

Factors Associated with Healthy Ageing among Chinese Rural Empty Elderly Nesters and Future Focus of Health Services

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Research article

Keywords: healthy aging, CREEN, physical health, ability of daily activities, psychological well-being, social participation

Posted Date: February 11th, 2020

DOI: <https://doi.org/10.21203/rs.2.23206/v1>

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Abstract

Background Like most countries in the world, China is stepping into an aging society and Healthy aging (HA) faces great challenges. Chinese rural empty elderly nesters (CREEN) as the vulnerable groups of ageing populations, providing health services for CREEN needs more attention and guidance.

Methods Using the method of logistic regression, four dimensions of HA among 618 respondents were separately analyzed based on the fifth public panel data of the China Health and Retirement Longitudinal Study (CHARLS).

Results 41.42% respondents met the recommended good physical health (PA), 'being literate', 'expectation of receiving long-term care in the future from family', and 'good physical health of grown children' were significant protective factors for PA. 83.17% respondents had good daily activity level, 'aged under 60 years' and 'grown children being literate' were significant protective factors while 'CREEN once lived with grown children' was a significant risk factor. 59.39% respondents had good psychological health, 'Male sex', 'Expectations of receiving long-term care in the future', and 'Physical health of grown children' were significant protective factors. 36.73% respondents met the corresponding criteria of good social participation, 'aged under 60 years' was a significant protective factor while 'CREEN once lived with grown children' was also a significant risk factor.

Conclusions For the CREEN, social participation, physical health and psychological health should be the focus and direction of providing health services. One factor could have different influence on different aspects of HA among CREEN. When health services are provided for CREEN, the second focus should assess comprehensive impact and do the long-term observation. Providing health services for CREEN should not only focus on 'What they have' and 'What they don't have', but also focus on 'What they have and then lose', especially factors associated with their grown children. Those points should be the future focus of health services for CREEN.

1. Background

According to the fifth census of China, by the end of year 2000, the number of the elderly people aged 60 years and over in rural China had reached 100 million, accounting for 77.52% of the total older population. By 2030, China's aging population will be close to 300 million, and the proportion of empty elderly nesters may reach 90%. Amid such rapid ageing, the traditional family pension mode and rural aged care projects have led to immense pressure and numerous challenges [1]. Those empty elder nesters lived alone and usually got little economical and emotional support. In recent years, the tragedies of CREEN (suicide, poor health, etc.) are frequent, which has attracted the attention of Chinese society and public health. Therefore, promotion of healthy ageing and support for improving the health of CREEN has been an important task [2–3]. In this regard, the idea that daily physical and psycho-social conditions are associated with the health development and reduction of suicide rate of Chinese rural elderly people is receiving increasing attention [4].

However, many previous studies focused on the elderly population in urban areas of China, like Beijing, Shanghai, Guangzhou, etc. China's rural areas are too large and the population is too scattered to carry out questionnaire survey and data collection [5]. By 2020, there will still be many older adults in rural areas living below the poverty line. Therefore, rural older populations have no time and are reluctant to work with researchers. Only national-grade research will cover most of China's rural areas [6].

But just like the China Central Television (CCTV) national survey in 2012, there was only one question: are you happy? Such an investigation has aroused widespread public discontent. Only using the single questionnaire (Are you healthy? Excellent, Good, Poor) was unable to satisfy the detection of the health of CREEN. This was also limitation in the past studies [7]. Therefore, national and multidimensional survey and research like CHARLS was necessary. Multidimensional aspects of HA should be assessed. Referring to the past research, there are four basic aspects of HA, including physical health, ability of daily activities, social participation and psychological health [8–12].

Then for the factors associated with HA, the characteristics of older adults like sex, age, residence, educational status and marital status have been reported to be related [13]. This study will also focus on these variables. Also, it has been conclusively shown that lower levels of healthy development and lack of support from family members were significant [14–16]. In most cases, relying on one's offspring for security in old age was highly risky. Especially in the past three decades, numerous rural youth had moved to cities, while their parents experienced the empty nest symptom [17]. Support from grown children need to get more attention [18]. If CREEN once lived with their grown children (grandchildren) and then separated (or hard to see each other), it could be negative effects on HA. So we will try to consider adding variables related to grown children for further exploration this time.

Therefore, we had the main hypotheses in this study. Health services should be prioritized in different aspects of HA among CREEN. Influence of a factor would change for different aspects of HA, systematic and long-term impacts and support from their grown children needed to be considered when health services for CREEN were provided.

2. Methods

2.1. Study design and data collection

The analysis was based on the fifth public panel data collected as part of the China Health and Retirement Longitudinal Study (CHARLS). CHARLS was a nationally representative study of China and initiated officially in 2011. The data used in this study was approved by the Institutional Review Board of Peking University Health Science Center. All participants provided their written informed consent before completing the interview. The sample is a multistage, stratified random sample recruited from the county, neighbourhood, and household levels [19-23]. It was designed to provide comprehensive information of

health and the data is publicly available [24]. For the purpose of this study, we included data of CREEN from CHARLS 2015.

The dependent variable (Health Ageing) consisted of four aspects, including 'Good physical health' (Y1), 'Good daily activity level' (Y2), 'Good psychological well-being' (Y3), and 'Good active social participation' (Y4).

In this study, Y1 was defined as 'no disability and no more than two chronic diseases'. Y2 was evaluated by Activities of Daily Living (ADL) Scale, which included 10 specific evaluation indicators (such as drinking, dieting, clothing, housing, and shopping). Each indicator was acquired using a self-anchoring scale ranging from 0 (Very poor) to 5 (Excellent). Respondents who reached the first three levels (Excellent, Very good, Good) were considered to have good daily activity level (Value=1). The validity of scale was considered acceptable based on the result of Cronbach's α coefficient ($\alpha = 0.79$).

Y3 consisted of 10 specific indicators (such as presence/absence of depression). Validity of the scale was also considered acceptable based on Cronbach's α coefficient ($\alpha = 0.786$). Y4 evaluated included a series of social activities (such as helping their neighbour). Actively participating in at least one of them (reaching the first level, very active) was considered as yes (Value=1). Cronbach's α coefficient ($\alpha = 0.771$) also showed acceptable validity of scale.

The independent variables were 'Sex' (X1, Male = 0, Female = 1), 'Age' (X2, Age under 60 years = 0, Age over 60 years = 1), 'Literacy status' (X3, Literate = 0, Illiterate = 1), 'Marital status' (X4, Married = 0, Other status = 1), 'Expectations of receiving long-term care from grown children in the future' (X5, Yes = 0, No = 1), 'Literacy status of grown children' (X6, Literate = 0, Illiterate = 1), 'Grown children once lived with CREEN, Yes = 0, No = 1), 'Marital status' (X8, Married = 0, Any other status = 1), 'Physical health of grown children' (X9, Good = 0, Poor = 1), 'Housing property status of grown children' (X10, At least one house = 0, No house yet = 1) and 'CREEN once provided care for grandchildren' (Yes = 0, No = 1).

2.2. Statistical analyses

As reported in Table 1, there were 256 respondents (41.42%) who reached the physical criteria. Second, most CREEN (514, 83.17%) had good ability of daily activities. Compared with “Good physical health”, the proportion (59.39%) of the elderly who achieved the criteria of “Good psychological well-being” was more. And for the social aspect of healthy aging, there were 227 respondents (36.73) who reached the corresponding criteria.

Table 1. Proportion of healthy aging among CREEN (N/ %)

Criteria Design	Healthy Aging	
	HA(N/%)	NHA(N/%)
Good physical health (Y1)	256 (41.42%)	362 (58.58%)
Good ability of daily activities (Y2)	514 (83.17%)	104 (15.83%)
Good psychological well-being (Y3)	367 (59.39%)	251 (40.61%)
Active social participation (Y4)	227 (36.73%)	391 (63.27%)

Note: N, number of respondents who reached the corresponding criteria; %, percentage of total respondents.

As shown in Table 2, there were 279 men and 339 women. 61.8% respondents aged 60 years old and 236 respondents aged between 45 and 60 years old. 354 respondents were literate and 264 respondents were illiterate. Most respondents (75.72%) were in married and 142 respondents’ status of marriage was another situation, including divorce, widowed spouse, etc. 411 respondents expected to get long-term care in the future. 499 respondents’ grown children were literate. 242 respondents once lived with their grown children and 482 respondents’ grown children were married. 92.3% respondents thought their children were in good physical health. 319 respondents’ grown children had bought at least one house. 311 respondents once provided care for grandchildren.

Table 2. Statistical description of the sample.

Variables	N: Total respondents	Value=0 (n/%)	Value=1 (n/%)
Sex (X1)	618	279 (45.2%)	339 (54.8%)
Age (X2)	618	236 (38.2%)	382 (61.8%)
Literacy status (X3)	618	354(57.3%)	264 (42.7%)
Marital status (X4)	618	476 (75.72%)	142 (24.28%)
Expectations of long-term care from their grown children (X5)	618	411 (66.6%)	207 (33.4%)
Literacy status of grown children (X6)	618	499 (80.8%)	119 (19.2%)
Grown children once lived with CREEN (X7)	618	242 (39.2%)	376 (60.8%)
Marital status of grown children (X8)	618	482 (77.9%)	136 (22.1%)
Physical health of grown children (X9)	618	571 (92.3%)	49 (7.7%)
Housing property status of grown children (X10)	618	319 (51.7%)	299 (48.3%)
CREEN once provided care for grandchildren (X11)	618	311 (50.3%)	307 (49.6%)

3. Results

In the present study, logistic regression was operated to explore factors associated with CREEN in China, using statistical software STATA 15.0. A factor would be certified as a

protective factor (which means good for HA) when the value of odds ratio (OR) was greater than 1. It would be certified as a risk factor (which means not good for HA) when the value of OR was between 0 and 1.

First, as reported in Table 3, “Being literate” [X3, OR=1.47 (95% CI 1.00–2.15)], “CREEN will get long-term care from their grown children in the future” [X5, OR=2.00 (95% CI 1.40–2.87)] and “Good physical health of grown children” [X9, OR=2.54 (95% CI 1.24–5.21)] were certified as significant protective factors for physical health among CREEN.

Table 3. Factors influencing physical health.

Good physical health (Y1)	OR	S.E.	Z	P> Z	95% CI	
					Lower	Upper
Sex (X1)	0.96	0.18	-0.21	0.834	0.66	1.39
Age (X2)	1.18	0.23	0.84	0.399	0.81	1.72
Literacy status (X3)	1.47**	0.29	1.98	0.047	1.00	2.15
Marital status (X4)	0.98	0.21	-0.09	0.931	0.64	1.50
Expectations of long-term care from their grown children (X5)	2.00***	3.67	3.78	0.000	1.40	2.87
Literacy status of grown children (X6)	1.17	2.66	0.69	0.490	0.75	1.83
Grown children once lived with CREEN (X7)	0.95	0.17	-0.30	0.762	0.66	1.35
Marital status of grown children (X8)	1.04	0.23	0.19	0.849	0.67	1.62
Physical health of grown children (X9)	2.54**	0.93	2.55	0.011	1.24	5.21
Housing property status of grown children (X10)	1.32	0.25	1.49	0.136	0.92	1.91
CREEN once provided care for grandchildren (X11)	0.87	0.15	-0.86	0.392	0.62	1.20
Constant	0.78	0.23	-0.81	0.416	0.44	1.41

Note: OR, odds ratio; S.E., Standard error of the coefficient; Z, Z statistics; CI, Confidence Interval; *P<0.1; **P<0.05.

Second, as reported in Table 4, “Age under 60 years old” [X2, OR=2.52 (95% CI 1.45-4.38)], “Being literate of grown children” [X6, OR=1.78 (95% CI 1.07-2.96)] were significant protective factors while “Grown children once lived with CREEN” [X7, OR=0.67 (95% CI 0.42-1.06)] was a significant risk factor for ability of daily activities among CREEN.

Table 4. Factors influencing ability of daily activities.

Good ability of daily activities (Y2)	OR	S.E.	Z	P> Z	95% CI	
					Lower	Upper
Sex (X1)	1.13	0.28	0.50	0.617	0.69	1.85
Age (X2)	2.52***	0.71	3.26	0.001	1.45	4.38
Literacy status (X3)	0.81	0.22	-0.80	0.425	0.48	1.36
Marital status (X4)	1.03	0.28	0.11	0.913	0.61	1.74
Expectations of long-term care from their grown children (X5)	0.93	0.22	-0.33	0.743	0.58	1.47
Literacy status of grown children (X6)	1.78**	0.46	2.22	0.026	1.07	2.96
Grown children once lived with CREEN (X7)	0.67*	0.16	-1.70	0.088	0.42	1.06
Marital status of grown children (X8)	1.20	0.35	0.61	0.541	0.67	2.13
Physical health of grown children (X9)	1.49	0.55	1.08	0.278	0.73	3.05
Housing property status of grown children (X10)	1.04	0.25	0.15	0.883	0.64	1.66
CREEN once provided care for grandchildren (X11)	1.04	0.23	0.17	0.867	0.67	1.61
Constant	0.11	0.04	-5.35	0.000	0.05	0.24

Note: OR, odds ratio; S.E., Standard error of the coefficient; Z, Z statistics; CI, Confidence Interval; *P<0.1; **P<0.05.

Then as reported in Table 5, statistical results showed that “Male sex” [X1, OR=1.51 (95% CI 1.03-2.20)], “CREEN will get long-term care from grown children in the future” [X5, OR=2.17 (95% CI 1.52-3.09)] and “Good physical health of grown children” [X9, OR=2.65 (95% CI 1.37-5.11)] were significant protective factors for psychological health.

Table 5. Factors influencing psychological health.

Good psychological well-being (Y3)	OR	Std. Err.	Z	P> Z	95% CI	
					Lower	Upper
Sex (X1)	1.51**	0.29	2.14	0.032	1.03	2.20
Age (X2)	0.85	0.17	-0.81	0.416	0.58	1.26
Literacy status (X3)	0.74	0.15	-1.54	0.124	0.49	1.09
Marital status (X4)	1.33	0.29	1.34	0.182	0.87	2.04
Expectations of long-term care from their grown children (X5)	2.17***	0.39	4.30	0.000	1.52	3.09
Literacy status of grown children (X6)	1.35	0.30	1.33	0.184	0.87	2.04
Grown children once lived with CREEN (X7)	1.03	0.19	0.15	0.881	0.72	1.48
Marital status of grown children (X8)	0.91	0.21	-0.43	0.666	0.58	1.41
Physical health of grown children (X9)	2.65***	0.89	2.90	0.004	1.37	5.11
Housing property status of grown children (X10)	1.03	0.19	0.14	0.889	0.71	1.49
CREEN once provided care for grandchildren (X11)	0.79	0.13	-1.35	0.177	0.56	1.11
Constant	0.47	0.14	-2.45	0.014	0.26	0.86

Note: OR, odds ratio; S.E., Standard error of the coefficient; Z, Z statistics; CI, Confidence Interval; *P<0.1; **P<0.05.

Finally, as reported in the Table 6, only “Age under 60 years old” [X2, OR=1.58 (95% CI 1.07-2.31)] was a significant protective factor and “Grown children once lived with CREEN” [X7, OR=0.67 (95% CI 0.47-1.67)] was a significant risk factor for social participation among CREEN. Also, change of factors on four aspects of HA was summarized, it was presented in Table appendix A1.

Table 6. Factors influencing social participation

Active social participation (Y4)	OR	Std. Err.	Z	P> Z	95% CI for OR	
					Lower	Upper
Sex (X1)	1.15	0.22	0.73	0.463	0.79	1.67
Age (X2)	1.58***	0.31	2.33	0.020	1.07	2.31
Literacy status (X3)	0.89	0.18	-0.57	0.571	0.61	1.31
Marital status (X4)	0.77	0.17	-1.23	0.217	0.50	1.17
Expectations of long-term care from their grown children (X5)	1.16	0.21	0.83	0.404	0.81	1.66
Literacy status of grown children (X6)	1.23	0.29	0.88	0.380	0.78	1.94
Grown children once lived with CREEN (X7)	0.67**	0.12	-2.16	0.031	0.47	1.67
Marital status of grown children (X8)	0.97	0.22	-0.15	0.879	0.62	1.50
Physical health of grown children (X9)	0.88	0.29	-0.39	0.697	0.46	1.67
Housing property status of grown children (X10)	1.26	0.24	1.20	0.231	0.86	1.82
CREEN once provided care for grandchildren (X11)	0.82	0.14	-1.15	0.250	0.59	1.15
Constant	1.59	0.48	1.54	0.123	0.88	2.89

Note: OR, odds ratio; S.E., Standard error of the coefficient; Z, Z statistics; CI, Confidence Interval; *P<0.1; **P<0.05.

4. Discussion

The current study aimed to assess the factors associated with health ageing of CREEN based on four-dimensional criteria, including good physical health, good daily activity level, good psychological well-being, and active social participation.

256 respondents (41.42%) met the recommended physical health, and most (83.17%) rural older respondents had good daily activity level. 59.39% rural older respondents had good psychological health. Only 227 respondents (36.73%) met the corresponding criteria of good social participation.

Therefore for the CREEN, social participation, physical health and psychological health should be the focus and direction of providing health services.

And, why do the CREEN have better ability of daily activities? In the previous studies, it was noted that the older adults in rural areas usually engaged in agriculture [25–27]. Avoiding burdening their grown children were considered to be obligations among CREEN in rural China [28–29]. Moreover, the entertainment of CREEN were relatively regular and monotonous [20]. Most of the elderly individuals in rural areas were relatively poor, and a lot of their time needed to be spent in farming to maintain their livelihood [31–32]. The lifestyle could be the main reason.

Combining all four aspects, the significant protective independent factors associated with HA among CREEN were male sex, relatively young age, being literate, expectation of receiving long-term care from their children in the future, and their grown children being literate and in good physical health, whereas grown children cohabiting with CREEN was a significant risk factor.

Younger old people (Under 60 years old) were generally in better physical health and also more willing to participate in social activities [33]. Educated old people were generally in a better mental state because they had a better health-care knowledge [34]. Compared to women, men were in a higher social position in China's rural areas [35]. Elderly people had a better sense of security if they had long-term care for themselves in the ageing process [36]. The better the adult children develop, the more they would support their parents [11, 30]. The findings were the same with those studies.

Moreover, our findings added some evidence different from those in previous studies. Male sex was a risk factor for the physical health, while it became a protective factor for the other three aspects of healthy ageing. Surprisingly, lower age was a risk factor for the psychological health, while it was a protective factor to the other three aspects of healthy ageing. Education was only a protective factor to physical health while it was a risk factor for daily activity, psychological well-being, and social participation. 'Expectations of receiving long-term care in the future' was a risk factor for daily activities while it became a protective factor for the other three aspects of HA.

It means the same factor could have different influence on different aspects of HA among CREEN. When health services are provided for CREEN, the second focus should assess comprehensive impact and do the long-term observation.

Also, providing health services for CREEN should not only focus on 'What they have' and 'What they don't have', but also focus on 'What they have and then lose'. This is the third point. Like the factor 'CREEN once cohabiting with grown children', CREEN had the support from their grown children and then lose. Maybe their grown children need to work in the urban areas and have the great economical pressure.

However, this study has some limitations. As it was designed as cross-sectional study, it was not possible to determine the causal effect. Second, information about more aspects of healthy ageing and additional

indicators (especially the factors related to support from family members other than children) need to be collected. A longitudinal study in the future will be necessary to confirm this finding.

5. Conclusions

The current study aimed to assess the prevalence and factors associated with HA among CREEN based on the multidimensional criteria. 256 respondents (41.42%) met the recommended good physical health, and most (83.17%) respondents had good daily activity level. 59.39% respondents had good psychological health. Only 227 respondents (36.73%) met the corresponding criteria of good social participation. For the CREEN, social participation, physical health and psychological health should be the focus and direction of providing health services. Being male, younger and literate, expecting to have long-term care in the future, having grown children literate, in good physical and independent were determinants of meeting recommended HA in the study setting. One factor could have different influence on different aspects of HA among CREEN. When health services are provided for CREEN, the second focus should assess comprehensive impact and do the long-term observation. Providing health services for CREEN should not only focus on 'What they have' and 'What they don't have', but also focus on 'What they have and then lose', especially factors associated with their grown children. Those points should be the future focus of health services for CREEN.

Declarations

Ethics approval and consent to participate: The data used in this study was approved by the Institutional Review Board of Peking University Health Science Center. All participants provided their written informed consent before completing the interview. It was publicly available data and the study subjects were not directly approached.

Consent for publication: Submission have been supported by all authors.

Competing interests: The authors declare no conflicts of interest.

Funding: This research was funded by Social Science major projects of Tianjin Municipal Education Commission (2017JWZD05).

Author Contributions: Investigation, L.F.; Methodology, L.F.; Resources, L.F. and L.H.; Writing—original draft, Y.W.; and Writing—review and editing, Y.W. Author L.H. is equal to the first author, she and author L.F. contributed equally to the article.

Acknowledgements: The authors thank the CHARLS research center of Peking University for their data sharing and all members in L.F.'s laboratory at Tianjin University for their assistance with manuscript review.

Appendix A

Table A1. Statistical comparison

HA/ Factors	Good physical health (Y1)	Good ability of daily activities (Y2)	Good psychological well-being (Y3)	Active social participation (Y4)
Sex (X1)	-	+	+, √	+
Age (X2)	+	+, √	-	+, √
Literacy status (X3)	+, √	-	-	-
Marital status (X4)	-	+	+	-
Expectations of long-term care from their grown children (X5)	+, √	-	+, √	+
Literacy status of grown children (X6)	+	+, √	+	+
Grown children once lived with CREEN (X7)	-	-, √	+	-, √
Marital status of grown children (X8)	+	+	-	-
Physical health of grown children (X9)	+, √	+	+, √	-
Housing property status of grown children (X10)	+	+	+	+
CREEN once provided care for grandchildren (X11)	-	+	-	-

Note: +, protective factor; -, risk factor; √, significant statistically.

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