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Linking Prohibited Grazing Policy to Farmers' Subjective Well-Being: A Case Study in Yanchi County, China

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Received: 23 February 2019; Accepted: 9 April 2019; Published: 11 April 2019



Abstract: Since the launch of a prohibited grazing policy (PGP) in 2002, the ecological environment in North China has improved markedly. The aims of PGP are to improve the ecological environment without reducing farmers' well-being in rural areas. Hence, after the implementation of the policy for more than 16 years, the effect of this policy on farmers' subjective well-being (SWB) has become a question that needs to be studied. In this paper, the survey data in Yanchi County was used to explore the relationship between the perception of the policy and farmers' SWB using structural equation modelling (SEM). The results showed that there was a full mediation effect in the relationship between the perception of the PGP and farmers' SWB through economic status, neuroticism, and extraversion. However, the mediation effect through the perception of the ecological environment was not significant. These findings suggest that it is important to continue to implement this policy.

Keywords: SWB; PGP; perception; farmers; Yanchi County; China

1. Introduction

The agro-pastoral ecotone in Northern China is one of the four largest farming-pastoral zones in the world. It is an important ecological barrier of the eastern part of China. The ecological environment in this area is fragile [1], and prior to the implementation of the prohibited grazing ecological policy, the grasslands continued to deteriorate due to excess reclamation, overgrazing, and inappropriate management of grassland resources [2]. The annual direct and indirect losses from these grasslands was 8.3 billion dollars [3]. In Yanchi County, the desertification area increased from 1106 km² in 1987 to 3014 km² in 2000 [4]. The deterioration of the ecological environment threatened the living environment, people's health, and sustainable development greatly.

Under this background, on 16 December 2002, the Chinese government formally launched the prohibited grazing policy (PGP) in areas where grasslands were severely damaged in Northwest China, that involved 800,000 km² of grasslands in 2017 [3]. Grazing and livestock production were the main income sources for farmers in these regions before the PGP. The farmers who participate in the PGP were forced to change their livestock production mode, from free grazing to house feeding, and many farmers abandoned livestock farming to engage in other production industries, meanwhile,

most young people have left their home villages for cities to seek better prospects. The main goals of this policy are to restore the grassland's social-ecological system to a steady-state system, and to consider the livelihood of farmers at the same time. In order to implement the policy smoothly, the central government invests more than 2.2 billion dollars annually for grassland ecology subsidies and a large part of that is used for the forbidden grazing subsidy in the eight provinces of major grassland and pastoral areas in China [5]. In 2016, the prohibited grazing subsidy increased to \$17.30/ha per year and the production subsidy for each household increased to \$76.90 per year. After the implementation of the policy, the eco-environment in these areas has significantly improved, and the desertification in some agro-pastoral ecotones has reversed [6,7]. The PGP aims to improve the ecological environment without reducing farmers' well-being in these rural areas. Hence, the effect of this policy on farmers' well-being has become a question that needs to be studied after its implementation for over 16 years.

The PGP is a policy to protect and manage the grasslands in ecologically fragile areas in China. There are also similar policies in other countries. In America, in order to promote grassland ecological restoration and the synchronous growth of farmers' income, the federal government of the United States has issued a series of long-term stable grassland protection and construction support policies through providing financial compensation and technical support to grassland operators. The conservation reserve program (CRP) is similar to the PGP in China and is implemented by the US Department of Agriculture [8]. After the implementation of the CRP, a large number of studies have focused on the impact of this policy. Research has shown that the CRP has successfully reduced soil loss, and brought significant ecological benefits including the reversal of landscape fragmentation, maintenance of regional biodiversity, creation of wildlife habitats, and favorable changes in regional carbon flux [9–13]. Chang et al. [14] indicated that participation in the CRP and off-farm work by the operator and the spouse increases farm household income. In addition, the CRP could also cause the number of farms and the rural population to decline [15]. In Australia, rest pastures are used to maintain grasslands in good condition or to restore them from poor conditions to increase pasture productivity [16]. This grazing strategy could improve land conditions in extensive grazing lands and increase overall animal productivity and sustainability [17]. However, almost all research on ecological policies of grassland protection focuses on the environmental and economic benefits of these policies, and few studies have been conducted on the impact of such ecological policies on farmers' well-being. The main goals of these policies are to improve the ecological environment without reducing farmers' well-being in these rural areas, and so is the PGP in China. Thus, this study on the effect of the PGP on farmers' well-being could provide a reference for similar policies in other regions.

It was suggested that both objective social indicators and subjective well-being measures should be used when evaluating the quality of life of a society [18]. However, Stiglitz et al. [19] argued that measures of subjective well-being (SWB) provide key information about quality of life, and Abdallah et al. [20] held that how people feel about their lives is a subjective judgement, therefore, it was suggested that subjective indicators should be used when we evaluate individuals' well-being. Subjective well-being refers to how people experience their own lives and is often measured through self-reports, such as population surveys [21]. In recent decades, the science of SWB has developed rapidly, for example, there were over 14,000 publications about this topic in 2015 [22], and self-reported data on happiness or life satisfaction is becoming increasingly available [23]. Evidence suggests that high SWB leads to a number of beneficial outcomes, including health and longevity, supportive social relationships, work productivity, and citizenship [24,25]. In addition, the farmers' livelihood has attracted more and more attention from the Chinese government, the "Thirteenth Five-Year Plan" put forward that "focus on improving people's well-being" is the main line of "shared development". Therefore, research on the link between PGP and SWB might provide advice about how to better implement this policy for policy makers.

To understand the relationship between the PGP and farmers' SWB, Yanchi County in Northwest China was used as an example, and the analysis of this study was based on the survey data in rural

areas. Then we researched the mediation effect between the perception of PGP and farmers' SWB using the structural equation model (SEM).

2. Materials and Methods

2.1. Overview of the Study Area

Yanchi County is located in the Ningxia Hui Autonomous Region Northwest China ($37^{\circ}04'–38^{\circ}10' N$, $106^{\circ}30'–107^{\circ}41' E$), the northern boundary is adjacent to the Mu Us Desert, the southeastern boundary is adjacent to the Loess Plateau (see Figure 1). The climate of Yanchi County is dry, rainless, and belongs to a typical temperate continental climate and the average annual precipitation is only 290 mm [26]. It is a transitional zone of topography, climate, vegetation, farming, and animal husbandry mode of production. It is also a part of the typical transitional zone between the loess hilly region and the Ordos platform (sand), which changes from a semi-arid to an arid area and from steppe vegetation to desert steppe vegetation. This geographical transition has resulted in a fragile ecosystem in this region.

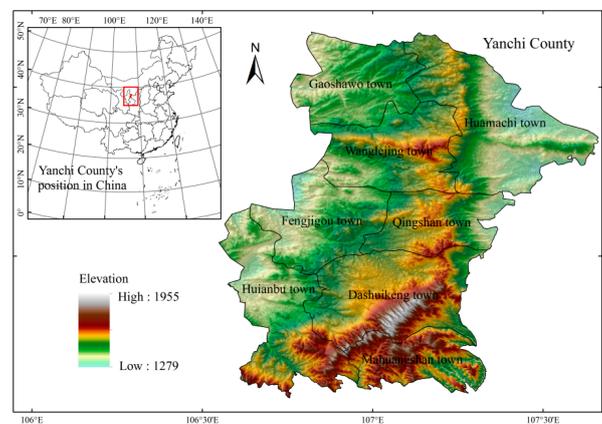


Figure 1. The study area.

The area of the county is $8.67 \times 10^5 \text{ hm}^2$, and the natural grassland area is $5.56 \times 10^5 \text{ hm}^2$ which has participated in the PGP. The total population was 155.7 thousand in 2016, of which the rural population was 85.6 thousand, accounting for 55% of the total population [27]. The per capita GDP was 7.0 thousand dollars in 2016, which increased 11.5% from the previous year [27]. The rural per capita net income was 1.3 thousand dollars, which was much lower than urban residents whose per capita disposable income was 3.4 thousand dollars in 2016 [27]. The agricultural production value of the region was approximately 202 million dollars in 2016, among that the animal husbandry was 100 million dollars. Yanchi County's economy is dominated by animal husbandry and agriculture, and this area is known as "licorice town" and "Tan sheep town" [3]. Grazing and livestock production was the main income source for farmers before the PGP. Yanchi County is a typical agro-pastoral ecotone in Northern China, and the county carried out the PGP in 2002. After the implementation of the PGP, the ecological environment was significantly improved, and there was a continued reduction in the desertification area in this county [26]. More than 16 years after the policy was carried out, Yanchi County has initially realized the ecological and economic benefits of the policy.

2.2. Conceptual Model

The PGP can affect environment quality, and there is a positive relationship between the natural environment and well-being in general [28]. Previous studies indicated that air quality is significantly associated with self-reported life satisfaction or happiness [29–33]. The environment of agro-pastoral ecotones in Northwest China is mainly affected by dusty wind, after implementation of the PGP,

in these areas, the environment has gotten better significantly. Hence, we assumed that there was a mediation effect between the PGP and farmers' SWB through the ecological environment.

After the implementation of PGP, farmers' incomes experienced a downward trend firstly and then an upward trend due to ecological subsidies and changes in livelihoods [34]. Meanwhile, individuals' economic status was found to significantly influence residents' cognitive well-being and affective well-being [35]. The PGP may have a significant impact on the farmers' economic status in rural areas where the policy was carried out, and the economic status of the residents could influence their SWB. Thus, we proposed the hypothesis that there was a mediation effect between the PGP and farmers' SWB via their economic status.

Personality traits could strongly influence individuals' SWB [36–42]. The Big Five personality dimensions have become the most widely used model to measure individuals' personalities [43,44]. Previous research suggests that extroversion and neuroticism are the two dimensions that are the most strongly related to SWB [45,46], extraversion was found to be positively related to SWB, and neuroticism was found to be negatively related to SWB [46–48]. In addition, previous studies deemed that personality could change for the influence of social investment [49,50]. The PGP is state-funded and implemented by the local government to form an environmental protection system, and Roberts et al. [51] stated that investing in social institutions is one of the driving mechanisms of personality development. Thus, we assumed that the PGP had a slight impact on individuals' personality, and individuals' personality had notable impact on farmers' SWB.

Base on the above research, the proposed conceptual model of the present study is illustrated in Figure 2. It should be noted that the perception of PGP, the perception of ecological environment, and the perception of economic status are to represent the PGP, ecological environment, and economic status in the current study, respectively. The perception of the PGP was expected to be significantly related to the perception of the ecological environment, economic status, neuroticism, extraversion, and SWB, respectively. Additionally, the model also strived to investigate whether the perception of the PGP indirectly influenced self-reported SWB through the mediation effect of the perception of the ecological environment, economic status, neuroticism, and extraversion.

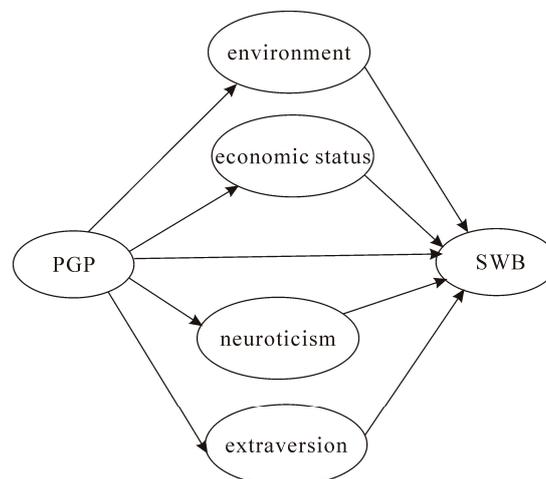


Figure 2. The conceptual research model.

2.3. Participants

Data were obtained via questionnaire surveys and household interviews with farmers in their homes by 4 students in 2018. We randomly selected 3 or 4 villages in every town of the 8 townships as the sample area, then the participants were randomly selected with rural residents from these villages in Yanchi County. One household was surveyed only with a questionnaire with someone who was familiar with their family situations. The sample consisted of 253 farmers (46% women and 54% men),

age mean = 57.2, standard deviation = 12.86. The population characteristics of the sample group are summarized in Table 1.

Table 1. Demographics for the participants ($N = 253$).

Parameter	Number of Participants	Percentage
Gender		
Male	136	54%
Female	117	46%
Marital status		
Married	229	91%
Other	24	9%
Education		
Lower than primary education	83	33%
Primary education	94	37%
Secondary education	72	28%
Higher education	4	2%
Age		
<45 years old	35	14%
45–59 years old	102	40%
>59 years old	116	46%
Household income (Dollars/Month)		
<\$300	90	36%
\$300–\$900	99	39%
>\$900	64	25%
Means of Livelihood		
Non-agricultural	145	57%
Crop	134	53%
Livestock	146	58%
Raise sheep	87	34%

2.4. Materials

The measurement of SWB was consistent with World Values Survey (WVS) which contained the self-reported life satisfaction and happiness items [52]. The self-reported life satisfaction item was “All things considered, how satisfied are you with your life as a whole these days?”, 1 means “completely dissatisfied” and 10 means “completely satisfied”. The self-report happiness item was “Taking all things together, would you say you are?”, 1 means “not at all happy”, 5 means “very happy”. The inclusion of the phrase “All things considered” in the SWB question may lead to the evaluative well-being being slightly skewed. However, this is an important improvement over most other empirical studies, which only took life satisfaction as a dependent variable [52].

Perception of PGP was measured by 5 items, three of the items were “PGP improved the local ecological environment”, “PGP increased household income”, “PGP improved living standards”. Each of these three items was rated on 5-point Likert scale ranging from 1 = “strongly worsen” to 5 = “strongly improve”. “I am satisfied with PGP” was rated on 5-point Likert scale ranging from 1 = “very dissatisfied” to 5 = “very satisfied”. Another item was “the PGP subsidy is reasonable”, this item was rated on 3-point Likert scale ranging from 1 = “very low” to 3 = “reasonable and high”.

To assess participants’ personality, the Ten-Item Personality Inventory (TIPI), which is a very brief measure of the Big Five personality domains, was used [43]. Only the items measuring extroversion (e.g., I see myself as extraverted and enthusiastic) and neuroticism (e.g., I see myself as anxious and easily upset) were included, as previous research has demonstrated that of the five domains, these two dimensions are most strongly related to SWB [53,54]. Respondents were asked to rate

the extent they agree or disagree with personality statements on a 5-point scale, ranging from “disagree strongly” to “agree strongly”.

Perception of economic status included 3 items. “Income level in your village” was measured by 5-point scale, ranging from 1 (very low) to 5 (very high). “Income and expenditure in the past few years” was rated on 4-point Likert scale ranging from 1 = “have a debt” to 4 = “save money”. “The household income of the past year” was rated on 3-point scale, 1 = “<300 dollars”, 2 = “300–900 dollars”, 3 = “>900 dollars”.

Perception of the ecological environment included 2 items. “Satisfied with the ecological environment” was rated on 5-point Likert scale ranging from 1 = “very dissatisfied” to 5 = “very satisfied”. “Ecological environment quality” was rated on 5-point Likert scale ranging from 1 = “very poor” to 5 = “very good”.

2.5. Analytic Technique

In this research, the relationship between the perception of the PGP and self-reported SWB was analyzed with structural equation modelling (SEM). Structural equation modelling is mainly a verifiable method, and it is designed to test the causal path relationship between the latent variables that cannot be measured directly [55]. structural equation modelling contains a measurement model and a structural model; the measurement model is confirmatory factor analysis (CFA) in essence [56] (Equation (1)), and the structural model is used to measure the relationship among latent variables (Equation (2)) [57]. Altogether, three matrix equations are proposed:

$$X = \Lambda_X \xi + \delta, Y = \Lambda_Y \eta + \varepsilon \quad (1)$$

where X is the vector of observational variables of exogenous latent variables, Y is the vector of observational variables of endogenous latent variables; ξ is the vector of exogenous latent variables, η is the vector of endogenous latent variables; Λ_X and Λ_Y are the factor-loading matrices; δ and ε are errors.

$$\eta = B\eta + \gamma\xi + \zeta \quad (2)$$

where B is the relationship between the endogenous latent variables; γ is the effect of the exogenous latent variable on the endogenous latent variable; and ζ is a residual term.

The analytical procedure was as follows: (1) measurement model and Cronbach’s alpha were used to test the validity and reliability; (2) correlation analysis; (3) analyzed the structural model to examine the statistical significance of the paths between the independent and dependent variables; and (4) mediation analysis to identify the relationship between the perception of PGP and farmers’ SWB. Basic statistics and reliability of the data were made by IBM SPSS 20.0, and SEM analysis was performed using the IBM Amos 24.0.

2.6. Measurement Model

To assess the fit of the measurement model, the most used indexes were chi-square divided by degrees of freedom (χ^2/df), comparative fit index (CFI), Tucker–Lewis index (TLI), incremental fit index (IFI), and the root mean square error of approximation (RMSEA). These indexes were applied to assess the measurement model in this study. The measurement model was estimated using a maximum likelihood estimation method, and the initial model showed a good fit to the data (see Table 2).

The validity and reliability should meet the recommended criteria (factor loading > 0.5 and Cronbach’s alpha > 0.50) [58–60]. All latent variables that met a threshold of alpha and items that did not meet this minimum factor loading criteria were removed from further analysis, thus, the items “PGP increased household income”, “PGP improved living standards”, and “the household income of the past year” were removed from the further analysis. Dropping these items revealed that the measurement model had a better fit than the initial model and the fit indices indicated an acceptable range based on the suggested threshold values (see Table 2). The factor loading coefficients of each

observed variable on the corresponding latent variables were statistically significant. Results of the CFA can be found in Table 3.

Table 2. Measurement model fit indexes.

Goodness of Fit Measure	Index (Initial Model)	Index (Modified Model)	Cut-off Criteria
χ^2/df	1.710	1.390	≤ 3.00
IFI	0.934	0.977	≥ 0.90
CFI	0.931	0.976	≥ 0.90
TLI	0.908	0.963	≥ 0.90
RMSEA	0.053	0.039	≤ 0.08

Note: Cut-off criteria come from Reference [55]; modified model removed the items: “the household income of the past year”, “PGP increased household income”, and “PGP improved living standards” for the low factor loading. PGP: prohibited grazing policy, IFI: incremental fit index, CFI: comparative fit index, TLI: Tucker–Lewis index, RMSEA: the root mean square error of approximation.

Table 3. Modified measurement model result.

Variable	Factor Loading	Cronbach’s Alpha
<i>Perception of PGP</i>		0.62
Satisfaction with PGP	0.72	
PGP improved ecological environment	0.56	
The PGP subsidy is reasonable	0.51	
<i>Perception of Environment</i>		0.85
Satisfaction with environment	0.94	
Quality of environment	0.79	
<i>Perception of economic status</i>		0.55
Income level in your village	0.56	
Income and expenditure	0.69	
<i>Extroversion</i>		0.58
I see myself as extraverted	0.62	
I see myself as reserved quiet (reverse-scored)	0.69	
<i>Neuroticism</i>		0.62
I see myself as easily upset	0.71	
I see myself as emotional stable (reverse-scored)	0.66	
<i>Subjective well-being (SWB)</i>		0.71
Life satisfaction	0.81	
Happiness	0.87	

3. Results

3.1. Descriptive and Correlational Analysis

Prior to the structural model analysis, the descriptive statistics and the correlational analysis were examined. The descriptive statistics of major variables were provided in Table 4. To avoid the possible multi-collinearity, the correlation coefficient between independent variables should be <0.90 [61]; there was no multicollinearity problem between the variables. The correlations between variables were provided in Table 5.

Table 4. Descriptive statistics of major variables.

Variable	Mean	SD	Max	Min
<i>Perception of PGP</i>				
Satisfaction with PGP	4.07	0.92	5.00	1.00
PGP improved ecological environment	4.84	0.46	5.00	3.00
The PGP subsidy is reasonable	2.72	0.87	3.00	1.00
<i>Perception of Environment</i>				
Satisfaction with environment	4.22	0.70	5.00	2.00
Quality of environment	4.31	0.63	5.00	2.00
<i>Perception of economic status</i>				
Income level in your village	2.57	0.84	5.00	1.00
Income and expenditure	2.76	0.91	4.00	1.00
<i>Extroversion</i>				
I see myself as extraverted	3.41	0.91	5.00	1.00
I see myself as reserved quiet (reverse-scored)	3.82	0.72	5.00	1.00
<i>Neuroticism</i>				
I see myself as easily upset	2.92	1.11	5.00	1.00
I see myself as emotional stable (reverse-scored)	2.36	0.84	5.00	1.00
<i>SWB</i>				
Life satisfaction	7.70	2.02	10.00	1.00
Happiness	3.96	0.96	5.00	1.00

Table 5. Correlations of the variables.

Variables	1	2	3	4	5	6
1. Perception of PGP	1					
2. Environment	0.704 ***	1				
3. Economic status	0.312 **	0.106	1			
4. Extraversion	0.216 *	0.049	0.469 ***	1		
5. Neuroticism	−0.389 ***	−0.343 ***	−0.442 ***	−0.396 ***	1	
6. SWB	0.419 ***	0.293 ***	0.554 ***	0.453 ***	−0.475 ***	1

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.2. Structural Model Analysis

Using the maximum likelihood method, the optimal structure models in Figure 3 were supported with standardized regression paths and SMCs (R^2), and the structural models retained acceptable fit to the data (see Table 6). From Model 1, we could see that the perception of PGP ($p = 0.497$) and the perception of environment ($p = 0.527$) were not significantly related to farmers' SWB. However, when the path from the perception of PGP to SWB was removed (Model 2), the perception of environment ($p < 0.1$) was marginally significantly related to farmers' SWB. The other results between Model 1 and Model 2 were largely the same.

These two models explained 45% of the variance respectively in farmers' SWB, the major results of the Model 2 are presented in Table 7. For Model 2, the perception of PGP had significant effects on the perception of environment ($\beta = 0.678$, $p < 0.001$), economic status ($\beta = 0.326$, $p < 0.01$), neuroticism ($\beta = -0.459$, $p < 0.001$), and extraversion ($\beta = 0.246$, $p < 0.05$). The perception of PGP could explain above

the variables 0.46, 0.11, 0.21, and 0.06 variance, respectively. In addition, economic status ($\beta = 0.405$, $p < 0.001$), neuroticism ($\beta = -0.272$, $p < 0.01$), and extraversion ($\beta = 0.273$, $p < 0.01$) had significant effects on farmers' SWB.

Table 6. Structural model fit indexes.

Model Fit	$\chi^2/DF (p)$	IFI	TLI	AGFI	CFI	RMSEA
Model 1	1.841 (<0.05)	0.945	0.921	0.902	0.943	0.058
Model 2	1.817 (<0.05)	0.945	0.923	0.903	0.944	0.057
Cut-off criteria	$\leq 3 (\geq 0.05)$	≥ 0.90	≥ 0.90	≥ 0.90	≥ 0.90	≤ 0.08

Note: Cut-off criteria come from Reference [55].

Table 7. Path coefficients of structural Model 2.

			<i>b</i>	SE	β	<i>p</i> -Value
SWB	<—	Environment	0.411	0.240	0.125	0.088
	<—	Economic status	1.388	0.369	0.405	0.000
	<—	Neuroticism	−0.639	0.231	−0.272	0.006
	<—	Extraversion	0.951	0.331	0.273	0.004
Environment	<—	PGP	0.499	0.082	0.678	0.000
Economic status	<—	PGP	0.231	0.080	0.326	0.004
Neuroticism	<—	PGP	−0.473	0.097	−0.459	0.000
Extraversion	<—	PGP	0.171	0.072	0.246	0.017

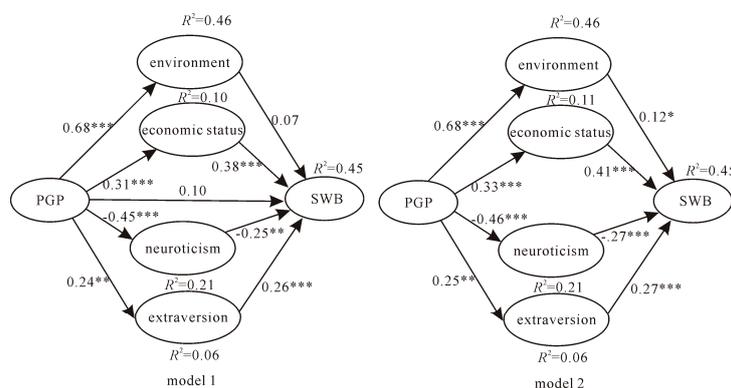


Figure 3. The results of structural model (standardized outcome). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3.3. Mediation Analysis

According to the results of the path analysis, there was a fully mediation effect in the relationship between the perception of PGP and farmers' SWB through other variables. The significance of the mediation effect was tested using the bootstrap estimation procedure in Amos 24. The standardized indirect effect, significance level and 95% confidence intervals are displayed in Table 8. As shown in Table 8, economic status, neuroticism, and extraversion (indirect effect: $\beta = 0.132$, $\beta = 0.125$, $\beta = 0.067$) were the significant mediators of the associations between the perception of PGP and farmers' SWB. However, the mediating role of the ecological environment was not significant ($p = 0.201$). The sum of the standardized indirect effect coefficient of the perception of PGP on farmers' SWB was 0.408 ($p < 0.01$).

Table 8. Mediation analysis of variables (Model 2).

Path	Indirect Effect β	Two Tailed p -Value	95% Confidence Intervals
PGP \rightarrow environment \rightarrow SWB	0.085	0.201	−0.037, 0.239
PGP \rightarrow economic status \rightarrow SWB	0.132	0.010	0.016, 0.351
PGP \rightarrow neuroticism \rightarrow SWB	0.125	0.011	0.022, 0.285
PGP \rightarrow extraversion \rightarrow SWB	0.067	0.046	0.001, 0.221
PGP \rightarrow SWB	0.408	0.002	0.238, 0.546

Note: Percentile confidence interval of bootstrap procedure using Amos 24, the number of bootstrap samples was 1000.

4. Discussion

In this study, 86% of participants were middle-aged or elderly people over 45 years old, and 70% of participants had not received secondary education. That the participants were older and had only received a lower education may be the consequence of rapid urbanization, as the young and educated are especially likely to leave their home villages for cities to seek better prospects. In China's rural areas, just in 2016, nearly 170 million peasant workers left their home villages and moved to cities, most of them were young and better educated [62]. In addition, the elderly and lower educated participants may also be associated with the selection of respondents, as there was only one participant in a household who was clear about the family in this research.

We found that farmers' mean life satisfaction was 7.70 (with a standard deviation of 2.02) in the rural areas of Yanchi County in 2018. The mean life satisfaction of China's rural areas and Yanchi County's rural areas were 6.70 and 6.90, respectively, using a 0–10 scale in 2013 [63], which were 7.00 and 7.18 when they were converted to a 1–10 scale. We could see that after five years of development, the farmers' mean life satisfaction was improved in Yanchi County. In past five years, the economic growth rate was 13.4%, and the farmer's per capita net income growth rate was 14.7% in Yanchi County. Wu et al. [64] revealed that the local economic growth rate has a positive effect on individuals' life satisfaction. Moreover, in this study, 86% of participants were middle-aged and elderly people, and the studies conducted by Neiss et al. [65] and Thomsen et al. [66] showed that elderly people report less negative effects than young and find pictures to be more positive and arousing than younger participants.

The results of our study showed that the influence of the perception of PGP on farmers' SWB was completely mediated by economic status, neuroticism, and extraversion. The perception of the ecological environment was not a significant mediate variable between the perception of PGP and farmers' SWB. Among all latent variables, economic status was the most important factor affecting farmers' SWB with a standardized regression coefficient 0.405; this result indicates that farmers who have a relative higher income level than other villagers and save money have a higher SWB. Subjective well-being was strongly affected by relative income, which is consistent with the existing results [67–69]. Asadullah et al. [70] stated that the rich only care about relative income, whereas poorer farmers' SWB in rural China is mainly affected by absolute income. However, in this study, the correlation between absolute household income and farmers' life satisfaction (happiness) was not statistically significant; there is the issue of income endogeneity which was not considered in this study [71]. In addition, the perception of PGP had the significantly positive influence on the farmers' economic status; this showed that the implementation of the PGP could bring about a relatively higher economic status to improve the farmers' SWB. After implementing the PGP, the farmers' economic benefits significantly increased through feeding sheep in the barn, large-scale breeding, a series of ecological subsidies, and engaging in non-agricultural production [72].

Neuroticism and extraversion were the second most important factors affecting farmers' SWB with standardized regression coefficients -0.272 and 0.273 , respectively. This indicated that lower neuroticism and higher extraversion are associated with higher SWB, which is consistent with previous results [46–48]. Additionally, the perception of PGP was found to have significantly positive influence on the extraversion and negative influence on the neuroticism, which brought significantly

positive indirect effects from the perception of PGP to farmers' SWB via neuroticism and extraversion. This result proved that investment in social institutions is one of the driving mechanisms of personality development [51].

The perception of the ecological environment was the least important factor affecting farmers' SWB among all latent variables in this study. Previous research held that there is a significantly positive relationship between environment quality and SWB [32,33,73,74]. In the current study, when we added the path from the perception of PGP to SWB, the perception of the environment was insignificantly related to farmers' SWB, and when we removed this path, the result became marginally significant ($p < 0.1$). This indicated that the direct effect from the perception of PGP to farmers' SWB might suppress the impact of the perception of the environment on farmers' SWB. However, the perception of PGP had the highest significant effect on the perception of environment ($\beta = 0.678$, $p < 0.001$), and accounted for 46% of the variance. The aims of PGP are to improve the ecological environment without reducing farmers' well-being in rural areas. The PGP has been implemented for more than 16 years, in this period, the grassland ecosystems in Yanchi County North China has been well protected and vegetation has been significantly improved [3]; the PGP has preliminarily achieved the goal of improving ecological environment. As for the perception of the ecological environment, it was not a significant mediate variable between the perception of PGP and farmers' SWB; this showed that people adapt easier to the improvement of the environment to some extent, and previous studies revealed that people adapt to most conditions very quickly [40].

Further research has held that SWB is malleable at both the individual and societal level [75]. Thus, the findings of the current study have some clinical implications for stakeholders and policy makers. On the one hand, the PGP had significantly positive indirect impacts on SWB. In view of the ecological environment vulnerability of Yanchi County, it may be crucial to continue the ecological policy for maintaining or further improving the ecological environment. On the other hand, to ensure the further smooth implementation of the PGP, policy makers should improve the farmers' perception of PGP, enhance farmers' satisfaction with PGP, and improve farmers' economic status. In order to improve farmers' economic status, policy makers should not only raise ecological compensation, but also, and more importantly, strengthen the production skills training of farmers and increase the accumulation of farmers' livelihood capital [76]. In addition, further research on how to improve farmers' satisfaction with the PGP is needed. At last, with the rapid economic development and urbanization process, and the changes in agricultural production modes, many young rural laborers have transferred to the city which has markedly increased their standard of living [77]. According to Hou et al. [3], the living standards of the farmers in the ecological policy implementation areas are forecasted to greatly improve in the future. With the aging of the rural population, whether it is necessary to implement such strict ecological policy in the future still needs further study.

The increase of farmers' satisfaction with the PGP, ecological environment, and ecological subsidy could improve farmers' SWB. However, previous studies have shown that the improvement of satisfaction with the PGP and the increase in household income through ecological subsidy does not mean that the PGP could be implemented well [78], and there is a widespread phenomenon of stealing grazing among sheep farmers in the PGP areas. The research by Lu et al. [79] showed that the main obstacles to the sustainability of the PGP are the changes in farmers' income after the implementation of the policy, their stealing behavior, the importance of the perceptions of farmers to the environment, and farmers' satisfaction with the PGP. The primary purpose of the PGP is to restore and protect the grassland ecology, thus, in addition to providing appropriate subsidies and improving the satisfaction of PGP, it is necessary to strengthen policy advocacy, supervision, and management in the PGP areas. The PGP areas in China are generally poverty and the farmers are the vulnerable group among them, so the reasonable compensation standard of the PGP should be constituted in line with local conditions to eliminate the driving factors of destroying grassland. The government should also strengthen the propaganda of ecological policy to improve the farmers' perception of the importance of grassland protection, which could make farmers actively participate in the PGP.

In addition, for the smooth implementation of ecological policy, it is necessary for the government to supervise and manage it well. In sum, the above factors mentioned should be considered when policy makers design similar environmental programs.

5. Conclusions

The purpose of the current study was to identify the relationship between the perception of the PGP and farmers' SWB using survey data in rural Yanchi County. From the investigation we found that due to the rapid urbanization and economic growth, the participants were generally older and the farmers' mean life satisfaction improved over the past five years in Yanchi County. The results of SEM showed that there was a full mediation effect in the relationship between the perception of the PGP and farmers' SWB through other variables. The results of this study could provide useful suggestions for the smooth implementation of the policy and future research.

Author Contributions: Conceptualization, L.Z. and W.W.; Data analysis and writing of original draft, W.W.; Visualization, Y.S.; Writing–review, L.Z., G.Y., Y.S. and Y.C.; Supervision: Y.C.; Funding acquisition, G.Y.

Funding: This paper was financially supported by the National Key Research & Development Program of China (2018YFA0606402), the National Natural Science Foundation of China (No. 41671187, No. 41601587, and No. 41807519).

Acknowledgments: The authors thank Ya Wang, Cuizhen Xia, Hui Liu, Mengli Wang, Xiao Feng, and the anonymous reviewers, as well, for their useful recommendations.

Conflicts of Interest: The authors declare that they have no conflict of interest.

Abbreviations

The following abbreviations are used in this manuscript:

PGP	prohibited grazing policy
SWB	subjective well-being
SEM	structural equation modelling
CFA	confirmatory factor analysis
CRP	conservation reserve program

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