

The Impact of Place Attachment on the Subjective Well-Being of Farmers Living Around Nature Reserves

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Abstract. With the continuous development of society and the economy, enhancing residents' well-being has become a developmental trend aimed at meeting people's spiritual needs and improving livelihoods. Using survey data from 645 households in Sichuan and Shaanxi provinces, this paper analyzes the impact of place attachment on the subjective well-being of farmers living around nature reserves. The results indicate that place attachment has a positive effect on the subjective well-being of farmers in nature reserve areas. From the perspective of its mechanism, place attachment enhances farmers' subjective well-being by fostering social trust. Based on these findings, the paper proposes measures such as strengthening farmers' emotional connection to their local communities and natural environments, encouraging their participation in the management and decision-making processes of nature reserves, and thereby improving their subjective well-being.

Keywords: Place attachment, Subjective well-being, Nature reserves

1. Introduction

The 14th Five-Year Plan of China explicitly states the need to "continuously enhance people's sense of gain, happiness, and security." Against the backdrop of social and economic development, improving residents' happiness has become a development trend to meet spiritual needs and enhance livelihoods. The sense of well-being refers to an individual's overall evaluation of life quality and emotional experience, serving as a key indicator of individual life quality [1]. Research on the factors influencing subjective well-being predominantly adopts two perspectives: economic and non-economic. On the economic side, factors include per capita income [2, 3] and macroeconomic growth [4]. For example, Rahut et al. [2] analyzed socioeconomic factors affecting well-being across 166 countries/regions, finding that per capita income positively impacts well-being, with a U-shaped relationship between income and well-being in developing countries. Non-economic factors include religious beliefs [5], social support [6], freedom of choice [7], and environmental issues [8], highlighting the diverse range of factors influencing subjective well-being.

Nature reserves, as critical ecological conservation areas, are vital hubs for achieving harmonious coexistence between humans and nature. However, the establishment of nature reserves is often driven by the goal of biodiversity conservation, frequently neglecting the opinions of local residents (indigenous people) [9] and sometimes failing to align with the interests of residents living around the reserves [10]. For instance, the creation of reserves often restricts farmers' access to natural resources [11], leading to imbalances in costs and benefits and regional development disparities. Farmers living near reserves are key stakeholders and play a vital role in reserve management [12]. Research has shown that when farmers assist in forest management within reserves, it leads to better forest conservation and management, positively impacting biodiversity and generating socioeconomic benefits for communities [13]. The subjective well-being of farmers around reserves is an important consideration for balancing conservation and development. Ensuring the proper functioning of reserves while improving farmers' well-being to achieve harmonious human-nature coexistence and promote community economic development and social progress is a significant research endeavor.

In summary, existing literature has extensively studied the factors influencing subjective well-being, providing a solid theoretical foundation and analytical basis for this paper. However, few studies have examined subjective well-being from the perspective of place attachment among farmers in nature reserves. This paper explores the impact of place attachment on farmers' subjective well-being by conducting robustness regression through variable substitution and introducing social trust and community participation as mediating variables to investigate the mechanism of place attachment's influence on subjective well-being.

being. Based on the findings, the paper offers recommendations to improve farmers' well-being, with the aim of fostering a harmonious relationship between humans and nature.

2. Theoretical Analysis and Research Hypotheses

2.1. Definition of Place Attachment

Place attachment, as an emotional bond formed through interactions between individuals and places, was initially introduced in environmental psychology. There is no unified and explicit definition of place attachment in academia, as scholars interpret it differently. For example, Tuan [14] describes place attachment as the transformation of an individual's pleasurable feelings toward a specific location into a long-term, stable attachment and sense of belonging. Gibbons and Ruddekk [15] consider place attachment to be an emotional cognition, where individuals derive satisfaction and anticipation from a specific place, eliciting positive emotions and interactions. Lin Zhijun and Sun Shufen [16] define place attachment as a close emotional connection established between individuals and places, encompassing functional dependence on environmental or facility-related aspects and affective identification with the place.

Depending on the research field and content, the dimensions of place attachment are categorized in various ways. Williams et al. [19] developed a place attachment scale comprising two dimensions: place dependence and place identity. Building on this, other scholars proposed different categorizations. For example, Hammit et al. [17] refined place attachment into five dimensions: place familiarity, sense of belonging, place identity, place dependence, and rootedness. Bricker et al. [18] categorized it into three aspects: place dependence, place identity, and lifestyle. Despite these varied categorizations, most studies focus on place dependence and place identity as the primary dimensions.

Regarding the two core dimensions of place attachment: Place dependence refers to the functional needs individuals develop for a specific place, including reliance on infrastructure, natural resources, and the surrounding environment. In contrast, place identity pertains to the emotional sense of belonging individuals associate with a location, manifesting through attitudes, emotional tendencies, and behaviors [25].

2.2. Place Attachment and Farmers' Subjective Well-Being

Numerous studies have demonstrated that place attachment positively impacts well-being. Specifically, Wang Zhenning et al. [20], using the Fudao walkway in Fuzhou as an example, explored the relationships between recreational involvement, place attachment, and well-being. Empirical analysis revealed that place attachment has a significant positive effect on well-being. Similarly, He Biao et al. [21], in studying the well-being of lifestyle-oriented migrant tourism workers, found that higher levels of place identity and lifestyle dependence—manifesting as stronger senses of belonging and security—correspond to increased well-being. In another study, Lin Alin et al. [22], focusing on university students, concluded through empirical research that place identity positively influences life satisfaction. Additionally, Liu Xiaofei et al. [23], studying residents of accessory housing communities, investigated the relationships among social environment, sense of place, and subjective well-being. Their findings indicated that sense of place plays a partial mediating role in the influence of residential environment on subjective well-being. Based on this evidence, this paper proposes the following hypothesis:

H1: Place attachment has a significant positive impact on farmers' subjective well-being.

2.3. The Mediating Role of Social Trust

Place attachment not only directly affects farmers' subjective well-being but also influences their level of social trust by enhancing interactions among farmers, effectively integrating community resources, and fostering cooperative and reciprocal relationships [24]. This impact, in turn, indirectly affects their subjective well-being. Research has shown that place attachment is a key factor in promoting social trust [26]. Within the internal space of communities, strong place attachment facilitates the formation of a mutual-aid-based "familiar society" model, which further strengthens community cohesion and reshapes social trust relationships. Ma et al. [24], using data from Sichuan Province in China, explored the role of farmers and community participation in grassroots disaster management and found that the two dimensions of place attachment (place identity and place dependence) are significantly positively correlated with organizational trust and emotional trust within community trust. This finding further supports the role of place attachment in fostering social trust. As an important component of social capital, social trust is deepened through communication among various parties and contributes to individuals' positive psychological and physiological experiences, thereby enhancing well-being. Multiple studies confirm this point: Yuan Zheng et al. [27], using data from the World Values Survey's China section, empirically tested the relationship between trust and well-being among Chinese residents, showing that social trust makes individuals happier. Jing Tiankui et al. [28], in examining the impact of "affiliation" on subjective well-being in China, found that levels of social trust and social connectedness are important mediating mechanisms influencing well-being. Ma Dan et al. [29] pointed out that social trust not only directly and positively affects the subjective well-being of the emerging productivity groups but also moderates the effect of peripheral social interactions on subjective well-being. As noted, place

attachment positively promotes social trust, which in turn impacts subjective well-being. Based on this, the following hypothesis is proposed:

H2: Social trust plays an important mediating role in the effect of place attachment on farmers' subjective well-being.

2.4. The Mediating Role of Community Participation

Place attachment, as a positive emotional bond, provides a sense of purpose in life and influences the extent to which farmers participate in community activities. Specifically, the stronger an individual's affection and attachment to their community, the more they are likely to care about its development and actively engage in community development and construction [30]. Numerous studies have highlighted the direct impact of place attachment on individuals' community participation behaviors. For example: Du Zongbin et al. [31], in their study on residents in rural tourism destinations, explored the mechanisms and pathways through which a sense of belonging affects community participation. Their findings showed a significant positive impact of a sense of belonging on community participation. Similarly, Wang Jinlian et al. [32], in their study on second-home tourism behavior, found that the level of place attachment positively influences travelers' community participation. Additionally, Wu Rong et al. [33], in their research on community participation in Guangzhou, confirmed that place attachment significantly influences community participation behaviors. Furthermore, as a vital component of social functioning, community participation plays an essential role in constructing well-being. Studies supporting this include: Bian Yanjie et al. [34], in their comparative analysis of subjective well-being among Chinese and British residents, found that higher levels of social integration consistently correspond to stronger subjective well-being across both countries. Zhai Jingpeng et al. [35], analyzing elderly well-being from a community perspective, revealed a positive correlation between happiness and the degree of social participation among older adults. Kang Lei et al. [36], focusing on low-income communities in Beijing, examined the impact of neighborhood socialization on the subjective well-being of low-income residents, finding a significant positive relationship between residents' social participation and subjective well-being. In summary, place attachment not only positively influences individuals' community participation but also fosters subjective well-being through participation behaviors. Therefore, this paper proposes the following hypothesis:

H3: Community participation plays an important mediating role in the effect of place attachment on farmers' subjective well-being.

3. Research Methodology

3.1. Data Source

The data for this study were obtained from field surveys conducted by the research team. Based on the levels and geographic locations of reserves, 17 giant panda nature reserves in Shaanxi and Sichuan provinces were selected. The questionnaire included sections on farmers' basic household information, household resources, production and management activities, social capital, and place attachment. For this study, data from the sections on basic household information, social capital, and place attachment were primarily used. After data cleaning and processing, a total of 645 valid questionnaires were obtained.

3.2. Variable Selection

1)Dependent Variable: The dependent variable in this study is the subjective well-being of farmers. Subjective well-being, as a key indicator of individual life quality, is measured by the question: "Do you think your life is happy?" Responses range on a five-point scale from "very unhappy" to "very happy."

2)Independent Variable: The core independent variable is the degree of place attachment among farmers in nature reserves. Place attachment is divided into two dimensions: place identity and place dependence. These are further broken down into two primary indicators and five secondary indicators. Responses are measured on a five-point Likert scale from "strongly disagree" to "strongly agree," with final values calculated using the entropy weighting method.

3)Mediating Variables: This study examines two mediating variables: community participation and social trust. Community Participation refers to Wang Xinsong's [37] definition, community participation is defined as "an individual's involvement in civic activities organized by other individuals or social organizations." It is represented by the number of collective activities participated in over the past year. Social Trust is assessed using responses to three questions: "Do you trust the village cadre?" "Do you trust other villagers?" and "Do you trust your neighbors?" Responses range from 1 ("very untrustworthy") to 5 ("very trustworthy").

4)Control Variables: To account for other factors influencing farmers' subjective well-being beyond place attachment, several control variables are included. These include gender, age, education level, marital status, health status, and political affiliation. The specific definitions and values of these variables are provided in the associated table.

Table 1. Descriptive Statistics of Variables

| Variable Name | Variable Definition | Mean | Standard Deviation |
|--------------------------------|--|----------|--------------------|
| Dependent Variable | | | |
| Farmers' Subjective Well-Being | Very unhappy = 1, Somewhat unhappy = 2, Neutral = 3, Somewhat happy = 4, Very happy = 5 | 4.088 | 0.795 |
| Independent Variable | | | |
| Place Attachment | See Table 2, divided into two dimensions: place identity and place dependence | 4.332 | 0.602 |
| Control Variables | | | |
| Age | Number of years | 56.629 | 11.524 |
| Gender | Male = 1, Female = 0 | 0.869 | 0.338 |
| Marital Status | Married = 1, Single = 2, Divorced = 3, Widowed = 4 | 1.223 | 0.732 |
| Education Level | Years of schooling: Primary school = 6, Middle school = 9, High school = 12, College = 15, Graduate = 19 | 7.195 | 3.598 |
| Health Status | Healthy = 1, Average = 2, Chronic illness = 3, Severe illness = 4, Disability = 5 | 1.461 | 0.922 |
| Political Affiliation | Party member = 1, Non-member = 0 | 0.168 | 0.375 |
| Religious Belief | Religious = 1, Non-religious = 0 | 0.409 | 0.492 |
| Annual Household Income | Total income of household members in one year (in yuan) | 128119.6 | 161733.6 |
| Distance to Cement Road | Distance from residence to nearest cement road (meters) | 53.093 | 224.209 |
| Distance to Town Center | Route distance from residence to town center (kilometers) | 10.179 | 14.125 |
| Mediating Variables | | | |
| Social Trust | Divided into trust in village officials, villagers, and neighbors (weighted average). Very untrustworthy = 1 to Very trustworthy = 5 | 4.240 | 0.851 |
| Community Participation | Number of collective activities participated in last year (times) | 3.645 | 1.318 |

3.3. Model Selection

The dependent variable, farmers' subjective well-being, is a multivariate ordinal variable, making the Ordered Probit model suitable for estimation. The baseline model is specified as:

$$H_i = \beta_0 + \beta_i S_i + \sum \gamma_j C_{ij} + \varepsilon_i \quad (1)$$

Where H_i represents the subjective well-being level of farmer i , S_i denotes the place attachment level of farmer i , C_{ij} includes the j^{th} control variables of farmer i , such as individual and household characteristics. β_0 is the constant term; β_i and γ_j are the parameters to be estimated; ε_i is the random disturbance term.

To examine whether place attachment affects farmers' subjective well-being through social trust and community participation, this study extends the baseline model by incorporating these as mediating variables. The mediating effect models are specified as follows:

$$M_i = \sigma_0 + \sigma_1 S_i + \sigma_2 C_{ij} + \varepsilon_2 \quad (2)$$

$$H_i = \varphi_0 + \varphi_1 S_i + \varphi_2 M_i + \varphi_3 C_{ij} + \varepsilon_3 \quad (3)$$

Where M_i represents the mediating variables, specifically social trust and community participation of farmer i ; σ_0 , φ_0 are constant terms; σ_1 , σ_2 , φ_1 , φ_2 , φ_3 are coefficients to be estimated; ε_2 , ε_3 are random disturbance terms.

3.4. Robustness Test

Since directly measured subjective well-being can be affected by respondents' emotional fluctuations during the survey, leading to potential measurement errors and subjectivity, this study employs a robustness check by substituting the dependent variable and re-estimating the model. Following the methodology of Ruan Ruohui et al. [38] and considering data availability, farmers' life satisfaction is measured as a composite of five dimensions: basic material conditions, safety, health, social relationships, and

choice and freedom. Respondents rate each dimension on a scale from 1 to 5, with higher scores indicating greater satisfaction. A weighted average (1/5 for each dimension) reflects the multidimensional differences in farmers' well-being.

4. Model Estimation Results

4.1. Analysis of the Impact of Place Attachment on Farmers' Subjective Well-Being

This paper uses Stata 17.0 to perform stepwise regression estimation of the model. First, the subjective well-being of farmers is regressed alone, and then control variables are added to test the robustness of the estimation results. Table 2 reports the estimation results of the impact of place attachment on farmers' subjective well-being. In Model (1), the estimated coefficient of place attachment is significantly positive at the 1% statistical level, indicating that place attachment has a significant positive effect on farmers' subjective well-being. From the estimation results of Model (2), after adding control variables, the result remains significant, demonstrating that the sense of security and belonging brought by place attachment is one of the key factors affecting farmers' subjective well-being. After adding control variables, the regression coefficient of place attachment decreases, indicating that omitting control variables would overestimate the impact of place attachment on farmers' subjective well-being. Regarding control variables, religious belief and household annual income have positive effects on farmers' subjective well-being. Specifically, farmers with religious beliefs have higher levels of happiness compared to those without religious beliefs, and farmers with higher household incomes tend to be happier.

Table 2. The Impact of Place Attachment on Farmers' Subjective Well-Being

| Variable Name | Model 1 | | Model 2 | |
|-------------------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error |
| Place Attachment | 0.887*** | 0.0776 | 0.872*** | 0.0794 |
| Age | | | 0.000699 | 0.00440 |
| Gender | | | -0.229* | 0.136 |
| Education Level | | | -0.0140 | 0.0143 |
| Health Status | | | -0.0163 | 0.0509 |
| Political Affiliation | | | 0.0161 | 0.125 |
| Religious Belief | | | 0.223** | 0.0928 |
| Annual Household Income | | | 4.80e-07* | 2.82e-07 |
| Distance to Town Center | | | -0.000678 | 0.00315 |
| Peseudo R ² | 0.0934 | 0.0934 | 0.1043 | 0.1043 |
| Sample Size | 645 | 645 | 645 | 645 |

Notes: ***, **, * denote 1%, 5% and 10% significance levels, respectively; Standard errors are shown in parentheses (same below).

4.2. Analysis of the Mechanism of Place Attachment on Farmers' Subjective Well-Being

To deeply analyze the mediating mechanism of how place attachment influences farmers' subjective well-being through social trust and community participation, and to test hypotheses H2 and H3, the Sobel and Bootstrap mediation effect tests were employed. The empirical analysis examines the mediating effects of community participation and social trust in the relationship between place attachment and farmers' subjective well-being. Place attachment has a significant positive effect on social trust, indicating that place attachment enhances the level of social trust. Furthermore, social trust significantly positively impacts farmers' subjective well-being at the 1% significance level. This finding demonstrates that social trust plays a partial mediating role between place attachment and farmers' subjective well-being, confirming the validity of H2. Analyzing the regression results with community participation as the mediator reveals that the regression coefficient of place attachment on community participation is significantly positive at the 1% statistical level. However, the regression coefficient of community participation on subjective well-being is not significant. This indicates that while place attachment can positively promote community participation, farmers' community participation behavior does not significantly influence their subjective well-being. Therefore, H3 is not supported.

Table 3. Mediating Effect of Social Trust

| Variable Name | Subjective Well-Being | Social Trust | Subjective Well-Being |
|-------------------|-----------------------|----------------------|-----------------------|
| Place Attachment | 0.576*** (0.0476) | 0.457*** (0.0542) | 0.514*** (0.050) |
| Social Trust | — | — | 0.135*** (0.0344) |
| Control Variables | Controlled | Controlled | Controlled |
| _cons | 1.760*** (0.283) | 2.359*** (0.323) | 1.590*** (0.302) |
| N | 645 | 645 | 597 |
| R-square | 0.219 | 0.115 | 0.241 |

Table 4. Mediating Effect of Community Participation

| Variable Name | Subjective Well-Being | Community Participation | Subjective Well-Being |
|-------------------------|-----------------------|-------------------------|-----------------------|
| Place Attachment | 0.576*** (0.0476) | -0.193** (0.0877) | 0.568*** (0.0476) |
| Community Participation | — | — | -0.412 (0.0215) |
| Control Variables | Controlled | Controlled | Controlled |
| _cons | 1.760*** (0.283) | 5.354*** (0.522) | 1.980*** (0.305) |
| N | 645 | 645 | 645 |
| R-square | 0.219 | 0.0384 | 0.209 |

Table 5. Bootstrap Results for Social Trust and Community Participation

| Mediator Variable | Effect | Coefficient | P> z | Confidence Interval |
|-------------------------|-----------------|-----------------------|-------|---------------------|
| Social Trust | Indirect Effect | 0.0619*** (0.0203) | 0.002 | [0.022,0.102] |
| | Direct Effect | 0.514*** (0.0583) | 0.000 | [0.400,0.629] |
| Community Participation | Indirect Effect | 0.00797 (0.00517) | 0.123 | [-0.002,0.018] |
| | Direct Effect | 0.568*** (0.0527) | 0.000 | [0.465,0.672] |

Notes: Bootstrap resampling was conducted 1,000 times.

4.3. Robustness Test

To verify the robustness of the findings, the dependent variable subjective well-being was replaced with the composite satisfaction score for farmers' life satisfaction across multiple dimensions. Table 6 presents the regression results. In Model (1), the estimated coefficient of place attachment is significantly positive at the 5% level, indicating that place attachment has a significant positive impact on farmers' life satisfaction. After incorporating additional control variables in Model (2), the results remain consistent with the findings presented earlier, further supporting the robustness of the conclusions. These results confirm that using farmers' life satisfaction as an alternative dependent variable does not alter the study's main conclusions. Therefore, the findings of this paper are robust.

Table 6. Statistical Results with Alternative Dependent Variable

| Variable Name | Model (1) | | Model (2) | |
|-------------------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard Error | Coefficient | Standard Error |
| Place Attachment | 0.426*** | 0.291 | 0.417*** | 0.0298 |
| Age | | | 0.00207 | 0.00175 |
| Gender | | | -0.0795 | 0.0530 |
| Marital Status | | | -0.0327 | 0.0246 |
| Education Level | | | 0.00409 | 0.00565 |
| Health Status | | | -0.0240 | 0.0202 |
| Political Affiliation | | | 0.0250 | 0.0490 |
| Religious Belief | | | 0.0258 | 0.0364 |
| Annual Household Income | | | 2.22e-07** | 1.11e-07 |
| Distance to Cement Road | | | 9.16e-05 | 7.88e-05 |
| Distance to Town Center | | | -0.000667 | 0.00125 |
| _cons | 2.146 | 0.128 | 2.141*** | 0.178 |
| R-square | 0.247 | 0.247 | 0.266 | 0.266 |
| Sample Size | 645 | 645 | 645 | 645 |

Notes: ***, **, * denote 1%, 5% and 10% significance levels, respectively; Standard errors are shown in parentheses (same below).

5. Conclusions and Implications

Using survey data from 645 farmers in 17 giant panda nature reserves in Sichuan and Shaanxi provinces, this study applies an ordered probit model to examine farmers' subjective well-being from the perspective of place attachment. It further explores the mechanism through which place attachment affects farmers' subjective well-being, contributing to a deeper understanding of the relationship between place attachment and farmers' well-being. This research enriches existing studies and provides new insights into improving the subjective well-being of farmers in protected areas. The main conclusions are as follows: 1. Place attachment positively promotes the subjective well-being of farmers in protected areas. To verify the reliability of this conclusion, robustness tests were conducted by replacing the explanatory variables, and the results remained significant, supporting the validity of the conclusion. 2. Social trust serves as a partial mediator between place attachment and the subjective well-being of farmers in protected areas. For farmers in protected areas, place attachment—expressed through place identity and place dependence—enhances individuals' sense of belonging and recognition of their locality, fostering unity among community members. When social trust levels are high, individuals are more willing to support and cooperate with one another, creating a positive social and cultural environment, thereby improving farmers' subjective well-being. 3. Community participation does not significantly affect the subjective well-being of farmers in protected areas. Community participation does not act as a mediator in the relationship between place attachment and farmers' subjective well-being.

Based on the conclusions of this study, the following specific policy recommendations can be implemented to improve the subjective well-being of farmers in protected areas: 1. Strengthen Farmers' Emotional Connection to the Local Community and Natural Environment: Policies should aim to enhance farmers' sense of attachment to their community and the surrounding natural environment. This can be achieved by organizing educational programs and cultural activities that increase farmers' awareness and appreciation of the historical, cultural, and ecological values of the area. 2. Encourage Farmers' Participation in the Management and Decision-Making Processes of Protected Areas: Involving farmers in the governance of protected areas can foster a stronger sense of belonging and responsibility. This can be achieved through participatory decision-making processes and co-management practices that include farmers as active stakeholders. 3. Establish and Improve Community Cooperation Mechanisms: From the perspective of social capital, initiatives should focus on fostering mutual support and collaboration among farmers. Building mechanisms for community cooperation can strengthen social ties, create a supportive network, and promote a cohesive community environment.

Acknowledgement

Innovation and Entrepreneurship Training Program for College Students (202310564029).

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