

# Factors Influencing The Mutual-Support Willingness and Needs Among The Rural Elderly in China: A Cross-Sectional Study

**Ke-ru Yao**

University of South China

**Xin-hong Yin** (✉ [466844009@qq.com](mailto:466844009@qq.com))

University of South China

**Luo Qin**

University of South China

**Xi Tang**

University of South China

**Xiu-zhu Tan**

University of South China

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## Research Article

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## Abstract

# Background

This study aimed to assess the influence factors of mutual-support eldercare willingness and identify the eldercare requirements of elderly living in rural areas of Hunan Province, China.

## Methods

Using Chi-square test and logistic regression to analyze factors influencing Participants' eldercare and the needs for mutual-support eldercare.

## Results

Factors influencing the mutual-support willingness and needs included individual characteristic, family security and so on. And rural elderly's demand for mutual support at a relatively high level. The total score on the social support for the aged was  $36.944 \pm 6.487$ , at a moderate level.

## Conclusions

It is necessary to objectively evaluate the factors related to mutual-support eldercare willingness and needs, and take steps to enhance social support and meet elderly the needs of mutual- support eldercare, which is of great significance for improving the happiness of the elderly in their later years and alleviating the crisis of population aging in China.

## Background

China has the world's largest elderly population. At the end of 2019, the number of elderly people aged 60 and over in China reached 254 million, accounting for 18.1% of the total population [1]. The report forecast that in 2050, there will be approximately a 483 million people aged 60 and over in China, accounting for about 34.1% of the total population[2].A large population base and rapid development are typical characteristics of China's population aging. The continuous growth of the aging population has increased the burden of old-age care in China. Among all the elderly, rural elderly account for more than half, due to the acceleration of our country's urbanization and the transfer of young and middle-aged rural labor, the power of migration to cities has made the rural population age faster than urban cities and rural areas are also facing serious problems of aging [3]. For rural communities, with the development of the economy and society, the general situation is that the villages are hollowed out, the population is aging, households are empty, and lives are impoverished [4]. Thus, the eldercare needs of older adults will grow substantially. However, the shortage of caregivers is a big challenge in China [5]. It is necessary to build an eldercare method that is universally applicable in rural areas and can be flexibly adjusted in various

regions. At present, based on the practice of supporting, self-help, and mutual assistance in elderly care around the world, three mainstream elderly eldercare models have been summarized: “family eldercare”, “community eldercare” and “institutional eldercare” [6]. Studies have shown that in China, the major concerns toward family eldercare are lack of care ability and separation of family members, whereas those toward institutional eldercare are unaffordable services and fear of being abandoned by the children. The major concerns toward community eldercare include affordability and lack of necessary services [7]. The model of mutual-support eldercare was first proposed by foreign countries. Judging from the current practice, the main international mutual-support eldercare models include the “time bank” [8], the social participation mutual-support eldercare in the United States [9], and the mutual-support eldercare of community residents in Japan [10]. In China, mutual-support eldercare was first explored in Qiantun Village, Feixiang County, Handan City, Hebei Province in 2008[11]. The concept of mutual-support eldercare has been introduced and implemented in China until now, there are three main models of mutual-support eldercare in China: the first is the service and time-saving model in urban communities, the second is the mutual-support eldercare in rural communities, and the third is the mutual-support eldercare in institutions [12].

For the time being, the application and promotion of mutual-support eldercare in rural areas are not enough. Many rural elderly people have never even understood the knowledge related to mutual-support eldercare, it may be related to the lack of in-depth publicity and inadequate explanations about mutual-support eldercare. A study shows that about a quarter of China's elderly, 28% in rural areas and 22% in urban areas, do not meet their needs for help in personal activities in their daily life [13]. Some studies show there is a contradiction in time and content between the demand and supply of mutual-support eldercare for the aged. Among them, medical care is the most shortage [14]. The willingness of the elderly in rural areas to receive mutual-support eldercare is low, awaiting further development [15].

Therefore, learning the attitude or willingness of the rural elderly towards mutual-support eldercare is vital for informing the development of social eldercare and health promotion programs and related policies that can enhance the elderly's life satisfaction and quality of life. Identifying the influencing factors associated with willingness and needs is important for dividing the rural elderly into different categories. It can contribute to the more rational allocation of eldercare resources and to satisfying their needs.

## Methods

### Survey methods

Rural elderly: elderly people with registered residence in agriculture and over 60 years of age living in the rural area. This was a cross-sectional study. The study used a convenience sampling method. The participants were 2,167 elderly people aged 60 years or older from Hunan province in China. The study was conducted from September 2020 to March 2021.

The electronic questionnaire was distributed to the potential participants by Wechat(Free applications for instant messaging services for smart terminals) promotion of responsible person in different regions, all investigators had received consistent training before the investigation, those who agree to participate in the survey can fill in the questionnaire online, the elderly who are illiterate or difficult to fill in will be assisted by volunteers or their families. And the respondents' answers were collected by Questionnaire star (A website for online questionnaire filling and collection) after they had completed.

## Measurements

The Electronic questionnaire consisted of a general information questionnaire (items included "Individual characteristic factors", "Family security factors", "Economic security factors", and "Medical security factors"). Questionnaire on willingness and demand of mutual support for the aged (items corresponding to "Daily life care service needs", "Health service needs", "Spiritual comfort service needs", "Entertainment and learning needs"), and Social support rating scale (SSRS). In this study, the Social support rating scale was used to measure the social support of the participants[16]. It consists of 10 items with a total score ranging from 12 to 66; a higher score indicates a higher level of social support. A score of SSRS  $\leq$  22 is considered as poor social support, one between 23 and 44 as moderate social support, and one between 45 and 66 scores as indicating adequate social support. There are three dimensions included, objective support, subjective support, and support utilization. Objective support reflects individual social networks and received instrumental and emotional support in the past. Subjective support represents individual subjective perceptions, such as the emotional experience of being respected, supported, and understood. Support utilization explains how to seek and use social support[16]. Since its establishment in 1986 by Xiao Shuiyuan, the SSRS has been applied in many studies in China. The predictive validity of SSRS is high. To ensure the validity of the questionnaire contents, items that matched the purpose of this study were carefully selected from past studies. The reliability of the questionnaire was evaluated by pretesting it in 50 elderly people aged 60 years or older. The retest coefficients of the second and third sections were 0.800, 0.89–0.94, respectively, while the Cronbach's  $\alpha$  coefficients were 0.934, and 0.920, respectively.

## Analysis procedures

Statistical analyses were performed with SPSS software (Statistical Product and Service Solutions, SPSS: An IBM Company, version 22.0, IBM Corporation, Armonk, NY, USA). Sociodemographic characteristics and responses to each question were described using frequencies and percentages. Spearman correlative analysis was conducted to assess the correlation about dimensions of mutual-support needs, and correlation with the mutual-support willingness (unwilling, be willing) and needs (low, moderate, high). Chi-square test was used to examine associations between willingness to receive mutual-support eldercare and individual characteristics variables, social support, and mutual-support needs. Factors associated with mutual-support eldercare or mutual-support needs were identified by using multiple logistic regression, which included variables that were statistically significant at the nominal two side  $P < 0.05$  level in the above univariate analyses. Odds ratio (OR) and 95% confident interval (CI) were used to quantify associations.

## Results

The electronic questionnaire was agreed by Participants first and then fill in, and 2,167 were returned. Questionnaires were all completed, but some were incomplete filling, so 65 questionnaires were excluded from the study. As a result, 2,102 (97%) valid questionnaires were analyzed.

## Characteristics of the participants and descriptive statistics of each

### Variable

Participants' characteristics appear in Tables 1 and 2. About the characteristics of the participants, 1243(59.1%) were aged between 60 and 70 years, and 626(29.8) were aged between 70 and 80 years, 233(11.1) were aged over 80 years. And the overall sample contained women (57.2%) more than men. The majority of the respondents had only primary or no formal education. In addition, 72.7% of participants had married, and 52.4% can take care of themselves. Concerning nation, 88% of participants belong to Han nationality. Other characteristics of the participants' details can be found in Table 1. Participants were unwilling to participate in mutual support pension after understanding the mutual support model was 13.2%, most of them took a positive attitude towards mutual support pension. The mean score on the demand for mutual support for the aged was  $66.37 \pm 14.396$ , which means that there is a mutual-support demand for rural elderly. The score on the SSRS (Social support rating scale) was  $36.944 \pm 6.487$ , and most of the participants(86.4%) were in moderate social support (22–44) (Table 7).

## Factors influencing mutual-support willingness among rural elderly

Participants were generally willing or willing to participate in mutual support pension after understanding the mutual support model was 86.8%, most of them took a positive attitude towards mutual support pension. Using Chi-square test to select meaningful independent variables to enter regression model. The results showed that mutual-support willingness differed significantly by Individual characteristic (nation, marital status, Physical condition), Family security (number of children, who cares for life, relationships among family members, family support), economic security(source of income, satisfaction with the current economic situation), medical security(Self-assessment of health status, current diseases, regular physical examination, health knowledge needs, medical accessibility), and mutual-support behavior (government support, accept others assistance, help others). Logistic regression was conducted to determine the factors affecting mutual-support willingness. Finally, there are nine variables in the regression model equation. "Marital status", "Who cares for life", "Satisfaction with the current economic", "Relationships among family members", "family support", "mutual support needs" and so on were related to a mutual-support willingness among rural elderly (see Table 4). These show that the willingness of mutual-support participation was higher for older people who relationships harmonious with family members, had family support or government support, be willing to help others, or accept other

pension assistance. And marital status, who cares for life, Satisfaction with the current economy, the regular physical examination also influencing Participants' mutual-support willingness. The willingness of mutual-support participation was higher among persons who are married (OR = 2.353, 95% CI = [1.019–5.436],  $p < 0.05$ ) compared with those unmarried. The willingness of mutual-support participate was higher among persons who are took care my spouse (OR = 2.955, 95% CI = [1.532–5.699],  $p < 0.05$ ) or Children (OR = 3.051, 95% CI = [1.565–5.946],  $p < 0.05$ ) compared with those cares by themselves. The mutual-support willingness of participants who had regular physical examination (OR = 1.382, 95% CI = [1.008–1.894],  $p < 0.05$ ) is 1.382 times that without physical examination.

## **Factors influencing mutual-support needs among rural elderly**

Table 3 shows the correlation of mutual-support needs four dimensions. Each dimension was significantly correlated. Table 4 shows that the scores of mutual support for the rural elderly. The total average score of rural elderly's demand for mutual support was  $66.37 \pm 14.396$ . The daily life care service needs scores were lowest among the four dimensions, was  $14.620 \pm 6.143$ . And with the health service needs score being the highest which was  $17.390 \pm 1.080$ . The elderly in this study scored relatively higher on health service needs, probably due to the shortage of medical and health resources in rural areas. Regarding items in spiritual comfort service and entertainment and learning, subjects also have demands of their life. Using Chi-square test to select meaningful independent variables to enter regression model. The results showed that mutual-support needs differed significantly by Individual characteristic (age, sex, education level, marital status, physical condition), Family security (number of children, who cares for life, relationships among family members), economic security(source of income, satisfaction with the current economic situation), medical security(Self-assessment of health status, current diseases, regular physical examination, health knowledge needs, medical accessibility), and mutual-support behavior (government support, accept others assistance, help others). Logistic regression was conducted to determine the factors affecting mutual-support needs. Finally, there are seven variables in the regression model equation. "age", "sex", "physical condition", "health knowledge needs", "medical accessibility" and so on were related to mutual-support needs among rural elderly (see Table 4). These show that participants who were increased in age, male, poor self-care ability, serious illness can not be treated in time, willing to accept other pension help had higher mutual-support needs. The need for mutual support was higher among persons who are aged more than 80 years old (OR = 0.631, 95% CI = [0.418–0.955],  $p < 0.05$ ) compared with those aged 60 to 70 years old. The needs of mutual-support was lower among persons who are partially self-care (OR = 2.097, 95% CI = [1.008–4.365],  $p < 0.05$ ) or can take care of themselves (OR = 2.224, 95% CI = [1.767-2.800],  $p < 0.05$ ) compared with those can't take care of themselves. The mutual-support needs of participants who were female (OR = 0.771, 95% CI = [0.627–0.947],  $p < 0.05$ ) is 0.771 times that male(see Table 6).

## **Social support affecting mutual-support willingness and needs among rural elderly**

The total score on social support for the aged was  $36.944 \pm 6.487$ , 86.4% at a moderate level. The subjective support score was relatively high. Social support affecting Participants' mutual-support willingness. And the results show that the higher the degree of social support, the more inclined to participate in mutual-support pension(see Table 7).

Table 1  
Univariate analysis of Chi-square test about the mutual-support willingness

Characteristic		n = 2102(%)	General and be willing n (%)	P- value	
<b>Individual characteristic</b>	60–70	1243(59.1)	1089(87.6)	0.417	
	Age (years)	70–80	626(29.8)		535(85.5)
		80~	233(11.1)		201(86.3)
Sex	Male	899(42.8)	777(86.4)	0.346	
	Female	1203(57.2)	1048(87.1)		
nation	Minority nationality	252(12.0)	202(80.2)	0.001	
	Han nationality	1850(88.0)	1623(87.7)		
Education level	Illiteracy	375(17.8)	325(86.7)	0.600	
	primary school	921(43.8)	807(87.6)		
	Secondary and higher	806(38.3)	693(86.0)		
marital status	Never married	89(4.2)	76(85.4)	<0.001	
	Married	1528(72.7)	1354(88.6)		
	Divorced	63(3.0)	34(54.0)		
	Widowed	422(20.1)	361(85.5)		
The physical condition	can't take care of oneself	54(2.6)	38(70.4)	<0.001	
	Partially self- care	863(41.1)	728(84.4)		
	Can take care of oneself	1185(56.4)	1059(89.4)		
<b>Family security</b>					
Number of children	0	42(2.0)	36(85.7)	<0.001	
	1	298(14.2)	237(79.5)		
	2 or more	1762(83.8)	1552(88.1)		
Who cares for life	Oneself	707(33.6)	628(88.8)	<0.001	
	spouse	938(44.6)	850(90.6)		

Characteristic		n = 2102(%)	General and be willing n (%)	P- value
	children	384(18.3)	299(77.9)	
	Others	73(3.5)	63(65.8)	
Relationships among family members	Not harmonious	132(6.3)	72(54.5)	<0.001
	General harmony	482(22.9)	397(82.4)	
	harmonious	1488(70.8)	1356(91.1)	
Does the family support mutual support	not support	222(10.6)	126(56.8)	<0.001
	General support	820(39.0)	719(87.7)	
	support	1060(50.4)	980(92.5)	
<b>Economic security</b>				
Average monthly income	Less than 200 yuan	975(46.4)	845(86.7)	0.866
	200 to 500 yuan	454(21.6)	392(86.3)	
	Over 500 yuan	673(32.0)	588(87.4)	
source of income	Subsistence allowances or pension	742(35.3)	630(84.9)	0.003
	Income from labor	457(21.7)	413(90.4)	
	From children	697(33.2)	604(86.7)	
	Other sources	206(9.8)	178(86.4)	
Satisfaction with the current economic situation	No	339(16.1)	244(72.0)	<0.001
	General	956(45.5)	861(90.1)	
	Yes	807(38.4)	720(89.2)	
<b>Medical security</b>				
Self-assessment of health status	Unhealthy	392 (18.6)	305(77.8)	<0.001
	Suboptimal	889(42.3)	788(88.6)	
	healthy	821(39.1)	732(89.2)	

Characteristic		n = 2102(%)	General and be willing n (%)	P-value
Current diseases	No disease	731(34.8)	652(89.2)	0.049
	One or two disease	1092(52.0)	938(85.9)	
	Three or more	279(13.3)	235(84.2)	
Regular physical examination	No	1287(61.2)	1134(88.1)	0.029
	Yes	815(38.8)	691(84.8)	
Health knowledge needs	No	282(13.4)	183(64.9)	<0.001
	General	934(44.4)	837(89.6)	
	Yes	886(42.2)	805(90.9)	
Medical accessibility (Whether serious illness can be treated in time)	No	573(27.3)	459(80.1)	<0.001
	Yes	1529(72.7)	1366(89.3)	
<b>mutual-support behavior</b>				
government support	No	535(25.5)	398(74.4)	<0.001
	Yes	1567(74.5)	1427(91.1)	
Accept others assistance	No	261(12.4)	147(56.3)	<0.001
	General	955(45.4)	861(90.2)	
	Yes	886(42.2)	817(92.2)	
help others	No	197(9.4)	85(43.1)	<0.001
	General	937(44.6)	837(89.3)	
	Yes	968(46.1)	903(93.3)	
<b>mutual support needs</b>	Low	542(25.8)	440(81.2)	<0.001
	moderate	1210(57.6)	1082(89.4)	
	high	350(16.7)	303(86.6)	
<b>Social support</b>	Low	32(1.5)	17(53.1)	<0.001
	moderate	1815(86.3)	1567(86.3)	
	high	255(12.1)	241(94.5)	
<b>participate in mutual support after understanding</b>	No	277(13.2)		
	Yes	1825(86.8)		



Table 2  
Univariate analysis of Chi-square test about mutual-support needs

Characteristic		n = 2102(%)	moderate /high n (%)	P- value	
<b>Individual characteristic factors</b>	60–70	1243(59.1)	883(71.0)	<0.001	
	Age (years)	70–80	626(29.8)		480(76.7)
		80~	233(11.1)		197(84.5)
Sex	Male	899(42.8)	644(71.6)	0.033	
	Female	1203(57.2)	916(76.1)		
nation	Minority nationality	252(12.0)	195(77.4)	0.393	
	Han nationality	1850(88.0)	1365(73.8)		
Education level	Illiteracy	375(17.8)	297(79.2)	<0.001	
	primary school	921(43.8)	687(74.6)		
	Secondary and higher	806(38.3)	576(71.5)		
marital status	Never married	89(4.2)	62(69.7)	<0.001	
	Married	1528(72.7)	1114(72.9)		
	Divorced	63(3.0)	47(74.6)		
	Widowed	422(20.1)	337(79.9)		
The physical condition	can't take care of oneself	54(2.6)	44(81.5)	<0.001	
	Partially self- care	863(41.1)	713(82.6)		
	Can take care of oneself	1185(56.4)	1059(89.4)		
<b>Family security factors</b>					
Number of children	0	42(2.0)	22(52.3)	<0.001	
	1	298(14.2)	228(76.5)		
	2 or more	1762(83.8)	1310(74.3)		
Who cares for life	Oneself	707(33.6)	499(70.6)	<0.001	
	spouse	938(44.6)	696(74.2)		

Characteristic		n = 2102(%)	moderate /high n (%)	P- value
	children	384(18.3)	299(77.9)	
	Others	73(3.5)	48(65.8)	
Relationships among family members	Not harmonious	132(6.3)	90(68.2)	0.001
	General harmony	482(22.9)	389(80.7)	
	harmonious	1488(70.8)	1081(72.6)	
Does the family support mutual support	not support	222(10.6)	157(70.7)	0.062
	General support	820(39.0)	602(73.4)	
	support	1060(50.4)	801(75.6)	
<b>Economic security factors</b>				
Average monthly income	Less than 200 yuan	975(46.4)	730(74.9)	0.125
	200 to 500 yuan	454(21.6)	345(76.0)	
	Over 500 yuan	673(32.0)	485(72.1)	
source of income	Subsistence allowances or pension	742(35.3)	560(75.5)	0.006
	Income from labor	457(21.7)	324(70.9)	
	From children	697(33.2)	526(75.5)	
	Other sources	206(9.8)	150(72.8)	
Satisfaction with the current economic situation	No	339(16.1)	251(74.0)	<0.001
	General	956(45.5)	750(78.5)	
	Yes	807(38.4)	559(69.3)	
<b>Medical security factors</b>				
Self-assessment of health status	Unhealthy	392 (18.6)	316(80.6)	<0.001
	Suboptimal	889(42.3)	692(77.8)	
	healthy	821(39.1)	552(67.2)	

Characteristic		n = 2102(%)	moderate /high n (%)	P- value
Current diseases	No disease	731(34.8)	491(67.2)	0.049
	One or two disease	1092(52.0)	840(76.9)	
	Three or more	279(13.3)	229(82.1)	
Regular physical examination	No	1287(61.2)	971(75.4)	0.142
	Yes	815(38.8)	589(72.3)	
Health knowledge needs	No	282(13.4)	182(64.5)	<0.001
	General	934(44.4)	666(71.3)	
	Yes	886(42.2)	712(80.4)	
Medical accessibility (Whether serious illness can be treated in time)	No	573(27.3)	469(81.8)	<0.001
	Yes	1529(72.7)	1091(71.4)	
<b>mutual-support behavior</b>				
government support	No	535(25.5)	397(74.2)	<0.001
	Yes	1567(74.5)	1163(74.2)	
Accept others assistance	No	261(12.4)	162(62.1)	<0.001
	General	955(45.4)	700(73.3)	
	Yes	886(42.2)	698(78.8)	
help others	No	197(9.4)	143(72.6)	<0.001
	General	937(44.6)	677(72.3)	
	Yes	968(46.1)	740(76.4)	
<b>Social support</b>	Low	32(1.5)	16(50.0)	0.006
	moderate	1815(86.3)	1351(74.4)	
	high	255(12.1)	193(75.7)	
<b>participate in mutual support after understanding</b>	No	277(13.2)	175(63.2)	<0.001
	Yes	1825(86.8)	1385(75.9)	
<b>mutual support needs</b>	Low	542(25.8)		
	moderate	1210(57.6)		

Characteristic	n = 2102(%)	moderate /high n (%)	P- value
High	350(16.7)		

Table 3  
Demand score of mutual support for the aged

	1	2	3	4	mutual- support needs	Social support
1. Daily life care	1	0.494***	0.496***	0.375***		
2. Health service	0.494***	1	0.672***	0.542***		
3. Spiritual comfort	0.496***	0.672***	1	0.760***		
4. Entertainment and learning	0.375***	0.542***	0.760***	1		
5. mutual-support willingness					0.068**	0.118***
Note. Report Spearman's correlation coefficients.						
*p < .05. **p < .01. ***p < .001						

Table 4  
Demand score of mutual support for the aged

Project	Item score	score(Mean ± SD)
Daily life care service needs	5.000	<b>14.620 ± 6.143</b>
1.Purchasing daily necessities	5.000	2.80 ± 1.103
2. Physical work	5.000	3.10 ± 1.117
3. Washing and cooking	5.000	2.77 ± 1.101
4. Cleaning	5.000	2.79 ± 1.106
5. Agency service	5.000	3.16 ± 1.158
Health service needs	5.000	<b>17.390 ± 1.080</b>
1. Escort to the hospital when sick	5.000	3.16 ± 1.158
2. Take care of by others when sick	5.000	3.59 ± 1.036
3. Help to measure blood pressure or blood sugar regularly	5.000	3.69 ± 0.963
4. Remind to take medicine	5.000	3.44 ± 1.013
5. Health knowledge popularization	5.000	3.51 ± 0.943
Spiritual comfort service needs		<b>16.370 ± 3.987</b>
1. Accompany and chat	5.000	3.51 ± 0.978
2. Participate in social activities	5.000	3.27 ± 0.987
3. psychological counseling	5.000	2.92 ± 1.049
4. Telephone care and greetings	5.000	3.36 ± 1.024
5. Accompany out for a walk	5.000	3.25 ± 1.022
Entertainment and learning needs		<b>15.930 ± 3.915</b>
1. Entertainment (chess, cards, etc.)	5.000	3.26 ± 1.045
2.Accompany to exercise	5.000	3.18 ± 1.024
3.Accompany to watch TV	5.000	3.12 ± 1.108
4.Attending lectures on health knowledge for the elderly	5.000	3.15 ± 0.995
5. Learning new things	5.000	3.31 ± 0.953
Demand score of mutual support		<b>66.37 ± 14.396</b>

Table 5  
Multivariate analysis of factors associated with the mutual-support willingness (n = 2102)

Variable	Unwilling n (%)	General + be willing n (%)	P- value	OR	95% CI
<b>marital status</b>			<b>0.004</b>	<b>0.769</b>	<b>0.643–0.921</b>
single	13(14.6)	76(85.4)		1	
married	174(11.4)	1354(88.6)	0.045	2.353	1.019–5.436
Divorce	29(46.0)	34(54.0)	0.084	1.428	0.954–2.138
Widowed	61(14.5)	361(85.5)	0.550	0.802	0.390–1.651
<b>Who cares for life</b>			<b>&lt;0.001</b>	<b>0.687</b>	<b>0.575–0.821</b>
oneself	79(11.2)	628(88.8)		1	
spouse	88(9.4)	850(90.6)	0.001	2.955	1.532–5.699
Children	85(22.1)	299(77.9)	0.001	3.051	1.565–5.946
Others	25(34.2)	48(65.8)	0.239	1.492	0.766–2.904
<b>Satisfaction with the current economic</b>			<b>&lt;0.001</b>	<b>1.178</b>	<b>1.029–1.479</b>
No	95(28.0)	244(72.0)		1	
General	95(9.9)	861(90.1)	0.005	0.525	0.334–0.826
Yes	87(10.8)	720(89.2)	0.002	0.824	0.834–0.979
<b>Relationships among family members</b>			<b>0.008</b>	<b>1.401</b>	<b>1.092–1.796</b>
Not harmonious	60(45.5)	72(54.5)	0.046	1	0.351–0.990
General	85(17.6)	397(82.4)	0.023	0.590	0.525–0.980
harmonious	132(8.9)	1356(91.1)		0.753	
<b>family support</b>			<b>&lt;0.001</b>	<b>1.743</b>	<b>1.400–2.17</b>
not support	96(43.2)	126(56.8)	<0.001	1	0.175–0.415
General	101(12.3)	719(87.7)		0.270	

Variable	Unwilling n (%)	General + be willing n (%)	P- value	OR	95% CI
Support	80(7.5)	980(92.5)	0.027	0.737	0.514–0.778
<b>Regular</b>	153(57.5)	113(42.5)	<b>0.014</b>	<b>0.670</b>	<b>0.487–0.921</b>
<b>physical examination</b>	124(15.2)	691(84.8)	0.045	1	1.008–1.894
No	137(40.9)	198(59.1)	<b>&lt;0.001</b>	1.382	<b>1.484–2.784</b>
Yes	140(8.9)	1427(91.1)	<0.001	<b>2.033</b>	0.335–0.634
<b>government support it</b>	114(43.7)	147(56.3)	<b>&lt;0.001</b>	1	<b>1.221–1.965</b>
No	94(9.8)	861(91.2)	<0.001	0.461	0.255–0.619
Yes	69(7.8)	817(92.2)	0.572	<b>1.549</b>	0.751–1.679
<b>Accept Other pension assistance</b>	112(56.9)	85(43.1)	<b>&lt;0.001</b>	1	<b>1.611–2.708</b>
No	100(10.7)	837(90.3)	<0.001	0.398	0.102–0.266
General	65(6.7)	903(93.3)	0.334	1.123	0.552–1.223
Yes	102(18.8)	440(81.2)	<b>0.007</b>	<b>2.089</b>	<b>1.098–1.783</b>
<b>help other</b>	128(10.6)	1082(89.4)	0.006	1	0.327–0.827
No	47(13.4)	303(86.6)	0.039	0.165	0.728–0.987
General				0.822	
Yes				<b>1.399</b>	
<b>mutual support needs</b>				1	
low				0.520	
moderate				0.918	
high					
<b>Social support</b>			<b>0.017</b>	<b>1.594</b>	<b>1.096–2.803</b>
low	15(46.9)	17(53.1)		1	
moderate	248(13.7)	1567(86.3)	0.005	0.192	0.061–0.604
high	14(5.5)	241(94.5)	0.032	0.731	0.394–0.857

Table 6  
Multivariate analysis of factors associated with mutual-support needs (n = 2102)

Variable	Low n (%)	moderate /high n (%)	P- value	OR	95% CI
<b>Age</b>			<b>0.011</b>	<b>1.250</b>	<b>1.053– 1.484</b>
60–70	360(29.0)	883(71.0)		1	
70–80	146(23.3)	480(76.7)	0.002	0.531	0.359– 0.783
80~	36(15.5)	197(84.5)	0.029	0.631	0.418– 0.955
<b>Sex</b>	255(28.4)	644(71.6)	<b>0.036</b>	<b>1.254</b>	<b>1.014– 1.550</b>
Male	287(23.9)	916(76.1)	.013	1	
Female	10(18.5)	44(81.5)	<b>&lt;0.001</b>	0.771	0.627– 0.947
<b>The physical condition</b>	150(17.4)	713(82.6)	0.048	<b>0.622</b>	<b>0.490– 0.790</b>
can't take care of oneself	382(32.2)	803(67.8)	<b>&lt;0.001</b>	1	
Partially self-care				2.097	1.008– 4.365
Can take care of oneself				2.224	1.767– 2.800
<b>Health knowledge needs</b>			<b>&lt;0.001</b>	<b>1.646</b>	<b>1.389– 1.952</b>
No	100(35.5)	182(64.5)		1	
general	268(28.7)	666(71.3)	<b>&lt;0.001</b>	0.442	0.319– 0.612
Yes	174(19.6)	712(70.4)	<b>&lt;0.001</b>	0.608	0.483– 0.766
<b>Medical accessibility (Whether serious illness can be treated in time)</b>			<b>0.002</b>	<b>0.639</b>	<b>0.481– 0.850</b>
No	104(18.2)	469(81.8)	<b>&lt;0.001</b>	1	1.376– 2.306
Yes	438(28.6)	1091(71.4)		1.782	
<b>Accept other pension assistance</b>	99(38.0)	162(62.0)	<b>&lt;0.001</b>	<b>1.397</b>	<b>1.168– 1.671</b>
No				1	

Variable	Low n (%)	moderate /high n (%)	P- value	OR	95% CI
General	255(26.7)	700(73.3)	<0.001	0.534	0.383– 0.745
Yes	188(21.2)	698(70.8)	0.046	0.792	0.630– 0.996
<b>participate in mutual support after understanding</b>	102(36.8)	175(62.2)	<b>&lt;0.001</b>	<b>1.964</b>	<b>1.419– 2.718</b>
No	440(24.1)	1385(75.9)	<0.001	1	0.439– 0.814
Yes				0.597	

Table 7  
Social support rating scale (SSRS)

Category	N Ratio (%)	Willing to mutual support	score(Mean ± SD)	P
Objective support			9.066 ± 2.783	
Subjective support			20.258 ± 3.954	
Support utilization			7.579 ± 2.019	
Social support			36.944 ± 6.487	<0.001
Low (≤ 22)	32(1.5)	17(53.1)		
Moderate (22–44)	1815(86.4)	1567(86.3)		
High (>45)	255(12.1)	241(94.5)		

## Discussion

This study contributes to a better understanding of the mutual-support willingness between mutual-support needs and social support. Most of the rural elderly hold a positive attitude towards mutual pension after understanding it. The higher the degree of social support, the stronger the willingness of rural elderly to participate in mutual pension. Rural elderly with mutual-support needs were more likely to take part in mutual pension. In general, we reach three main conclusions.

### Adequate Protection and Care

In this study, as for individual characteristic factors, there is no significant relationship between the willingness to participate in mutual support and the gender, age of the elderly. And the willingness to participate in mutual support was related to marital status, who cares for life, and satisfaction with economic conditions. From the perspective of age, most scholars believe that with the growth of age, the

physical strength and intelligence of the elderly gradually decline, which will lead to a decrease in the willingness to participate in mutual support [17]. From the perspective of educational level, scholars generally believe that with the continuous improvement of the educational level of the elderly, their willingness to participate in mutual support is higher [18]. The elderly with good health are more willing to participate in mutual support, the domestic multi mathematician's research shows that good health is the necessary condition for the elderly to participate in mutual support pension [19]. But, Xu Jiaming in the study of specific groups of the elderly, there is no significant relationship between the willingness to participate in mutual support and the gender, age, and educational background of the elderly [20]. The existence of spouses plays a necessary role in emotional support and stress relief for the elderly, making them more inclined to provide mutual assistance services 18. As for family security factors, relationships among family members and family support were significant with mutual support willingness. This result indicates that family members have an important influence on the decision of the elderly to participate in mutual support [21]. Rural family structure, lifestyle, cultural foundation, and emotional foundation make it possible to help each other and support each other, which has become a strong support for the operation of mutual support pension model. As for economic security factors, there is no significant relationship between the willingness to participate in mutual- support and the average monthly income of the elderly. And the willingness to participate in mutual support was related to the source of income, satisfaction with the current economic situation. In this study, the economy was relatively lower than those reported in the urban areas, signifying double influence among the rural elderly regarding mutual support willingness. First, economic condition is one of the important factors that restrict the mutual support participation of the elderly. Only by ensuring that the elderly have no financial worries and that the elderly participate in community mutual-support for the elderly, can they have no worries. But for the elderly without income, may be more inclined to get help, and their willingness to mutual support may be stronger. As for medical security factors, health status and medical accessibility have a significant on the decision of the elderly to participate in mutual-support pension. Most rural elderly have no regular physical examination habits and are inconvenient to go to the hospital. That means due to economic and environmental constraints, most of the rural elderly have fewer medical resources, and lots of them have no children around because of the transfer of young and middle-aged rural labor, so medical security was an important factor to influence the mutual-support willingness. Finally, clarified the influencing factors of rural elderly's willingness to participate in mutual pension and given them adequate protection and care to solve their worries about participating in mutual pension.

### **Maintain mutual-support needs service**

The total average score of rural elderly's demand for mutual support is at a relatively high level. And the demand for health services, Spiritual comfort services, and entertainment and learning needs is slightly higher than that daily life care service. The highest score was health service demand, which is consistent with the results of relevant studies [22–23], possibly due to the risk of disease. With the increase of age, the physical function of the elderly will degenerate and become more and more unpredictable. In recent years, more and more diseases will follow, and the demand for health services will be stronger. In terms of health service demand, the elderly in rural areas have the highest demand for medical escort and care

when they are sick. Due to the inconvenient transportation, low economic level, and insufficient primary health resources in rural areas, it is more difficult for the elderly to seek medical treatment, so the demand for medical escort is higher. Moreover, the long-term absence of the children of the empty nest elderly will inevitably affect the availability of their care resources. Even when they are sick, their children can't continue to care for them, and their physical condition is poor. The influence on the elderly is particularly prominent. Therefore, it is very important to solve the problem of rural pension by ensuring the needs of the elderly in rural areas, especially medical care and increasing investment in medical resources in rural areas and care for the elderly.

### **Strengthen social support**

The total score on social support for the aged was  $36.944 \pm 6.487$ , at a moderate level. And the higher degree of social support, the stronger willingness to participate in mutual support for the aged. Rosow held that the effectiveness of social support for the rural elderly decreased among children, neighbors, and friends, and when rural elderly fell ill, their neighbors would provide the most essential social support if their children were not around [24]. Walker and Hiller found that physical health and subjective well-being could be directly affected by perceptions of neighborhood relationships in the community. In other words, establishing a social support network in the community through reciprocal trust not only can make them feel more supported, but also improve their life satisfaction [25]. The rural elderly shared their experiences and knowledge and provided each other with necessary help through life or emotional support at the mutual-management stage, thereby developing new relationships to add to the support network, which also contributed to the significant increases in their SSRS scores. Take measures to improve social support for the elderly in rural areas, for improving the happiness of the elderly in their later years, promoting the development of rural pensions, and alleviating the crisis of population aging.

## **Conclusion**

In conclusion, a population of elderly in a rural area of China generally lack knowledge about the mutual-support pension. It is necessary to objectively evaluate the factors related to mutual-support willingness and needs of elderly living in rural districts, and take steps to enhance social support and meet their demand for mutual support. Health authorities in China and community health centers need to provide these older people with adequate interventions, such as promoting the rural mutual-support pension model, encouraging family members to provide more support for the elderly, and taking action to improve their care services. This study emphasizes the importance of social support and improved medical, health, and counseling services for rural elderly, which is of great significance for improving the happiness of the elderly in their later years, promoting the development of rural pensions, and alleviating the crisis of population aging in China.

## **Declarations**

### **Conflict of interest**

The authors declare no conflicts of interest.

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## **Authors' contributions**

Ke-ru Yao wrote the main manuscript text and Xin-hong Yin responsible for guiding and revising the main manuscript text. Ke-ru Yao, Qin Luo, Xi Tang, and Xiu-zhu Tan participated in the data collection, analysis, and interpretation. All authors reviewed the manuscript.

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## **Availability of data and materials**

Not applicable.

## **Ethics approval and consent to participate**

This study was approved by the Ethical Review Board of the Graduate School of Nursing of the Faculty of The University of South China. Concerning the protection of human rights, the participants were informed consent, and the questionnaire was completed anonymously. As for private information, it was clearly stated in the study description that individuals could not be identified and that the data would not be used for other purposes besides those explained. Our survey contained no hurtful questions. Finally, the participants were allowed to decide whether or not to be completed the questionnaire. They were allowed to decide to cease and quit the questionnaire answering process whenever they want.

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