

Article

The Impact of Different Value Types on Environmentally Responsible Behavior: An Empirical Study from Residents of National Park Communities in China

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Abstract: The construction of China's national park system is an important part of the ecological civilization development strategy, and the behavior of the subjects in the national park has a great impact on its sustainable development. Environmentally responsible behavior (ERB) is considered an important aspect of national park management, and the impact of an individual's held value on environmental behavior has received much attention. However, the assigned value (AV) of community residents in national park-specific situations has not been concerned, which is often closely related to resident behavior within national park. Therefore, we took the residents of four gateway communities (Qixi town, Hetian town, Changhong town, and Suzhuang town) in Qianjiangyuan national park (QNP), Zhejiang province as research subjects. Based on the value-belief-norm (VBN) model representing individual values, this study integrates the perceived social value of ecosystem services in the national park among community residents and analyzes their impact on ERB. The collected data were statistically analyzed using SPSS 23.0, and the structural model was validated using SmartPLS based on Partial Least Squares Regression. The research findings revealed that (1) the assigned value has a significant positive influence on the environmentally responsible behavior of community residents; (2) pro-environment personal norms are the strongest predictive variable of environmentally responsible behavior; and (3) biosphere value, altruistic value and personal norms have significant positive influence on the formation of the assigned value of community residents.

Keywords: national park; environmentally responsible behavior; value-belief-norm theory; assigned value



Citation: Zhang, Y.; Zhao, Y.; Zhang, H.; Zheng, S.; Yao, J. The Impact of Different Value Types on Environmentally Responsible Behavior: An Empirical Study from Residents of National Park Communities in China. *Land* **2024**, *13*, 81. <https://doi.org/10.3390/land13010081>

Academic Editor: Weiqi Zhou

Received: 29 November 2023

Revised: 31 December 2023

Accepted: 5 January 2024

Published: 10 January 2024



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1. Introduction

A national park has the purpose of protecting typical, representative and rare ecosystems, natural and cultural relics or landscapes for the public, with education, scientific research and recreation opportunities, and designated by the state according to law [1]. National parks undertake the task of natural ecological protection and the sustainable development of community livelihood, and play an important role in China's rural revitalization strategy. The premise of realizing these functions is that national parks always maintain good ecosystem integrity, which is closely related to the protective behavior of core stakeholders. As the core stakeholders of national parks, community residents and tourists' environmental responsibilities have always been a wide concern of researchers. There have been many studies already, especially on the topic of tourists [2–7]. Residents, also core stakeholders, focus more on community livelihood development. However, there is limited research on the environmentally responsible behavior of individuals and groups [8,9]. In fact, compared with other stakeholders, community residents live/stay in the national park for a longer period of time and have more extensive contact with all aspects of the

park, and their own living/production environment is an important part of the ecological environment of the national park. In particular, China is currently facing the pilot period of national park system construction, and many community settlements are located in the core areas of parks or ecological conservation areas. At the same time, many forest lands, water areas and other resources within the park are still in the stage of the right confirmation, and the management and use subjects are not clear, which is more likely to cause the destruction of ecological resources. Therefore, whether the residents of the national park community take environmentally responsible behavior into their production and life will directly affect the ecological environment quality of the park, and the degree of impact may be more significant than that of other stakeholders. Thus, it is vital for the sustainable development of national parks to explore the influencing factors of environmentally responsible behavior and its action mechanism.

Over the past four decades, social psychology has seen great strides in the study of human behavior. These studies are beneficial to promoting environmental sustainable development. Attitude–behavior correspondence research has received particular attention in the natural resource management (NRM) context due to its potential to impact biodiversity and human well-being intervention strategies [10]. A deeper understanding of the psychological factors that lead to paying more attention to environmental protection can provide more information and support for related protection work [11]. Although much progress has been made in interpreting the links between internal processes, values, beliefs, norms, and behaviors, how to translate these variables into action requires further research. Studies have shown that general attitudes have moderately correlated positive associations with general behaviors [12], whereas specific attitudes and specific behaviors produce stronger associations and more accurate predictions [13]. As the heterogeneity of individual environmental behavior in different contexts becomes more prominent, the use of one single theoretical model to explain and predict is increasingly challenging, and the integration of theory and model is increasingly important. However, most current studies still integrate related theories in the field of social psychology, such as normative activation theory and values theory, plan behavior theory, expectation theory, VBN, etc. [14–16]. There is still a research gap on how to integrate the specific attitude preferences with the individual's values to predict an individual's environmental behavior. Therefore, this study attempts to integrate the perception of social values of ecosystem services representative of specific contextual attitudes and the VBN theory model representing individual held value, with a focus on residents of national park communities, to explore their impact on individual and collective ERB.

2. Theoretical Basis and Model Assumptions

2.1. Environmentally Responsible Behavior

Environmentally responsible behavior (ERB) is often used interchangeably in different studies with other terms such as pro-environmental, environmentally friendly, green and eco-friendly behaviors [14,17]. The measurement of ERB also varies from one study context to another. Hungerford, Peyton and Wilke deconstructed the connotation of ERB into persuasion, consumerism, political behavior, legal behavior, and ecological management [18]. Stern divided ERB into environmentalism and non-environmentalism behavior in the public sphere, and environmentalism behavior in the private sphere [19]. Smith-Sebasto and D'Costa measured ERB in the following aspects: civic behavior, educational behavior, financial behavior, legal behavior, physical practice behavior and persuasion behavior [20]. This study used the definition from Lee, "a series of measures taken by individuals to minimize the adverse effects on the environment" [21]. Often, measures of environmental behavior include both environmental liability behavior at general sites and site-specific environmental liability behaviors. Considering that community residents are more involved in individual daily life within the scope of national parks, this study measures the general environmental behavior of residents.

2.2. Value-Belief-Norm Theory

The VBN theory is extended by the fusion value theory of Stern, based on the normative activation model (NAM), and the behavior in the model is influenced by individual norms [14,22]. Personal norms are important concepts originating in sociology. Over time, they have been used to explain a wide variety of behaviors, including pro-environmental behaviors and tourist behaviors [23,24]. Most studies distinguish descriptive norms from injunctive norms [25]. Descriptive norms are knowledge of the actual actions of others or what the majority does, while injunctive norms are things that the majority agrees for or is out of doing. Thøgersen, according to the level of specification internalization, proposed a normative classification method, including descriptive norms, subjective social norms, internal penetration norms and fusion norms [26]. The latter three norms are all injunctive norms. Subjective social norms describe what others think a person should do, and such norms are reflected in the theory of planning behavior [27]. With the increasing level of internalization, social norms are manifested as personal norms, including internal penetration and the integration of personal norms. Integrating personal norms is a norm deeply internalized in personal values and beliefs, while internal norms are superficially internalized. Following and violating interpenetration norms can lead to self-imposed feelings of pride or guilt. The constructs of individual norms are embodied in both the normative activation model and the value belief norm theory [14,22]. In response to normative pressures, individuals may tend to adopt environmentally friendly behaviors, such as disposing of discarded items that may lead to unintended environmental consequences. In this case, if the opposite action is taken (e.g., littering), the negative sanctions may cause disharmony, thus activating the response.

To influence environmental behavior, personal norms can be activated or removed by two related belief constructs, including attribution of responsibility (AR) and awareness of consequence (AC) [22]. According to the “cause and effect chain”, both constructs are considered to be cognitive premises for moral norm activation as proposed by the NAM and VBN models. The original assumption of these models is that individuals recognize the importance of their contributions to avoiding negative impacts on non-human species and other humans, which is expressed by a sense of moral obligation. [22]. For example, an individual may deny their responsibility to seek out garbage and/or recycling bins for disposing of food because they assume that a sufficient number of others are engaging in such actions, or because the potential contribution is considered negligible [28]. While when one feels a sense of responsibility and is aware of the possible consequences of action and/or inaction, they are likely to perform environmental behaviors consistent with normative stress.

According to VBN theory, another construct that reflects environmental worldviews and/or general beliefs about the perceived relationships between human beings and their environment needs to be constructed before measuring norms and beliefs. Worldviews are more universal than norms because they contain broader tendencies that are not limited to a particular domain [29]. This construct, characterized with the New Ecological Paradigm (NEP), has received considerable attention over the last few decades [30,31]. The NEP scale is theoretically related to the principle of harmony with the natural and social world. That is, the NEP worldview is a continuum of bio-centered, environmentally centered, and human-centered, based on the belief that man precedes nature [32]. Previous studies suggest that the NEP scale is a reliable and valid measure for environmental worldview and is a strong predictor of environmental behavior [33]. In the measurement process, the NEP scale will appear in multiple forms. The original scale contains 12 measurement items, including the balance of nature, the limitations of growth, and the human rights of the rule over the rest of nature [31]. The scale was later revised to contain more balanced positive and negative terms [30]. In previous research, four-item and six-item scales have also been used, representing three aspects of the original NEP scale and relatively simplified [15,34]. The simplified four-item NEP scale was used in this study.

Values are stable cognitive structures formed early in life and remain relatively constant for a short period [35]. Faith constructs and moral obligations feel the influence of value systems that are the guiding principles in life and define people's relationship to the natural world [14]. Different values including ecocentrism and anthropocentrism have been measured in existing studies, and the association between values and environmental concern has been confirmed [36]. The logical starting point of the VBN model is to reveal environmentalist values that are embodied to varying degrees in all individuals. There are usually three different tendencies of environmental values, namely, the following: biosphere values (BV), centered on non-human species and the biosphere (among the individuals who hold this value, environmental protection is of relative importance in decision making); altruistic values (ALV) focus on the human well-being of the whole society; egoism values (EV) focus on personal interests, and make positive contributions to environmental protection when individuals think their well-being is threatened, and take no action if individuals need to pay a high price. Although previous studies have established three tendencies of environmental values, there are still differences in the number of dimensions of this construct [36]. Stern suggests that morality, in the basis of ethical considerations in human and non-human species, plays an equally important role in activating the BV and ALV [37]. This logic and past empirical research support the two-dimensional structure of values, from which the biosphere and altruism form a single category [38], namely biosphere altruism. Thus, biosphere altruistic values belong to higher-order categories beyond the self, and the well-being of humans and the environment favors or equals the self-interest. On the other hand, egoism values mainly involve authority, power and broader self-enhancement motivation. Therefore, the biosphere altruistic values and egoistic values have a positive and negative impact on environmentalism, respectively, affecting personal moral responsibility, and then affecting personal environmental behavior. Based on the above discussion, this study makes the following assumptions:

H1a. *The biosphere value positively influences NEP;*

H1b. *The altruism value positively affects NEP;*

H1c. *The egoism value positively affects NEP;*

H2. *NEP positively affects awareness of consequence;*

H3. *Awareness of consequence positively affects attribution of responsibility;*

H4. *Attribution of responsibility positively affects personal pro-environmental norm;*

H5. *Personal pro-environmental norms positively affect the tourists' ERB intentions.*

2.3. Assigned Value

AVs are the values that people attach to things, whether they are commodities such as wood, activities such as entertainment, or services such as education [39]. While a held value has strong predictive power in explaining the environmental behavior of individuals and collectives, less attention is paid to the relationship between assigned value and environmental behavior. Brown believes that when individuals allocate value to a thing, they are "expressing in some way the importance or value of this thing relative to one or more other things" [40]. When the held value is constant, an individual's preference for things results in different things having different degrees of importance or value. In other words, AV can refer to the relative assessment of specific natural locations, attributes, or phenomena, and because it is more specific than a held value, it is more suitable for on-site assessment [41]. In the academic field of natural resource management, an assigned value is often described in the following forms: economic value, entertainment value, quality of life value, aesthetic value, recuperation value and spiritual value [12,42–44]. In this

study, it is translated as tourists' perceived preference for the social value of a national park ecosystem service, such as aesthetic value and entertainment value.

Generally speaking, the assigned value depends on three aspects: one is the individual's perception of things and all related objects; the second is the personal values and related preferences; and the third is the situation of the distribution of value. Held value is (at least in part) the basis of personal preference formation, and the individual preference relationship forms the relative importance or value of things, that is, the assigned value. Brown and Lockwood et al. believe that held value directly affects the assigned value through value orientation [39]. However, Seymour used the VBN model to survey the residents of three Australian communities and found that even the residents who held the same values still had huge differences in allocating the value of different natural landscapes to different natural landscapes [45]. It was believed that the held value would indirectly affect the assigned value through the environmental worldview (NEP). Van Riper's survey of tourists in a national park also found that the samples with different environmental world views, the types of value distribution and the distribution of value hot spots were all different [42]. In the same study, it was also confirmed that previous studies had found that norms play an important role in the formation of assigned value [42,46]. Although assigned value appears to be less stable compared with held value, many researchers believe that assigned value, having a stronger explanatory power in terms of individual environmental behavior than held value, may be a better predictor variable [12,44,45]. Based on the above discussion, we propose the following assumptions. The conceptual model of the study is shown in Figure 1:

H6a. *The biosphere value positively influences AV;*

H6b. *The altruism value positively influence AV;*

H6c. *The egoism value positively influence AV;*

H7. *The New Ecological Paradigm positively affects AV;*

H8. *Personal pro-environmental norms positively affect AV;*

H9. *AV positively affects the intention of ERB.*

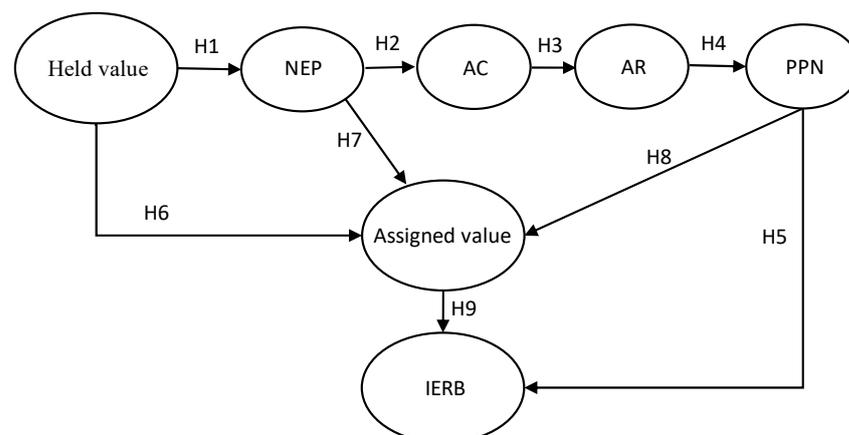


Figure 1. AV-VBN concept model (NEP: New Ecological Paradigm; AC: Awareness of consequence; AR: Attribution of responsibility; PPN: Personal pro-environmental norm; IERB: Intention of environmentally responsible behavior).

3. Methods

3.1. Measurement Scale

The measurement scale of this study is based on previous studies and adjusted according to the special circumstances of the cases. BV (including three items), ALV (including four items), and EV (including four items) were derived from the study of Stern [19], which measured the value orientation of residents. The NEP scale originates from Dunlap's improved measurement scale in 2000, from which we selected four items to form the scale [30]. The AC (including 3 items), AR (including 3 items) and PPN (including 4 items) were obtained from the study of Stern and Han [16,19]. The assigned value measurement scale contains seven items from Clement and Benson [47,48]. The original scale of assigned value contains 12 items. On the basis of the preliminary investigation, the author eliminated the value types with a poor perception of community residents (such as intrinsic value, historical value, etc.), and finally formed the formal measurement scale. The scale was derived from Smith-Sebasto and D'Costa. The original scale contains six dimensions: civic behavior, educational behavior, economic behavior, legal behavior, physical practice behavior and persuasion behavior. According to the specific situation of this study, the four dimensions of citizen behavior, economic behavior, physical practice behavior and persuasion behavior were selected, including 15 items. All scale items were measured by a five-point Likert scale, with items 1–5 representing "very disagree-very agree", and value orientation scale 1–5 representing "very unimportant-very important".

3.2. Data Collection

This survey was conducted during the Chinese National Day Golden Week in 2019, with us choosing Qianjiangyuan National Park in Zhejiang Province. The Qianjiangyuan National Park includes four gateway communities, namely Qixi Town, Hetian Town, Changhong Town, and Suzhuang Town. The park covers an area of approximately 250 square kilometers. In order to ensure access to a wider range of resident survey data, systematic sampling was chosen to ensure that residents of each town were surveyed. Convenience sampling was used for household surveys during the investigation process. In total, 400 questionnaires for community residents were distributed, 339 were recovered, and questionnaires with missing values of more than 10% were excluded according to the criteria of Hair [49]. In addition, questionnaires in which answers were repeated more than 10 times in a row were also excluded. Finally, 335 valid questionnaires were obtained, with an effective rate of 83.75%. The demographic characteristics of the respondents are shown in Table 1. Men were slightly more surveyed than women (53.4% for men, compared with 46.6% for women). The age distribution of respondents was reasonable, with 7.8% aged under 18, 27.8% aged 18–30, 37.6% aged 30–45, 24.8% aged 45–60, and 2.1% over 60. In terms of education level, 56.1 percent of the respondents were high school or below, 24.8 percent had a junior college degree, 18.8 percent had a bachelor's degree, and 0.3 percent had a graduate degree. A proportion of 36.7% of the respondents monthly income was below 422USD, the proportion of the monthly income that was 422–704 USD was 28.4%, 24.5% of the respondents' monthly income was 704–1127 USD, and the proportion of the respondents' incomes above 1128 yuan was 10.4%. The sources of income of respondents were 3.6% for tourism, 0.9% for farming, 3% for agricultural cultivation, 11.9% for migrant workers, 23% for self-employed, 37% for enterprises and institutions, and 20.6% for other workers. The number of respondents in the four townships was 26% in Qixi Town, 28.4% in Suzhuang Town, 22.4% in Changhong Township and 23.2% in Hetian Township, respectively.

Table 1. Demographic characteristics of the resident sample.

Item	Option	Frequency (%)	Item	Option	Frequency
Age	18 and below	7.8	Source of income	tourism	3.6
	18–30	27.8		cultivation	0.9
	30–45	37.6		agricultural planting	3
	45–60	24.8		migrant worker	11.9
	Over 60	2.1		individual household	23
Education	high school and below	56.1	Place of residence	enterpriser	37
	junior college	24.8		others	20.6
	undergraduate college	18.8		Qi xi town	26
	graduate student and above	0.3		Suzhuang town	28.4
	below 3000	36.7		Changhong town	22.4
Monthly income level (RMB)	3000–5000	28.4	Sex	Hetian town	23.2
	5000–8000	24.5		man	53.4
	More than 8000	10.4		woman	46.6

3.3. Data Analysis

The SmartPLS 3.0 Partial Least Squares structural equation model (PLS-SEM) was used to evaluate the measurement scale and to test the hypotheses. According to Hair [49], PLS-SEM can be used in the following situations: (1) the study objective is to determine key drivers, rather than theoretical testing, confirmation or comparison; (2) the structural models contain formative constructs; (3) complex structural models and many constructs and indicators; (4) a small sample size; and (5) the data are non-normally distributed. In this study, the research objective was to explore the interactive mechanisms of held value and AV on ERB. The model was more complex, with nine potential constructs and 46 measurement items, of which 20 items had skewness and/or kurtosis beyond the range of -1 to $+1$ and belonged to the non-normal distribution. Therefore, for this study, the variance-based PLS-SEM was superior to either AMOS or LISREL—covariance-based SEM. Bootstrapping was used to test the significance of 335 cases and 300 sub-samples.

4. Results

4.1. Measurement Model

Unlike covariance-based SEM, PLS-SEM does not provide a single goodness-of-fit criterion for evaluating the measurement and structural models, but rather provides a set of non-parametric evaluation criteria. According to Hair, measurement models are divided into two types: the reflective measurement model and formative measurement model [49]. The evaluation criteria of the reflective measurement model includes comprehensive reliability, index reliability, convergent validity (mean extraction variance) and discriminant validity. In this study, all constructs were measured (shown in Table 2). The reliability, convergent validity, and discriminatory validity of the nine reflective constructs were assessed. The factor loading of the five indicators was below the standard threshold of 0.7. Excluding these five indicators, all factor loads were above 0.7, the CR ranged from 0.729 to 0.392 (above threshold 0.7), and the AVE ranged from 0.537 to 0.777 (above threshold 0.5), indicating good internal consistency and convergence validity of the measurement model. Following the criteria of Fornell and Larcker, in which the square root of a construct AVE should be greater than the maximum correlation [50] between the construct and any other construct, we evaluated and confirmed the discriminant validity between the constructs (shown in Table 3) and met the analysis criteria for continuing the structural model.

Table 2. Evaluation of measurement models and descriptive statistics.

Item	Mean	Kurtosis	Skewness	Factor Loading	a Coefficient	CR	AVE
AV					0.879	0.906	0.579
The Qianjiangyuan National Park has a beautiful scenery	4.56	0.481	−0.594	0.776			
Qianjiangyuan National Park is rich in wildlife resources, which can conserve water and purify air	4.56	1.26	−1.21	0.803			
Qianjiangyuan National Park can provide opportunities for tea, breeding and tourism to drive economic development	4.45	0.452	−1.033	0.76			
Qianjiangyuan National Park has rich historical and cultural value	4.31	0.533	−0.878	0.752			
Qianjiangyuan National Park can provide a place for people to relax and relax	4.19	0.487	−1.077	<u>0.695</u>			
Both physically and psychologically, Qianjiangyuan National Park makes me feel even better	4.47	0.345	−0.955	0.741			
This is sacred to me and spiritually special	4.20	−0.811	−0.571	0.737			
BV					0.856	0.392	0.777
Prevent environmental pollution and protect natural resources	4.74	8.222	−2.410	0.849			
Respect the earth and live in harmony with other species	4.58	4.174	−1.787	0.390			
Get along well with nature	4.59	3.423	−1.716	0.885			
ALV					0.794	0.867	0.620
People are equal, and everyone has equal opportunities	4.51	0.387	−1.236	0.749			
Peace, no war and conflict	4.61	6.841	−2.216	0.780			
Social justice, to help the weak	4.52	2.681	−1.443	0.850			
Willing to help others and help others	4.50	0.166	−1.059	0.766			
EV					0.829	0.875	0.639
Social power, control of others, and dominance	3.65	−0.629	−0.508	0.717			
Material wealth, the money	3.85	−0.515	−0.323	0.726			
Authority, and the power to lead or command	3.75	−0.681	−0.360	0.842			
Influence, affects others and events	3.88	−0.197	−0.509	0.898			
NEP					0.717	0.822	0.537
The ecological balance is very fragile and easily disturbed	3.82	0.30	−0.735	<u>0.652</u>			
Humans are seriously abusing the environment	3.68	−0.375	−0.515	0.750			
The Earth's resources and space are all limited	4.26	1.523	−1.119	0.788			

Table 2. Cont.

Item	Mean	Kurtosis	Skewness	Factor Loading	α Coefficient	CR	AVE
At present, we have not done enough to protect the environment	4.14	0.539	−0.757	0.736			
AC					0.805	0.885	0.719
The living and production activities of the community residents may pollute the local water source	3.39	−0.186	−0.413	0.839			
The life and production activities of the community residents may have a huge impact on the national park ecosystem	3.84	−0.40	−0.552	0.871			
The production and living of the residents may lead to the environmental deterioration of the village community	3.75	−0.027	−0.630	0.836			
AR					0.702	0.834	0.627
Every resident should be partly responsible for the ecological and environmental problems of the national parks	4.3	0.434	−0.887	0.759			
Every resident must have a shared responsibility for the ecological deterioration caused by others	4.09	0.959	−0.978	0.789			
Every resident must be responsible for the ecological and environmental problems he causes	4.28	1.825	−0.809	0.825			
PPN					0.817	0.880	0.647
Community residents have the responsibility to protect the ecological environment of the national park	4.24	−0.347	−0.674	0.828			
Community residents have the responsibility to reduce the negative impact on the resources and environment of national parks	4.24	1.321	−0.900	0.789			
No matter what others do, I will be environmentally friendly in my life	4.32	1.989	−1.098	0.745			
In daily life, every community resident has the responsibility to practice environmentally friendly behavior	4.37	0.089	−0.670	0.851			
Citizen behavior					0.719	0.729	0.574
I would like to join or contribute to environmental organizations	3.84	0.086	−0.52	0.733			
I am willing to pay higher taxes in order to protect the environment	3.27	−0.475	−0.152	<u>0.580</u>			
I am willing to do some volunteer work to solve the environmental problems	4.07	0.772	−0.700	0.782			
I will support the government's garbage classification policy from the action	4.2	0.003	−0.556	<u>0.615</u>			

Table 2. Cont.

Item	Mean	Kurtosis	Skewness	Factor Loading	a Coefficient	CR	AVE
Economic behavior					0.804	0.805	0.579
I will try to choose to buy products that can be reused or recycled	4.2	0.085	−0.502	0.730			
I use recyclable or reusable shopping bags when shopping	4.12	0.081	−0.484	0.772			
I will buy environmentally friendly products	4.14	0.685	−0.522	0.779			
Practice behavior					0.786	0.739	0.558
I turn off the tap when I wash the dishes or brush my teeth to save water	4.27	1.280	−0.903	0.736			
If I leave the room for more than 10 min, I will turn off the lights	4.18	1.000	−0.391	0.733			
I will minimize household waste by reuse or recycling	4.3	−0.112	−0.524	0.771			
If I can, I will try to choose public transportation	4.14	−0.051	−0.57	<u>0.578</u>			
Persuasion behavior					0.875	0.879	0.709
I will persuade people not to use plastic bags when buying fruit or vegetables	3.79	−0.78	−0.215	0.831			
I would persuade others to buy the outer packaging of products that can be reused or recycled	3.81	−0.637	−0.241	0.341			
I will persuade people to turn off the tap when brushing their teeth or washing their face to save water	4.01	−0.495	−0.552	0.770			

Note: “_____” Representing factor loadings below 0.7 were excluded. The data in the table show that all constructs passed the reliability and content validity tests (AV: Assigned value; BV: Biosphere value; ALV: Altruism value; EV: Egoism value; NEP: New ecological paradigm; AC: Awareness of consequence; AR: Attribution of responsibility; PPN: Personal pro-environmental norm).

Table 3. Discriminant validity.

	AC	AR	NEP	PPN	AV	ALV	EV	ERB	BV
AC	0.849								
AR	0.419	0.738							
NEP	0.506	0.431	0.733						
PPN	0.238	0.663	0.379	0.804					
AV	0.182	0.279	0.282	0.357	0.761				
ALV	0.234	0.367	0.339	0.387	0.467	0.787			
EV	0.142	0.175	0.216	0.136	0.27	0.335	0.800		
ERB	0.332	0.494	0.327	0.598	0.401	0.445	0.216	0.808	
BV	0.228	0.358	0.388	0.383	0.438	0.684	0.204	0.379	0.881

Note: The diagonal value is the square root of the AVE. The data in the table show good discriminant validity among the various constructs, and there are no issues with collinearity (AV: Assigned value; BV: Biosphere value; ALV: Altruism value; EV: Egoism value; NEP: New ecological paradigm; AC: Awareness of consequence; AR: Attribution of responsibility; PPN: Personal pro-environmental norm; ERB: Environmentally responsible behavior).

The ERB in the study was conceptualized as a second-order reflective construct, and content validity and collinearity were used to assess measurement quality (shown in Table 4). The four factor loads of environmentally responsible behavior ranged from 0.773 to 0.865, demonstrating that the constructs had good content validity. The variance inflation factor (VIF) was used to assess the level of collinearity and all VIFs ranged from 1.589 to 2.132 (below 5), indicating that there was no potential collinearity problem.

Table 4. Evaluation of second-order measurement models.

Second-Order Constructs	First-Order Constructs	Path Coefficient	T-Value	Factor Loading
ERB	Citizen behavior	0.321	15.777	0.773
	economic behavior	0.346	20.790	0.865
	Practice behavior	0.315	18.272	0.813
	Persuasion behavior	0.33	13.500	0.777

4.2. Structural Model

The results of the structural model analysis are shown in Figure 2. The model explained 39.8% of the total change in the ERB of residents in national park communities. PPN are the most important factor influencing residents’ environmental behavior, with a path coefficient of 0.521 ($t = 12.808, p = 0.000$). The AV also had a significant positive impact on residents’ ERB, with a path coefficient of 0.215 ($t = 4.711, p = 0.000$). At the same time, PPN indirectly affected the intention of ERB by AV, with a path coefficient of 0.155 ($t = 3.118, p = 0.002$). BV and ALV had significant positive effects on AV, with a path coefficient of 0.278 ($t = 4.119, p = 0.000$) and 0.139 ($t = 2.482, p = 0.013$), while EV had no significant effect on AV ($\beta = 0.030, t = 0.538, p = 0.539$). Contrary to the hypothesis, the NEP also had no significant effect on the AV ($\beta = 0.044, t = 0.755, p = 0.451$). Within the framework of the VBN model, BV and EV had significant positive effects on the NEP, with a path coefficient of 0.241 ($t = 4.119, p = 0.000$) and 0.124 ($t = 2.42, p = 0.026$), while ALV had no significant effect on the NEP ($\beta = 0.045, t = 1.270, p = 0.205$). The NEP has a significant positive effect on AC, with a path coefficient of 0.506 ($t = 10.48, p = 0.000$). AC had a significant positive effect on AR, with a path coefficient of 0.419 ($t = 9.367, p = 0.000$). AR had a significant positive effect on PPN, with a path coefficient of 0.663 ($t = 16.966, p = 0.000$). Therefore, all hypotheses were supported by survey data except those of H1b, H6c, and H7.

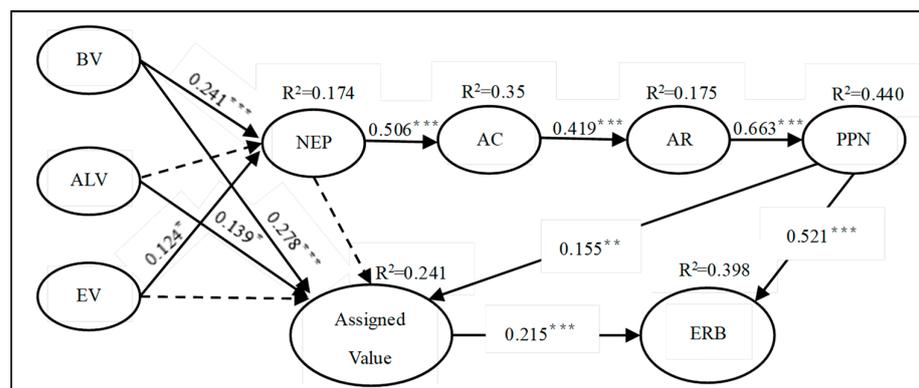


Figure 2. SPLS analysis results of the AV-VBN model. Note: dashed arrows represent non-significant paths, and solid arrows represent significant paths. * Represents $p < 0.05$, ** represents $p < 0.01$, and *** $p < 0.001$.

5. Discussion

This study specifically explored the mechanisms of two value types on individual ERB. Using the research basis in the field of natural resource management, the assigned value is operated into the perception about the social value of ecosystem service. Taking the community residents of Qianjiangyuan National Park in Zhejiang Province as the research object, the explanatory power of the assigned value and the held value to the ERB was verified. The theoretical model proposed by the study included seven constructs in the VBN theoretical framework (BV, ALV, EV, NEP, AC, AR, and PPN), AV constructs, and ERB constructs. This model explained 39.8% of the changes in ERB, which represents higher level of predictive power compared with previous studies. According to the research of Stern, the sample variance explained by the VBN model was between 19% and 35%, indicating that the assigned value constructs added to this study were suitable for the study of community residents' ERB in national park. The results can help to better guide and manage the related behaviors of the residents in the national park community by revealing the formation process of the assigned value and the influence on the ERB. Overall, the model research data confirmed the relevant constructs in explaining the importance of national park residents' ERB but future research should distinguish between different areas in the form of environmental behavior, especially those more human activities in the non-core reserve, development for specific environment, to reflect the national park subject on ecological and social and cultural integrity.

5.1. Assigned Value and ERB

Seymour argues that AV for a specific natural landscape has greater explanatory power than held value in predicting ERB [45]. Therefore, they proposed a conceptual model integrating held value and assigned value on the basis of VBN theory and a field case study. This study confirmed the significant influence of AV (this study is the national park community residents' perception of the social value of ecosystem service) on residents' intentions of ERB and the formation of AV is also significantly influenced by PPN, BV, and ALV. In one study, Seymour found that the respondents who held similar values toward the environment would express different AVs. Therefore, he believed that the held value could not necessarily directly predict the AV. However, this study found that held value is directly predictive of AV. Among the three environmental value orientations included in held values, both BV and ALV have significant positive effects on AV. This shows that the respondents believe that recognizing the value of national park ecosystem services can bring benefits to the biosphere, society and others. However, EV has no significant impact on residents' perception of assigned value, which is similar to the findings of Stern. He believed that BV and ALV were more likely to promote individuals to acquire ecosystem service value, so as to practice environmental behavior [19]. When they evaluated the ecosystem social value by public participation GIS (PPGIS), Van Riper found that respondents in the strong NEP subgroup allocated social value in a larger geographical area, namely, NEP affected individuals' AV selection [42]. However, in this study, NEP does not have a significant effect on assigned value, which is also different from Brown's argument that "AV is a social collection of beliefs" [40]. This may be because the current residents of Qianjiangyuan National Park have not really realized the importance of the relationship between humans and nature, and have not yet formed a strong environmental world view. During the investigation, the research team also found that this community had inconvenient transportation and low economic development levels because of their mountainous location. The construction of national parks has further reduced the income sources of natural resources, such as farming and wood, which local residents could previously rely on. As a result, community residents pay more attention to the development of their own community livelihood in the early stage of national park construction, rather than the construction of the ecological environment. Therefore, driven by EV involving self-interest, residents do not strongly perceive the value of ecosystem services. However, the influence of NEP on assigned value needs to be demonstrated by more case studies. In this study, PPN significantly affects the

assigned value of residents in the national park community, as hypothesized by Seymour. The activated personal norms have long been viewed as a sense of moral obligation and as strong predictors of ERB, but this construct is often associated with individual held values [14–16,19]. However, when exploring the difference in the influence of intentions based on individual norms and attitudes, Godin found that the allocation of individual normative beliefs to specific values also play a significant predictive role. In this study, individual norms both strongly influenced environmental behavior intentions and were the most powerful predictor of resident assigned value. Assigned values are more unstable and more susceptible than held values. Thus, personal norms play a more important role in regulating participants' environmentally responsible behavior.

5.2. Held Value and ERB

Consistent with the research of Kaiser, Han, Kiatkawsin, and others, the constructs within the VBN framework in this study maintain strong correlations. [15,16,51] On the basis of previous studies, the environmental values in this study consisted of biosphere values, altruistic values, and egoism values reflecting individualistic tendencies. The findings suggest that BV in humanist tendencies have more explanatory power in predicting environmental worldviews. Consistent with previous studies, EVs representing individualistic tendencies also have a significant positive effect on NEP. In their study, Kittipoom and van Riper found that egoism values had no or a negative effect on NEP and environmentally responsible behavior. However, there has been controversy about the positive and negative effects of egoism values on environmental behavior [15,42]. The results show that the interest of the non-human biosphere and personal interests are important to ERB. Many current eco-environmental declarations, such as the Millennium Ecosystem Assessment, demonstrate the importance of environmental protection by focusing more attention on human well-being. Through this study, it is necessary to integrate the interests of biosphere and the interests of residents into the ethical framework in order to protect the ecological environment and better arouse individual ethics.

In line with the VBN theoretical model, NEP, assessed with the 4-item scale, had a significant positive impact on AC and AR, while NEP in turn was influenced by biosphere values and egoism values (explaining 17.4% of the change in variance). Respondent residents with strong NEP were more likely to be responsible for environmental protection and able to recognize the negative outcomes from their own inaction [42]. NEP is often considered as an individual's environmental worldview, namely the individual's view of the interactive relationship between people and the environment. The results show that the extensive conceptualization of human–environment interaction is the cognitive premise by which residents' personal norms are activated, which can be regarded as the connection between residents' potential value system and belief structure, such as AC and AR.

PPN plays an important role in the formation of ERB in residents in Qianjiangyuan National Park, and are the most important predictor variable of environmental behavior constructs (path coefficient, 0.521). Together with the assigned value, it explained 39.8% of the variation in environmental behavior. Individual norms were influenced by the direct effect of AR, explaining 44% of the total change in individual norms. This result is also supported by previous studies, and the explanatory power of individual normative constructs in related models is also relatively high [15,38]. For example, Steg found that the prior variable environmental values, environmental worldview, AC and AR of the VBN model explained the total change in individual norms reaching 49% [52]. Previous research has shown that individual ethics are influenced by multiple internal and external factors, including environmental knowledge, motivation, attitude and basic implementation, economic pressure, the system and others [21]. Although these internal and external measures were not considered in this study, the findings suggest that AR has a strong potential to explain individual norms, which further influences the environmental behavior of residents. Consistent with the normative activation model, community residents feel obliged to practice ERB when they are aware of the threatened ecological resources

of national parks and are willing to assume personal responsibility. Past research has shown that accountability is conceptually different from the antecedent variables of other behaviors, and that residents are less likely to follow the norm if they do not recognize the problems caused by environmental degradation and seek solutions on their own [53]. Empirical findings suggest that AC, AR, and PPN are strong foundations for explaining individual environmentally responsible behaviors. However, the results of this paper are still slightly different from the other studies. When studying the influencing factors of tourists choosing green hotel behavior, Han found that R^2 for the AR was the largest and the largest R^2 was PPN in this study. It suggests that different elements can influence individual decision behavior in different contexts. Compared with choosing green hotels, national park residents can feel the ecological environment more personally, and their personal norms are more likely to be activated, thus affecting their environmental behavior.

6. Conclusions

VBN and related integration models have been widely used to explain a series of ERBs, and individual-held value orientation and individual norms have also been shown to be important predictive variables of ERB. However, few studies have included assigned values in specific situations into studies of environmentally responsible behaviors. In the field of natural resource management, assigned value is usually operationalized into individual social value assessment of ecosystem services. This study targeted residents of Qianjiangyuan National Park, and combined its assigned values with traditional personal values to explore their mutual influence on respondents' environmentally responsible behaviors. This has made a new contribution to the research of ERB and opened up a new perspective, which is conducive to better guiding and managing the daily activities and behaviors of residents in the national park community.

As an important type of protected area, national parks have the dual goals of ecological protection and community livelihood development, and the production and living activities and behavior management of community residents is an important challenge in the environmental management of national parks. Although there are some injunctive norms in national parks, it is still very important to guide community residents to actively practice ERB. The results of this study can help park managers to understand the influencing factors of the environmental behavior of national park residents and thus adopt corresponding management strategies. Firstly, PPNs are the strongest predictor of environmentally responsible behavior, and the AR of community residents for ecological environmental damage in national parks will activate individual norms. Secondly, residents' perception of the social values of national park ecosystems also influences individual environmental behavior. Therefore, several methods can be used to guide the daily behavior of community residents in other national park: (1) emphasize the public welfare of national parks, highlight the main status of community residents and activate their personal responsibility; (2) emphasize the service value of national park ecosystem and increase the perception of residents; and (3) solve the livelihood development of community residents within the scope of national parks so that they can benefit from the construction of national parks.

7. Limitation and Future Study

Although this study has achieved the corresponding research objectives, there are still some limitations. First of all, the study case Qianjiangyuan National Park is currently in the pilot stage. Most residents do not have a clear understanding of the concept and function of national park, and the ecological compensation and community livelihood development in the construction of national park lag behind, which may affect the environmental values and environmental behaviors adopted by individuals. Secondly, this study is to explore the influence of individual held values and AV on environmental behavior based on the VBN framework. Different environmental values formed by cultural differences may affect the final research results, and the integration of traditional oriental values into the model should be considered in the future. Finally, this study only explored the impact on the

formation of individual assigned value from the perspective of the VBN framework, and the impact of variables such as environmental knowledge and environmental experience on the formation of assigned value was not considered, which is a part of future studies.

Author Contributions: Conceptualization, Y.Z. (Ye Chen Zhang) and H.Z.; methodology, Y.Z. (Ye Chen Zhang); software, Y.Z. (Ye Chen Zhang) and Y.Z. (Ya Fei Zhao); validation, Y.Z. (Ye Chen Zhang) and S.Z.; formal analysis, Y.Z. (Ye Chen Zhang) and J.Y.; investigation, Y.Z. (Zhang Ye Chen) and Y.Z. (Ya Fei Zhao); resources, Y.Z. (Ye Chen Zhang); data curation, Y.Z. (Ye Chen Zhang); writing—original draft preparation, Y.Z. (Ye Chen Zhang); writing—review and editing, Y.Z. (Ye Chen Zhang); visualization, Y.Z. (Ye Chen Zhang); supervision, Y.Z. (Ye Chen Zhang) and J.Y.; project administration, H.Z.; funding acquisition, H.Z. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Philosophy and Social Science Planning Project of Anhui Province, grant number AHSKQ2022D076; National Natural Science Foundation of China, grant number 41971254; University Humanities and Social Sciences Research Project of Anhui Province, grant number SK2021A0581, SK2021A0578; Talent Program of Hefei University, grant number 20RC71; Social Science Innovation and Development Research Project of Anhui Province, grant number 2021CX048, 2021CX017.

Data Availability Statement: The data presented in this study are available on request from the author. The data are not publicly available due to privacy restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

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