Original Research

Effect of Social Class Cognition and Public Service Satisfaction on Pro-Environmental Behavior in China

Yu Zhang^{1,2*}, Jiahui Tang^{1,2}, Jie Wang^{1,2}, Wang Zhang^{1,2}

¹Business School, Yangzhou University, Jiangsu 225127, China ²Research Center for Government Governance and Public Policy, Yangzhou University, Jiangsu 225127, China

Received: 13 December 2023 Accepted: 24 March 2024

Abstract

Although people have extensively studied the influencing factors of pro-environmental behaviors (PEBs) on individuals and society, there is still a lack of a unified and reasonable explanation among individuals, society, and nature. We explore the relationship among social class cognition (SCC), public service satisfaction (PSS), environmental risk perception (ERP), media use (MU), and citizens' PEBs. Structural equation modeling (SEM) was used for evaluating the causal chain from SCC, PSS to citizens' PEBs in the Chinese General Social Survey 2013 (CGSS2013, n=673), and the mediating role of ERP in the transition from SCC, PSS to citizens' PEBs. The results show that SCC and PSS significantly influence citizens' PEBs. From the perspective of impact mechanism, ERP plays an important mediating role in the impact path of SCC and PSS on citizens' PEBs. ERP is constantly spread, diffused, and enhanced by MU, and contributes to the formation of citizens' PEBs. This research is helpful to get a reasonable explanation of PEBs in individual-society-nature, and thus break the boundary between the private sphere and the public sphere to form an environmental governance pattern of co-construction, co-governance, and sharing.

Keywords: pro-environmental behaviors, social class cognition, public service satisfaction, environmental risk perception, structural equation model

Introduction

Recently, various environmental issues have frequently occurred, mainly attributed to increased air, river, and sea pollution, large-scale land degradation, a sharp reduction of forest area, a threat to biodiversity, etc. Simultaneously, excessive emissions of greenhouse gases lead to global warming, significantly increasing the frequency and intensity of natural disasters. Land, freshwater bodies, and oceans are being overexploited for food production, infrastructure, industry, and human settlements [1-3]. Up to 400 million tons of heavy metals, solvents, toxic sludge, and other industrial wastes are released annually into the world's waters. Urbanization and industrialization have led to many negative impacts on ecosystems and human health, which seriously endanger the quality of human life. The research indicates that 25% of human diseases

^{*}e-mail: maggie_zhangyu@163.com

are directly related to environmental degradation, and most of them stem from the imbalance between human social development and ecological governance [4, 5]. Topfer (1998), the former Executive Director of the UNEP, established that "mankind is at the crossroads of development presently, and the future of mankind is in its own hands. The choices of today will determine what kind of environment current and future generations will live in". He emphasized that without environmental protection, it is impossible for human society to achieve its ideal development goals. This requires people to change their daily behaviors and reduce the adverse effects of their behaviors and activities on the environment [6]. However, from what perspective can people's PEBs be changed to a greater extent, which is the basis of environmental governance at this stage?

In the general explanation framework of PEBs, scholars often regard PEBs as goal-oriented behaviors and analyze the formation mechanism and psychological factors of PEBs from the perspective of individual citizens [7, 8]. Some researchers have established that the current literature mainly studies the PEBs of individual citizens from the internal and external mechanisms of individual environments (cognitive factors and population factors) or from the separation and integration of society and nature (social and cultural factors). For example, the early planned behavior theory [9] and other theoretical frameworks all try to explain the formation mechanism of PEBs [10]. However, rational behavior theory and planned behavior theory pay excessive attention to individual cognitive factors such as behavior attitude and subjective norms, overlooking the social situation of behavior formation. Although the theory of norm activation [11] introduces responsibility as a variable with obvious social attributes, it cannot influence PEBs by promoting the formation of group social norms [12]. These two types of research paths make it difficult to obtain a reasonable explanation from individuals, society, and nature. Currently, there is a lack of detailed explanation of the social-individual path in PEBs, and the influence of social subjective cognition on citizens' PEBs is overlooked [13].

Compared with previous studies on citizens' PEBs, we attempt to explore the relationship between social subjective cognition (SCC, PSS), individual ERP [14], and citizens' PEBs from the perspective of social situations and integrate social and cultural factors [15]. This study primarily aims to consider the following questions: (1) What factors of social subjective cognition have a significant impact on citizens' ERP? (2) What is the influence mechanism of social subjective cognition on citizens' PEBs? (3) Does media use expand citizens' perceptions of environmental risks?

This study uses the national data set of CGSS2013 for empirical analysis. SEM is used to estimate the impact of PSS and SCC on citizens' PEBs [16]. Using the bootstrap method, this paper discusses the mediating effect of ERP and tests the "expanding effect" of MU on ERP to PEBs.

The marginal contributions of this study are as follows: First, PSS and SCC are considered the main explanatory variables, enriching the multi-dimensional perspective research on the influencing factors of citizens' PEBs. It discusses the implicit relationship among the influencing factors by using SEM. Secondly, on the basis of theory and experience, different from the previous pattern of dividing the nature of PEBs between public domain and private domain, it breaks the opposition between citizens' PEBs in the public domain and the private domain [17] and finds a common explanation among individuals, society, and nature, which is of great practical significance to the construction of the environmental governance pattern of "co-construction, sharing, and governance" (the report of the 19th National Congress of the Communist Party of China). Thirdly, the results of this study can provide reference suggestions for deepening the precise formulation of citizens' PEB policies and establishing the participation of the whole people in environmental governance.

The rest of this article is as follows: Section 2 describes the influencing factors and research assumptions. Section 3 introduces the data sources and research methods. Section 4 introduces the results of this empirical study, including the model-fitting test, structural path analysis, mediating effect analysis, and moderating effect test. Section 5 discusses the research results of this paper and puts forward relevant suggestions. Finally, it reveals the conclusions and limitations of this paper.

Literature Review and Hypotheses

PEBs and Their Related Factors

Scholars try to define the concept of PEBs and clarify the correlation among various influencing factors. However, due to the diversity of environmental problems and the multidimensional nature of environmental behavior [18], it is difficult to define PEBs. PEBs mainly include environmentally responsive behaviors [19], ecological behaviors [20], conservation behaviors [21], and ecological consumer behavior [22]. According to this study, PEBs can be defined as any behavior that benefits the environment or minimizes damage to the environment. Considering influencing factors, since the 1980s, environmental psychology scholars have identified two main sets of factors to predict PEBs: interpersonal factors and contextual factors [23]. Interpersonal factors include attitudes, norms, motivations, and subjective well-being [24]. The latter includes physical infrastructure, capability, technical facilities, and the availability of products [25].

Public Service Satisfaction (PSS)

PSS is citizens' subjective judgment on the supply

and construction of public services in the field of self-interaction [26]. Public service is an important part of public interest, and citizens' daily behavior is closely related to the supply of public service. From previous studies, it is known that PSS has an important impact on pro-environmental behavior [27]. First, infrastructure construction in public services, such as quantity, accessibility, and accessibility, can promote PEBs [28]. Second, after the demand for public services such as housing and employment has been met to a certain extent, people tend to consider specific social problems, such as environmental problems [29]. These points indicate that PSS may indirectly or directly affect citizens' PEBs. Thus, we present the following hypothesis:

Hypothesis 1. PSS has a positive impact on PEBs.

Social Class Cognition (SCC)

SCC is the subjective judgment of individual citizens on their social class based on objective conditions and external subjective perception. Various national macrolevel studies have found that environmentalists tend to be middle-class or upper-middle-class individuals. For example, roadside recycling research supports this perspective [30]. In the process of PEB research, scholars have found that the impact mechanism of the social level on PEBs is still unclear [31]. Although it may be due to negligence in literature research (such as the failure to translate environmental concerns into meaningful actions), it also provides new perspectives [32]. SCC seems to have a positive and moderate impact on environmental behavior [33]. The latest research indicates that PEBs have been popularized and implemented at all levels of American society [34], and SCC may play an important role in determining pro-environmental behavior [35]. Based on this, the following research hypothesis is proposed:

Hypothesis 2. SCC has a positive impact on PEBs.

Environmental Risk Perception (ERP)

The definition of environmental risk perception

is complex and cross-cutting, and it comprises a series of cognitive processes of environmental risk events caused by individuals' psychology [36]. It is a subjective judgment made by people on the characteristics and seriousness of environmental risks and can guide people's pro-environmental behavior. According to the intuitive judgment and subjective feeling of environmental risk, individual citizens judge subjective risk, which is used as the basis for avoiding and changing their attitude toward environmental risk and making PEB decisions [37]. Previous studies have shown that there is a significant positive correlation between risk perception and behavioral intention to participate in environmental actions [38]. Moreover, some scholars established that individuals with higher environmental risk perception levels would take radical risk response actions, such as petitions, street protests, violent incidents, etc., while the public may ignore potential risks when perceiving lower environmental risks [39]. Thus, the following hypotheses are proposed:

Hypothesis 3. ERP has a positive impact on PEBs.

Hypothesis 4a. ERP plays a mediating role between PSS and PEBs.

Hypothesis 4b. ERP plays a mediating role between SCC and PEBs.

Media Use (MU)

The current research focuses on the "amplification effect" of mass media in the process of environmental risk communication [40, 41]. Mass media, as a "communication releaser", can strengthen or weaken people's perceptions of environmental risks. Meanwhile, because of its wide audience, mass media also makes the spread of environmental risks more convenient and rapid, making it difficult for society to control the spread of related risks over time [42, 43]. Furthermore, the use of mass media and the behavior of the public play a crucial role in determining the impact of a dangerous event. While citizens use the media to obtain information, the dissemination of environmental risks through the media creates memories of similar experiences, and MU may even indirectly influence

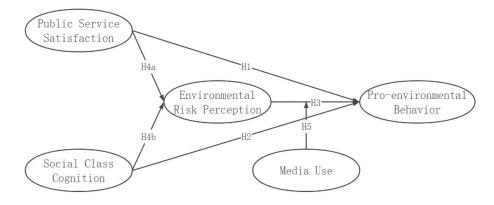


Fig. 1. The theoretical model framework of determinants of PEB.

other members of the public [44, 45] and promote the generation of pro-environmental behaviors. Therefore, media may not play a role, but when environmental risk perception is activated, media use will spread and amplify environmental risk perception, improving citizens' willingness to participate in PEBs [46]. Based on the above, the following hypothesis is proposed:

Hypothesis 5. MU strengthens the effect of ERP on PEBs.

Based on the above research hypotheses, the theoretical model framework of this study is constructed and shown in Fig. 1.

Material and Methods

Sample and Data Collection

The data for this study is obtained from the China General Social Survey, which is the first national, comprehensive, and continuous academic survey project in China. Compared with the previous data, the environmental module contained in CGSS2013 is more representative and comprehensive in the study of environmental behavior; hence, it is suitable for the study of the impact mechanism of PEBs. By eliminating the missing values, 673 valid samples were finally obtained.

Measures

Dependent Variable: PEBs

To measure PEBs, we used 10 items in the CGSS2013 questionnaire, including environmental protests, actively paying attention to environmental problems and related information through radio and television, discussing environmental pollution problems with relatives and friends, sorting garbage into different garbage bins, shopping with shopping baskets, using packaging bags repeatedly, donating money for environmental protection, actively participating in environmental protection activities organized by government departments or environmental protection non-governmental organizations, and planting forests or green spaces at their own expense. The answer is divided into three levels (1 = never, 2 = occasionally,3 = often). Through this research, we can obtain different types of PEBs by accumulating the scores of related items on the scale. The higher the scores, the more public participation in PEBs.

Independent Variables: SCC, PSS

SCC is the understanding and evaluation of social individuals' own ideas. The following question was included in the questionnaire: "In our society, some people are at the upper level of society, and some people are at the lower level of society. What level do you think you are at present?" According to the residents' answers,

"10" points represent the top level, and "1" points represent the bottom level, and the scores are used as a measure of the residents' SCC. The higher the score, the higher the public's recognition of self-class.

Public service is the most relevant part of public interest, and PSS is a comprehensive variable that affects public behavior in daily life. According to the questionnaire of CGSS2013, this study measures four aspects: the adequacy of public service resources, the balanced distribution of public service resources, the convenience of obtaining public services, and the inclusiveness of public services. The answers are divided into five levels (1 = very dissatisfied, 2 = not very satisfied, 3 = unclear satisfaction or dissatisfaction, 4 = relatively satisfied, 5 = very satisfied, implying that the higher the score, the higher the public's satisfaction with public services.

Mediating Variable: ERP

ERP is an important structure to study how individuals understand environmental risks, which mainly refers to the degree of environmental risks perceived by the public. Therefore, in this study, we use the Likert scale to measure the risk perception: "How serious are the environmental pollution problems (such as air pollution, industrial waste pollution, water pollution, food pollution, noise pollution, and solid waste pollution) in your area?" ERP is divided into 7 levels (1 = no problem, 2 = unimportant/difficult to explain, 3 = average, 4 = not serious, 5 = not too serious, 6 = serious, 7 = very serious). We calculate the citizens' environmental risk perception level by accumulating the scale scores. The higher the score, the stronger the public's perception of environmental risk.

Moderating Variable: MU

MU is the key structure for investigating how individuals perceive and assess environmental risks. In the CGSS2013 questionnaire, it is comprehensively measured by a scale comprising six items (such as newspapers, magazines, radio, the Internet, and mobile phones), of which TV items are excluded after factor rotation. Faced with environmental risks, individuals usually need more risk information regarding environmental pollution issues to help assess environmental risks. It mainly refers to the frequency of media use by participants in the face of potential environmental damage. Media use is a continuous variable. The answer is divided into five levels (1 = never, 2 = very little, 3 = sometimes, 4 = often,5 = very frequent). This means that the higher the score, the more frequently the public uses the media.

Analytical Techniques

SEM is one of the most popular multivariate analysis tools and has been widely used to estimate

the structural correlation between potential variables. There are two reasons for choosing SEM in this study. First, in the process of changing from SCC and PSS to PEBs, complex factors play a role simultaneously, which requires explanation by multiple methods. We pay more attention to the correlation between potential variables, which is difficult to achieve with traditional regression methods. SEM is a suitable method for discussing the correlation between potential variables. Secondly, we construct an intermediary model, and SEM can more effectively reveal the relationship between variables in the complex model.

Results

Descriptive Statistics

In this study, we describe the statistical data and bivariate correlation of the dimensions in the model. According to Table 1, the PEBs of most respondents are only at a medium level. Considering the correlation between various variables, there are significantly high correlations among many variables, while there are no correlations among other variables. In view of the high enough correlation between the dimensions, we can discuss the influence of PSS, SCC, intermediary variables (ERP), and moderator variables (MU) on PEBs, which will be introduced in the next section.

The Measurement Model

A Harmen single factor test was used to measure CMV in this study [47]. The results showed that there

were five factors in factor analysis, and the first factor accounted for 32.68% of the variance. Therefore, CMV does not pose a threat to the current research.

Using Hair et al.'s [48] test method of research reliability and validity, Cronbach's α coefficient and compound reliability (C.R.) of all latent variables are above 0.7, indicating that the internal reliability of the scale is good. The average extraction variance (AVE) was greater than the benchmark value of 0.5, which indicated that the convergence validity of the measurement model was good [49].

The square root of AVE is used to evaluate the discriminant validity of the scale. Table 2 shows that the scale has good discrimination validity, and each structure is different from other structures.

The Structural Model

According to the existing research, first, the whole fitting degree of the model is tested. Table 3 indicates that CFI, TLI, RMRA, RMSEA, and other fitting indices all meet the standards [50], indicating that the whole model has a high degree of acceptability.

Fig. 2 presents the relationship between the structural models and marks the normalized path coefficients between the facets. The results show that PSS (β = 0.175, p<0.001), ERP (β = 0.505, p<0.001), and SCC (β = 0.169, p<0.001) have significant positive effects on citizens' PEBs; hence, H1, H2, and H3 are accepted. The PSS to ERP (β = 0.179, p<0.001) and the SCC to ERP (β = 0.546, p<0.001) have a significant positive impact.

Table 1. Descriptive Statistics and Inter-correlations of the Constructs.

Variable name	M	SD	PEB	PSS	SCC	ERP	MU
PEB	16.37	3.55	1				
PSS	11.53	3.01	0.027*	1			
SCC	17.80	5.92	0.049*	0.111***	1		
ERP	36.36	12.25	0.233***	-0.006	-0.106**	1	
MU	11.72	4.07	0.362***	-0.067*	0.272***	-0.246**	1

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

Table 2. Reliability and validity tests of the constructs and correlations and square roots of AVEs.

					_			
Construct	Cronbach's α	CR	AVE	PEB	PSS	SCC	ERP	MU
PEB	0.778	0.795	0.644	0.802				
PSS	0.839	0.866	0.687	0.166	0.829			
SCC	0.720	0.778	0.606	0.061	0.178	0.778		
ERP	0.899	0.903	0.706	0.368	0.207	0.199	0.840	
MU	0.688	0.781	0.597	0.401	0.061	0.360	0.343	0.773

Table 3.	Test statist	ics for th	ne hypoth	esized model.

Fit indices	Definition	Criteria	Results
CFI	Comparative ft index	>0.9 good fit	0.997
TLI	Tucker-Lewis index	>0.9 good fit	0.984
χ^2/df	Chi-square	<3 good fit	2.606
RMSEA	Root mean squared error of approximation	<0.08 good fit	0.049
SRMR	Standardized root mean squared residual	<0.09 good fit	0.018

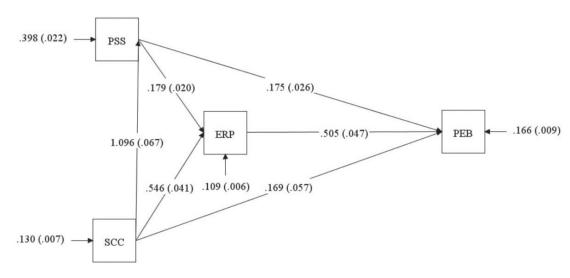


Fig. 2. The influence paths of pro-environment behaviors.

The Mediating Effect of ERP

According to Fig. 2, ERP has mediating effects on PSS, SCC, and PEBs. Therefore, this section will analyze the intermediary role of ERP. Compared with the Sobel test method, the Bootstrap method is more powerful in testing multiple mediators and can be used for non-normal parameter estimation. It is the most recommended mediation effect test method in academic circles at present. Table 4 displays the validation results in both bias-corrected and percentile modes. The results show that ERP plays an intermediary role in PSS and PEBs (indirect effect = 0.084; 95% CI [0.098, 0.143],

[0.091, 0.138]), and ERP also plays an intermediary role in SCC and PEBs (indirect effect = 0.039; 95% CI [-0.150,-0.009], [-0.148,-0.035]). Simultaneously, the results show that the direct effect of the model does not include the value 0 in the range of 95% CI; hence, ERP plays a partial intermediary role in PSS, SCC, and PEBs, and H4A and H4B hold true.

The Moderating Effect of MU

From the results of Model 1 of Table 5, it can be observed that MU has a significant positive effect on PEBs ($\beta = 0.185$, P<0.01). It can also be observed from

Table 4. The mediation effect test of environmental risk perception.

Madiation math	Types of mediating	Estimate	Product of coef.		Bias-corrected		Percentile	
Mediation path	effects	Estimate	SE	Z	Lower	Upper	Lower	Upper
	Indirect effect	0.084	0.012	9.956	0.098	0.143	0.091	0.138
PSS—ERP— PEB	Direct effect	0.175	0.016	9.235	0.081	0.118	0.078	0.116
	Total effect	0.259	0.006	8.326	0.072	0.102	0.059	0.094
	Indirect effect	0.039	0.032	6.365	-0.150	-0.009	-0.148	-0.035
SCC—ERP— PEB	Direct effect	0.169	0.014	5.329	0.015	1.039	0.025	0.104
	Total effect	0.208	0.038	5.986	0.030	1.118	0.049	1.137

	M - J - 1	Non-normalized coefficient		Normalized coefficient	P value	D2	Adjusted R ²
	Model	β	S.E.	B		R ²	
	(Constant)	2.994	0.050	_	***		
1	ERP	0.567	0.075	0.349	**	0.146	0.175
	MU	0.180	0.045	0.185	**		
	(Constant)	2.973	0.051	_	***		
2	ERP	0.574	0.075	0.353	**	0.100	0.102
2	MU	0.176	0.045	0.181	**	0.190	0.183
	Interactive item	0.153	0.067	0.103	*		

Table 5. The moderation effect test of media use.

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

Model 2 that the interaction between ERP and MU is significant, i.e., in the process of ERP acting on PEBs, if MU changes, the amplitude of this effect will also show significant differences, and the normalized regression coefficient $\beta=0.103$, indicating that the regulation of MU is positive. Simultaneously, the R² of model 2 is larger than that of model 1 (0.190>0.146), so the regulatory effect exists, and the P value is 0.023<0.05, which indicates that the positive regulatory effect between MU and ERP and PEBs reaches a significant level. Based on the above analysis, it is assumed that H5 is acceptable.

Discussion

Relationships between SCC, PSS, and PEBs

According to the results, SCC and PSS directly determine individual PEB patterns. Subjectively, people get cognition of the relative position of their class status through comparison. Individuals who are rising to the comparative advantage position have an upward flow track, which brings people an optimistic attitude, and on this basis, the expectation of social governance level increases. However, groups that subjectively believe that they have a higher social status may have more resources and channels. They may have more confidence that their actions can have an impact on the environmental governance process, their awareness of rights and responsibilities is constantly strengthening, and their drive to participate in environmental protection behavior is stronger. This is consistent with the survey results of other large international samples [51, 52]. Similarly, the improvement of citizens' PSS makes citizens more willing to participate in the process of PEBs. Just as the government provides the public with good environmental protection infrastructure (such as classified garbage bins), it promotes citizens' awareness of environmental protection, such as garbage classification, to directly implement PEBs.

Relationships between SCC, PSS, and ERP

ERP is constructed by social subjective cognition. ERP can be regarded as a kind of social construction that is based on personal experience and life experience, local memory, moral beliefs, and personal judgment discourse in daily life rather than the social reality that social individuals meet. In environmental governance, environmental risk and environmental risk perception are also an active social construction process, which is not independent and internal. People in different cultural environments (etc.) have obvious differences in their perception of different kinds of risks, and the degree and type of citizens' perception of environmental risks are jointly determined by their PSS and SCC.

Relationships between ERP and PEBs

ERP and PEBs are interrelated and inseparable. In the ecosystem, various internal and external processes are intricate and intertwined. Individuals promote the generation of PEBs through embodied risk perception embedded in the environment; i.e., physical participation. Simultaneously, the reflection brought by behavior reversely reshapes the previous ERP [53]. In perception and action, the participation of the body makes perception and action form a loop. Therefore, environmental protection actions should first effectively mobilize citizens' physical participation and obtain full-embodied perception through physical participation before promoting psychological participation based on embodied perception to promote the continuous development of PEBs.

Amplification Effect of MU on ERP

From the perspective of the social process of risk construction, the MU, which constitutes the social amplification component, is an important factor for determining the risk and scale. MU is the activator, through which various social factors affecting

environmental risks are activated from the potential state and become the signal to strengthen or weaken the environmental risk information received by individuals [54, 55]. When the amount of information about an environmental risk event is larger, it indicates that the new risks are becoming more serious. Simultaneously, in the absence of direct personal ERP experience, people generally identify risks through mass media. Therefore, the mass media plays an important role in regulation. Environmental risks are often dealt with and transmitted by mass media (newspapers, networks, communications, etc.), and finally, subjective risks are constantly spread, diffused, and enlarged in the form of information.

Suggestions

The above research conclusions provide relevant policy enlightenment, and the possible policy suggestions are as follows: First, with the help of technical tools, we should change from "manual" guidance to "scenario" environmental practice. Simulating PEBs through the visual process, live video, demonstration animation, and other means, and promoting scene-based environmental public services in communities and public places can facilitate various groups to acquire the ability of PEBs.

Secondly, the reality of "re-delocalization" promotes environmental cooperative governance between citizens and the government. The "re-delocalization" of post-industrial society makes the public sphere and private sphere gradually merge. Therefore, considering the reality of domain integration, non-governmental organizations, and many socially autonomous forces participate in the process of social environmental governance, thus breaking the boundary between public domain and private domain, changing the static governance structure of separation between the governor and the governed, and launching environmental cooperative governance based on voluntary consciousness.

Finally, the mutually beneficial and symbiotic development between humans and the environment is considered. This mutually beneficial symbiotic relationship not only refers to the common existence between citizens and the environment but also refers to the common development of citizens and the environment, i.e., the two sides grow and evolve on the premise and condition of each other. The environment provides the necessary materials and resources for the survival and development of citizens. Conversely, citizens also inject new vitality into the sustainable development and benign construction of the environment and add richer and more diverse environmental elements to the environment as producers. While the environment shapes human beings, people are also transforming the environment, and they depend on each other and live together.

Conclusions and Limitations

Conclusions

Based on the data from CGSS2013, this study analyzes the influence mechanism of social subjective cognition on citizens' pro-environmental behavior by using structural equation modeling and intermediary and moderating effect tests. We can draw the following main conclusions: First, SCC and PSS have a significant positive impact on citizens' PEBs; i.e., the more optimistic the citizens' SCC and higher the PSS, the more frequent the citizens' PEBs. Secondly, from the perspective of impact mechanisms, ERP plays an important intermediary role in the impact of SCC and PSS on citizens' PEBs. Third, ERP is significantly affected by the risk amplification effect of MU. Fourth, it integrates and unifies personal perception, social cognition, and PEBs under the same theoretical framework and better explores the influence mechanisms of citizens' PEBs.

Limitations

However, some limits should be considered. First, we consider cross-sectional data, which may have endogenous problems and are common problems in empirical research based on single survey data. Therefore, the scale used to measure variables in this study was not developed for the purpose of this study. Although the internal consistency, reliability, and structural validity of each questionnaire have been tested.

Acknowledgments

The authors thank Renmin University of China for making the Chinese General Social Survey in 2013 publicly available for academic use. The authors also thank Yue Han and anonymous reviewers for their feedback on the article's revisions.

Funding

This work was supported by National Social Science Found of China (No. 22AZZ008).

Conflict of Interest

The authors declare no conflict of interest.

References

1. SCHEIDEL A., DEL B.D., LIU J., NAVAS G., MINGORRIA S., DEMARÍA F., AVILA S., ROY B.,

- ERTÖR I., TEMPER L. Environmental conflicts and defenders: A global overview. Global Environmental Change-Human and Policy Dimensions, **63**, 102104, **2020**.
- SMITH G.S., ANJUM E., FRANCIS C., DEANES L., ACEY C. Climate change, environmental disasters, and health inequities: the underlying role of structural inequalities. Current Environmental Health Reports, 9, 80, 2022.
- KNAP A.H., RUSYN I. Environmental exposures due to natural disasters. Reviews on Environmental Health, 31, 89, 2016.
- ROSENMANN A., REESE G., CAMERON J.E. Social identities in a globalized world: Challenges and opportunities for collective action. Perspectives on Psychological Science, 11, 202, 2016.
- MONIKA B. Association between air pollution and wellbeing. Social and Preventive Medicine, 34, 231, 1989.
- KLEIN S.A., HILBIG B.E. How virtual nature experiences can promote pro-environmental behavior. Journal of Environmental Psychology, 60, 41, 2018.
- SUN J.X., MA B.L., WEI S.M. Same gratitude, different pro-environmental behaviors? Effect of the dual-path influence mechanism of gratitude on pro-environmental behavior. Journal of Cleaner Production, 415, 137779, 2023.
- LU H., ZHANG W.B., DIAO B.D., LIU Y., CHEN H., LONG R.Y., CAI S.H. The progress and trend of proenvironmental behavior research: a bibliometrics-based visualization analysis. Current Psychology, 42, 6912, 2021.
- 9. LIAO Y.H., YANG W.H. The determinants of different types of private-sphere pro-environmental behaviour: an integrating framework. Environment Development and Sustainability, 24, 8566, 2022.
- LING M.L., XU L. Relationships between personal values, micro-contextual factors and residents' pro-environmental behaviors: An explorative study. Resources Conservation and Recycling, 156, 104697, 2020.
- 11. LEE P.S., SUNG Y.H., WU C.C., HO L.C., CHIOU W.B. Using episodic future thinking to pre-experience climate change increases pro-environmental behavior. Environment and Behavior, **52**, 60, **2020**.
- 12. YURIEV A., DAHMEN M., PAILLÉ P., BOIRAL O., GUILLAUMIE L. Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. Resources Conservation and Recycling, 155, 104660, 2020.
- ATEŞ H. Merging theory of planned behavior and value identity personal norm model to explain pro-environmental behaviors. Sustainable Production and Consumption, 24, 169, 2020.
- 14. AJZEN I. The theory of planned behavior. Organizational Behavior and Human Decision Processes, **50**, 179, **1991**.
- UDALL A.M., JUDITH I.M., SIMON B., SHANKAR A. How do I see myself? A systematic review of identities in pro-environmental behaviour research. Journal of Consumer Behaviour, 190, 108, 2020.
- XING Y.F., LI M.Q., LIAO Y.H. Trust, identity, and publicsphere pro-environmental behavior in China: an extended attitude-behavior-context theory. Frontiers in Psychology, 13, 919578, 2022.
- 17. THIERMANN U.B., SHEATE W.R. Motivating individuals for social transition: The 2-pathway model and experiential strategies for pro-environmental behaviour. Ecological Economics, 174, 106668, 2020.
- 18. O'CONNOR P., ASSAKER G. COVID-19's effects on future pro-environmental traveler behavior: An empirical

- examination using norm activation, economic sacrifices, and risk perception theories. Journal of Sustainable Tourism, **30**, 89, **2021**.
- SONG Y., ZHAO C., ZHANG M.G. Does haze pollution promote the consumption of energy-saving appliances in China? An empirical study based on norm activation model. Resources Conservation and Recycling, 145, 220, 2019.
- WANG S.Y., WANG J.P., ZHAO S.L., YANG S. Information publicity and resident's waste separation behavior: An empirical study based on the norm activation model. Waste Management, 87, 33, 2019.
- DONG Y.J., LIU Z.S., ZHANG Y., JIANG J. Perceived descriptive norms strengthen the global human identification-general pro-environmental behavior association: Empirical evidence from survey studies. Journal of Cleaner Production, 418, 138134, 2023.
- 22. SILVI M., PADILLA E. Pro-environmental behavior: Social norms, intrinsic motivation and external conditions. Environmental Policy and Governance, 87, 33, 2021.
- 23. SAMPENE A.K., LI C., WIREDU J., AGYEMAN F.O., BRENYA R. Examining the nexus between social cognition, biospheric values, moral norms, corporate environmental responsibility and pro-environmental behaviour. Does environmental knowledge matter? Current Psychology, 42, 1, 2023.
- 24. VAN VALKENGOED A.M., ABRAHAMSE W., STEG L. To select effective interventions for pro-environmental behaviour change, we need to consider determinants of behaviour. Nature Human Behaviour, 6, 1482, 2022.
- SIEGRIST M., ÁRVAI J. Risk perception: Reflections on 40 years of research. Risk Analysis, 40, 2191, 2020.
- 26. BRADLEY G.L., BABUTSIDZE Z., CHAI A., RESER J.P. The role of climate change risk perception, response efficacy, and psychological adaptation in proenvironmental behavior: A two nation study. Journal of Environmental Psychology, 68, 101410, 2020.
- CHWIALKOWSKA A., BHATTI W.A., GLOWIK M.O.
 The influence of cultural values on pro-environmental behavior. Journal of Cleaner Production, 2020, 268, 122305.
- 28. MI L.Y., QIAO L.J., XU T. GAN X.L., YANG H., ZHAO J.J., QIAO Y.N., HOU J.X. Promoting sustainable development: The impact of differences in cultural values on residents' pro-environmental behaviors. Nature Human Behaviour, 28, 1539, 2020.
- 29. LIU P.H., TENG M.M., HAN C.F. How does environmental knowledge translate into pro-environmental behaviors? The mediating role of environmental attitudes and behavioral intentions. Science of the Total Environment, 728, 138126, 2020.
- SHAFIEI A., MALEKSAEIDI H. Pro-environmental behavior of university students: Application of protection motivation theory. Global Ecology and Conservation, 22, e00908, 2020.
- 31. TSAI C.C., LI X.Y., WU W.N. Explaining citizens' proenvironmental behaviours in public and private spheres: The mediating role of willingness to sacrifice for the environment. Australian Journal of Public Administration, 80, 510, 2021.
- 32. BAMBERG S., MÖSER G. Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psychosocial determinants of pro-environmental behaviour. Journal of Environmental Psychology, 27, 14, 2007.
- 33. LI D., ZHAO L.M., MA S., SHAO S., ZHANG L.X. What influences an individual's pro-environmental behavior?

- A literature review. Resources Conservation and Recycling, 146, 28, 2019.
- GRILLI G., CURTIS J. Encouraging pro-environmental behaviours: A review of methods and approaches. Renewable & Sustainable Energy Reviews, 135, 110039, 2021
- 35. DE YOUNG R. Changing behavior and making it stick: The conceptualization and management of conservation behavior. Environment and Behavior, 25, 485, 1993.
- 36. SUGANTHI L. Examining the relationship between corporate social responsibility, performance, employees' pro-environmental behavior at work with green practices as mediator. Journal of Cleaner Production, 232, 739, 2019.
- 37. KAISER F.G., SCHULTZ P.W. The Attitude–Behavior Relationship: A Test of Three Models of the Moderating Role of Behavioral Difficulty. Journal of Applied Social Psychology, 39, 186, 2009.
- 38. LARSON L.R., STEDMAN R.C., COOPER C.B., DECKER D.J. Understanding the multi-dimensional structure of pro-environmental behavior. Journal of Environmental Psychology, 43, 112, 2015.
- GOSLING E., WILLIAMS K.J.H. Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. Journal of Environmental Psychology, 30, 298, 2010.
- WHITBURN J., LINKLATER W., ABRAHAMSE W. Meta-analysis of human connection to nature and proenvironmental behavior. Conservation Biology, 34, 180, 2020.
- 41. TOBLER C., VISSCHERS V.H.M., SIEGRIST M. Eating green. Consumers' willingness to adopt ecological food consumption behaviors. Appetite, 57, 674, 2011.
- 42. KAUTISH P., DASH G. Environmentally concerned consumer behavior: evidence from consumers in Rajasthan. Journal of Modelling in Management, 12, 712, 2017
- 43. BLEIDORN W., LENHAUSEN M.R., HOPWOOD C.J. Proenvironmental attitudes predict proenvironmental consumer behaviors over time. Journal of Environmental Psychology, 76, 101627, 2021.
- 44. STEG L., VLEK C. Encouraging pro-environmental behaviour: An integrative review and research agenda. Journal of Environmental Psychology, 29, 309, 2009.

- STERN P.C. Psychology and the science of humanenvironment interactions. American Psychologist, 55, 523, 2000.
- 46. NOPPERS E.H., KEIZER K., BOLDERDIJK J.W., STEG L. The adoption of sustainable innovations: Driven by symbolic and environmental motives. Global Environmental Change-Human and Policy Dimensions, 25, 52, 2014.
- 47. PODSAKOFF P.M., MACKENZIE S.B., LEE J.Y., PODSAKOFF N.P. Common method biases in behavioral research: a critical review of the literature and recommended remedies. Journal of Applied Psychology, 88, 879, 2003.
- 48. HAIR J.F., SARSTEDT M., RINGLE C.M., MENA J.A. An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the Academy of Marketing Science, 40, 414, 2012.
- FORNELL C., LARCKER D.F. Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18, 39, 1987
- BARRETT P. Structural equation modelling: Adjudging model fit. Personality and Individual Differences, 42, 815, 2007.
- GITTELL R., TEBALDI E. Charitable giving: Factors influencing giving in US states. Nonprofit and Voluntary Sector Quarterly, 35, 721, 2006.
- 52. KORNDÖRFER M., EGLOFF B., SCHMUKLE S.C. A large scale test of the effect of social class on prosocial behavior. PLoS One, 10, e0133193, 2015.
- WITT J.K., STEFANUCCI J.K., RIENER C.R., PROFFITT D.R. Seeing beyond the target: Environmental context affects distance perception. Perception, 36, 1752, 2007.
- 54. OH S.H., LEE S.Y., HAN C. The effects of social media use on preventive behaviors during infectious disease outbreaks: The mediating role of self-relevant emotions and public risk perception. Health Communication, 36,
- 55. MALECKI K.M.C., KEATING J.A., SAFDAR N. Crisis communication and public perception of COVID-19 risk in the era of social media. Clinical Infectious Diseases, 72, 697, 2021.