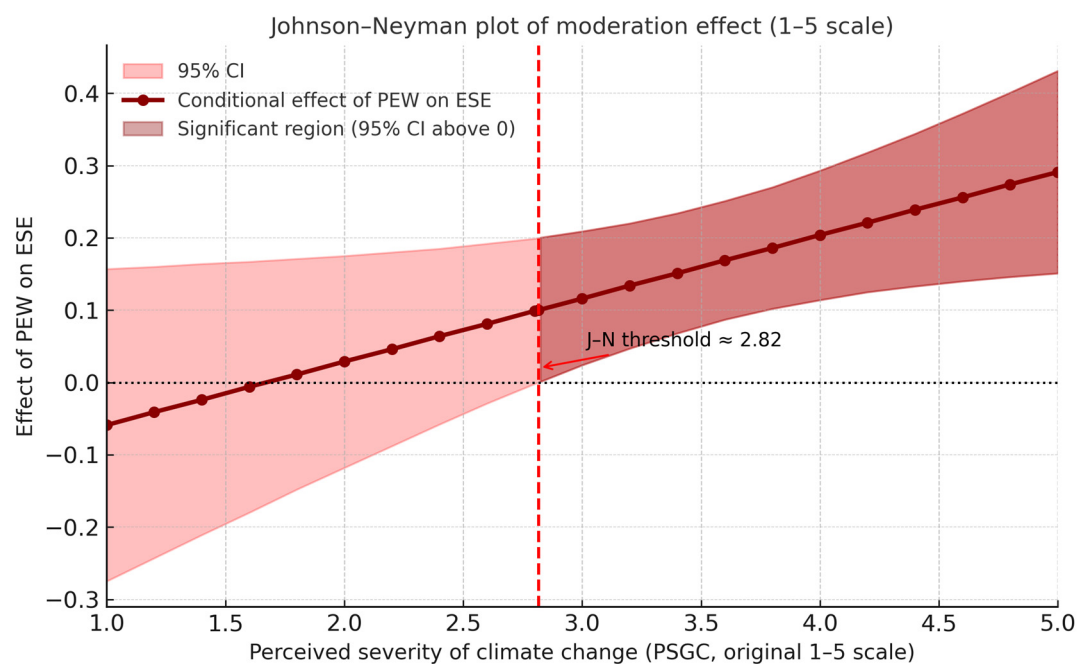


Figure 3. The Johnson–Neyman diagram.

As an exploratory analysis of cohort effects, respondents were grouped into four generational cohorts: Silent/Early Boomers (≤ 1960), Baby Boomers (1961–1974), Generation X (1975–1989), and Millennials/Y (1990–2003), to examine whether age-related patterns reflect generational differences. Given that the survey was conducted in 2021, this classification may not perfectly align with conventional generational boundaries, but it provides a reasonable approximation for examining potential cohort differences. First,

we tested whether the cohort moderated the direct effect of PEW on EPU. The interaction was not significant ($p = 0.864$), indicating that the effect of PEW on EPU does not differ substantially across generations. Next, we examined whether the cohort moderated the effect of PEW on ESE, the mediator in our model. Although the overall direct effect of PEW on ESE was not significant, the interaction with cohort was significant ($\beta = 0.066$, $p = 0.025$). Simple-slope analyses showed that PEW had a non-significant effect on ESE for the oldest cohort (Silent/Early Boomers; $\beta = 0.055$, $p = 0.298$), a significant effect for the middle cohort (Baby Boomers; $\beta = 0.121$, $p = 0.001$), and a stronger significant effect for the youngest cohort (Millennials/Y; $\beta = 0.253$, $p < 0.001$). These results suggest that generational differences moderate the pathway from PEW to ESE, even though the average direct effects are small.

5. Discussion

5.1. General Discussion

This study examined how pro-environmental worldviews associate with citizens' understanding of environmental policies in China, drawing on PMT. The findings offer several insights into the mechanisms that connect ecological values, cognitive appraisals, and policy comprehension. By linking these psychological processes with the informational demands of sustainability governance, this study highlights the cognitive foundations required for individuals to transition toward sustainable literacy.

First, pro-environmental worldviews were positively associated with policy understanding (e.g., Table 2, $\beta = 0.046$, $p < 0.01$), suggesting that citizens who hold stronger ecological values are more attentive to and capable of processing information about environmental policies. This result extends prior studies that mainly focused on worldviews to pro-environmental behaviors such as recycling, energy conservation, or climate activism [12,43]. In a broader sustainability context, this finding implies that enduring ecological worldviews not only motivate behavioral engagement but also enhance citizens' capacity to understand and navigate sustainability policies, which is an essential prerequisite for informed participation in sustainable governance [61]. Second, environmental self-efficacy partially mediated this relationship. Individuals with stronger pro-environmental worldviews tended to report greater confidence in their ability to deal with environmental issues, which in turn was linked to higher levels of policy comprehension. This aligns with extensive evidence from PMT-based research showing that self-efficacy is one of the most consistent predictors of protective engagement [18,20]. Third, perceived severity of global climate change moderated the link between pro-environmental worldviews and self-efficacy (e.g., Table 4, $\beta = 0.083$, $p < 0.05$). The association became stronger as perceptions of severity increased, and the Johnson–Neyman analysis indicated that this effect was significant for almost the entire range of severity values, excluding only the lowest levels of perception. This finding resonates with prior studies emphasizing that higher perceived threat enhances the salience of environmental information and encourages motivated processing [51,62]. In addition, several control variables showed significant associations. Age was negatively related to both environmental self-efficacy and policy understanding (Table 1), suggesting that younger respondents tend to report higher confidence and greater familiarity with environmental policies [63]. Subjective SES was positively associated with these outcomes, indicating that individuals who perceive themselves as having a higher social standing are more likely to understand policy frameworks. This finding is similar to the previously studied relationship between subjective SES and pro-environmental behavior [64]. Gender differences were modest, but men reported slightly higher levels of policy understanding [65]. Moreover, education showed a relatively strong and significant positive association with both environmental policy understanding and environmental self-efficacy.

This suggests that individuals with higher educational attainment are not only better able to comprehend the structure and content of environmental policies but also more confident in their ability to act upon them. In other words, education appears to strengthen both the cognitive and efficacy pathways that facilitate engagement with environmental policies. These findings are consistent with prior research indicating that formal education enhances pro-environmental attitudes and policy support by fostering knowledge, personal norms, and perceived competence [66]. Studies on sustainability education further demonstrate that higher education can increase environmental self-efficacy, which in turn mediates the relationship between education and policy-relevant engagement [67]. Exploratory analyses further indicated that generational cohort moderated the effect of pro-environmental worldviews on self-efficacy, with stronger effects among younger cohorts. This pattern likely reflects that younger Chinese generations generally have higher educational levels [68], which in turn boosts efficacy perceptions. Overall, education remains the primary factor explaining variance in self-efficacy and policy understanding, while cohort effects provide a minor, exploratory perspective.

In addition, the model explains a relatively small proportion of the variance in policy understanding, and the observed mediation effect and the moderation effect are relatively small. These outcomes likely reflect two main factors. First, policy understanding is influenced by multiple cognitive, informational, and contextual determinants, such as exposure to policy information and regional implementation differences, which are not captured in the CGSS dataset. Second, the CGSS measures of environmental self-efficacy and perceived severity include single-item indicators and multiple items developed by the survey designers, consistent with previous research [43,51]. Still, these are not validated multi-item scales, which may limit the precision and magnitude of estimated effects. Despite these limitations, the significant associations still provide theoretically meaningful insights into the role of individual psychological factors in shaping sustainability policy understanding. Future studies using richer, policy-targeted datasets and validated psychological measures could improve explanatory power and effect estimates.

5.2. Theoretical Contributions

The study makes three main contributions. First, it incorporates pro-environmental worldviews as a distal predictor, linking enduring ecological values with the situational appraisals of threat and coping emphasized in PMT. Whereas most applications of PMT have treated perceptions as immediate responses to specific risk contexts [18,20], our findings show that stable values can provide a motivational foundation that predisposes individuals to take environmental information more seriously [69]. In this way, the study connects value-based orientations with appraisal processes that are often modeled in isolation. Second, it positions policy understanding as a central outcome of environmental engagement. Previous research has largely focused on pro-environmental behaviors such as energy saving [12] and recycling [11], often overlooking whether people comprehend the institutional frameworks that guide such actions. By shifting attention to policy understanding, this study highlights cognition as an equally important dimension of engagement. Third, the research highlights the significance of context. While prior studies have primarily examined PMT in Western or individual-level settings, environmental governance in China is largely policy-driven, with well-established regulations and targets at both national and provincial levels [7]. Showing how citizens' values and efficacy beliefs associate with their understandings of these policies provides evidence from a setting where policy understanding is critical for effective implementation.

5.3. Practical Implications

The results have several practical implications for environmental governance. First, the positive association between pro-environmental worldviews and policy understanding suggests that communication strategies should consider citizens' ecological values. Public campaigns that align with these values (e.g., emphasizing long-term responsibility for nature) are more likely to encourage attention to policy content. For example, Thomaes et al. demonstrated that programs designed to engage adolescents in sustainable behaviors, through interactive activities, peer discussions, and values-based messaging, effectively promoted environmental engagement, suggesting that similar approaches could enhance attention to and understanding of environmental policies [70]. Second, the mediating role of environmental self-efficacy suggests that citizens need to be more confident in their ability to address environmental issues. Policies and educational initiatives should not only explain regulatory requirements but also highlight practical steps that individuals can take. Reid et al. highlight the critical role of environmental education in building both knowledge and self-efficacy [71]. Providing accessible information and opportunities for engagement within these educational initiatives can further strengthen self-efficacy and, consequently, improve comprehension of environmental policies. Offering clear examples, accessible information, and opportunities for participation can enhance efficacy and, in turn, improve policy comprehension. Third, the moderating effect of perceived severity of global climate change underscores the importance of conveying the seriousness of environmental risks [62]. Policymakers can provide credible and balanced information about the consequences of climate change, which can increase the perceived relevance of policy measures and motivate citizens to engage with them. Finally, these implications are particularly relevant in China's largely policy-driven governance system, where well-established environmental regulations and targets require public understanding and cooperation for effective implementation [7]. Therefore, enhancing policy understanding is not only a matter of public education but also a crucial condition for policy success.

5.4. Limitations and Future Research

Several limitations of this study should be acknowledged. First, the analysis relied on cross-sectional survey data, which restricts the ability to infer causal relationships. Therefore, the mediation and moderation results should be interpreted as statistical associations rather than causal mechanisms, and future longitudinal or experimental research is required to validate the temporal ordering among variables. Second, while the measures of policy understanding and environmental self-efficacy used here drew on items from a large-scale national survey (i.e., CGSS), they may not fully capture the depth and precision of citizens' knowledge. This limitation reflects a common feature of large-scale national and cross-national surveys, where space constraints, translation issues, and concerns about measurement invariance often lead to the use of shortened or adapted items rather than well-validated multi-item instruments [43,51,55]. Therefore, future research could employ standardized questionnaires to provide more reliable assessments of policy understanding. Third, the study examined in the Chinese context, the findings may not generalize to other political systems. Comparative research across countries with different institutional arrangements would help to clarify the scope and limits of the framework. Another limitation concerns the measurement of subjective socioeconomic status. The MacArthur Scale of Subjective Social Status was used as a brief indicator of individuals' perceived social standing. Although this measure has been widely applied in large-scale social surveys, it captures only a single dimension of socioeconomic perception and may not fully reflect the structural and contextual aspects of social hierarchy. Future research could incorporate more comprehensive indicators (e.g., occupational prestige, household assets, or multidimensional

indices of inequality) to provide a fuller understanding of how socioeconomic position relates to policy understanding and environmental attitudes. Finally, although this study adopted PMT as the guiding framework, other theoretical perspectives, such as the Social Identity theory [55], or Identity-based Motivation theory [54], may also provide valuable insights. Future research could compare and integrate these perspectives to develop a more comprehensive understanding of how citizens engage cognitively and behaviorally with environmental governance.

6. Conclusions

This study found that pro-environmental worldviews are positively associated with policy understanding in China, partly through environmental self-efficacy and further moderated by perceived severity of climate change. By integrating value-based perspectives with Protection Motivation Theory, the analysis broadens the theoretical scope from behavioral intentions to policy literacy, showing that citizens' comprehension of environmental policies is closely linked to their ecological values and perceived capacity for action. From a practical standpoint, enhancing policy understanding requires communication strategies that align with public values, strengthen efficacy beliefs, and convey reliable information about climate risks. Several limitations should be acknowledged. The cross-sectional design limits causal interpretation, and some measures, particularly environmental self-efficacy, were derived from concise indicators available in the CGSS dataset. Future research could employ longitudinal or experimental designs and adopt validated multi-item scales to examine these mechanisms in diverse policy contexts. Despite these constraints, the findings provide an integrative framework connecting values, efficacy, and risk perceptions, offering a clearer understanding of how citizens interpret and engage with sustainability policies within China's environmental governance landscape.

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Abbreviations

The following abbreviations are used in this manuscript:

PMT	Protection Motivation Theory
CGSS	Chinese General Social Survey
PEW	Pro-environmental worldview
CNEP	Chinese version of the New Environmental Paradigm
ESE	Environmental self-efficacy
SSES	Subjective socioeconomic status
PSCG	Perceived severity of global climate change
EPU	Environmental policy understanding

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