

Analysis on the quality of life and influencing factors of the lonely elderly in Changsha

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Abstract: The research aims to explore the quality of life and influencing factors of the lonely elderly in Changsha. A cross-sectional survey was conducted among 173 lonely elderly living alone in communities and elderly care institutions in Changsha using the World Health Organization Quality of Life Scale (WHOQOL-100). It was shown that the quality of life of the lonely elderly in Changsha was at a medium level (80.93 ± 11.32 points). Univariate analysis showed that there were significant differences in quality of life and subjective well-being among the lonely elderly with different economic conditions, health conditions, living situations, and institutional elderly care preferences ($P < 0.05$). Multiple linear regression further confirmed that economic conditions ($\beta = -0.163 \sim -0.296$) and health conditions ($\beta = -0.072 \sim -0.438$) were the core negative predictors of quality of life; living in an elderly care institution had a positive impact on the physical and environmental domains of quality of life for the lonely elderly ($\beta = 0.196 \sim 0.258$), but a negative impact on the social relationship domain ($\beta = -0.229$); institutional elderly care preferences significantly improved the quality of life in the environmental domain ($\beta = 0.245$). In a word, the quality of life of the lonely elderly in Changsha is influenced by multiple factors such as economy, health, living arrangements, and personal preferences. Comprehensive measures such as improving economic security and subsidy mechanisms, promoting medical and elderly care integration and health management services, strengthening social support and psychological care within elderly care institutions, and enhancing the transparency and accessibility of institutional environments are needed to improve their well-being in old age.

1. Introduction

The seventh national census in China shows that the population aged 60 and above is 264.02 million, accounting for 18.70% of the total population (among which, the population aged 65 and above is 190.64 million, accounting for 13.50%)^[1]. As the most vulnerable and special part of the elderly population, the living and development conditions of the lonely elderly have become an important indicator to measure the civilization and harmony of a society. This group, due to the lack of traditional family support from spouses and children, faces more severe challenges than ordinary elderly people in terms of physical and mental health, economic security and social integration^[2],

whose current state of quality of life (QOL) has increasingly become the focus of attention in both academic circles and the field of public policy. Changsha, as one of the cities with a relatively high level of aging in China, its construction of the elderly care service system holds forward-looking significance in addressing the nationwide challenge of aging. This study aims to systematically assess the quality of life of the lonely elderly living in Changsha and deeply analyze the key influencing factors. The research results not only can fill the research gap in this field regarding regions and groups, but also can provide solid empirical evidence and directional guidance for optimizing the supply of elderly care services for the lonely elderly living in Changsha and across the country, as well as for precisely allocating elderly care resources and improving the quality of life of this group in their later years.

2. Subjects and methods

2.1. Study subjects

Cluster sampling was employed to select communities and five nursing institutions providing centralized support for households under the "Five Guarantees" system from Yuelu District, Yuhua District, Wangcheng District, and Changsha County in Changsha. A total of 173 eligible lonely elderly were enrolled as study subjects, and a questionnaire survey was conducted from November to December 2025. Inclusion criteria: ① Age ≥ 60 years; ② No spouse or children; ③ Residing in the survey location for at least six months; ④ Voluntary participation in the study. Exclusion criteria: ① Elderly individuals without family support residing outside the local area during the survey; ② Subjects unable to cooperate due to severe physical or mental disorders; ③ Refusal to participate. A total of 184 questionnaires were distributed, with all 184 recovered, achieving a 100% response rate. Among these, 173 were valid. The study was approved by the Nursing and Behavioral Medicine Ethics Review Committee of Hunan University of Chinese Medicine (ZYYHLLL2025008). All participants provided informed consent and voluntarily participated in the study.

2.2. Methods and content

The survey questionnaire consists of two parts:

(1) General information questionnaire: including gender, age, marital status, educational level, economic status, and health condition of elderly individuals living alone.

(2) Chinese Version of the World Health Organization Health-Related Quality of Life Scale (WHOQOL-100)^[3]: The scale was localized and revised by Professor Fang Qian's team, comprising 100 items across 6 domains (physiological, psychological, independence, social relationships, environment, and spiritual pillars/religion/personal beliefs), 24 subdomains, and 4 general items assessing overall quality of life and health status. Each subdomain consists of 4 items, with all domains and subdomains scoring positively—higher scores indicate better quality of life. The scale demonstrates good reliability and validity, with Cronbach's α coefficients ranging from 0.42 to 0.93 for all domains^[4].

2.3. Statistical processing

Statistical analysis was performed using SPSS 31.0 software. The general demographic data of the lonely elderly in Changsha were statistically described using frequency (percentage). The levels and fluctuations of quality of life and their influencing factors were evaluated using mean \pm

standard deviation ($M \pm SD$). Univariate analysis was performed using independent samples t-test and analysis of variance, while multivariate analysis was conducted via multiple linear regression. A P-value <0.05 was considered statistically significant.

3. Results

3.1. General conditions of the lonely elderly in Changsha

In the gender distribution of the lonely elderly in Changsha, the proportion of males is higher than that of females. Females account for 48.0%, while males account for 52.0%. In terms of age distribution, those aged 70-79 years old account for the largest proportion (52.0%), followed by those aged 60-69 years old (40.5%), and the least are those aged 80-89 years old, accounting for only 7.5%. In terms of educational attainment, those with primary school education or below account for the largest proportion (85.0%), followed by those with junior high school education, accounting for 8.5%, and those with university education or above are the least, accounting for only 2.9%. In terms of marital status distribution, those who are unmarried have the largest proportion (72.8%), followed by widowed (19.1%), and those who are divorced have the least proportion, accounting for only 8.1%. Regarding the number of children, those without children have the largest proportion (84.4%), while those whose children have passed away account for 15.6%. In terms of economic situation, those with very poor economic conditions have the largest proportion (49.1%), followed by those with average economic conditions (20.2%), and those with good economic conditions are the least, accounting for only 11.0%. In terms of health status, those with average health status have the largest proportion (53.8%), followed by those with poor health status (27.7%), those with very good health status account for 15.6%, and those with very poor health status have the least proportion (2.9%). In terms of living situation, those living in nursing homes have the largest proportion (69.4%), followed by those living alone (26.6%), and those living with relatives have the least proportion, accounting for only 4.0%. In terms of institutional care preference, those who prefer institutional care have the largest proportion (90.8%), while those who do not prefer it have the least proportion, accounting for only 9.2%.

3.2. WHOQOL-100 score distribution among the lonely elderly in Changsha

In terms of the total score of the quality of life (QOL) for the lonely elderly in Changsha, the post-hoc LSD test revealed that those without children had significantly higher scores than those whose children had passed away ($p < 0.05$); those with good economic conditions had higher scores than those with average, poor, and very poor economic situations, and those with poor economic conditions had higher scores than those with very poor conditions ($p < 0.05$); those with poor health conditions had lower scores than those who were very good and those with average health conditions ($p < 0.05$); those with the intention to receive institutional care had higher scores than those without such intention ($p < 0.05$) (.

Table 1).

The various domains of WHOQOL-100 are affected differently by gender, age, educational level, marital status, children's situation, economic condition, health status, living conditions, and the willingness to live in an institution. The physical domain is mainly influenced by children's situation, health status, living conditions, and the willingness to live in an institution; the psychological domain is mainly influenced by marital status, economic condition, and health status; the independence domain is mainly influenced by economic condition and health status; the social relationship domain is mainly influenced by gender, marital status, economic condition, health status, and living conditions; the environmental domain is mainly influenced by economic condition,

health status, living conditions, and the willingness to live in an institution; the spiritual pillar/religion/personal belief is mainly influenced by educational level, marital status, economic condition, and health status; the overall quality of life is mainly influenced by children's situation, economic condition, and health status (. Table 1).

Table 1).

Table 1 The WHOQOL-100 score situation of the lonely elderly in Changsha city (M±SD)

Variable		n	QOL score	PHYS	PSYCH	IND	SOCIAL	ENVIR	SPIR	OVERALL
Gender	Male	90	81.38±1.04	50.14±7.85	52.03±8.79	49.62±1.04	46.55±1.04	62.18±1.09	51.53±19.23	56.67±15.73
	Female	83	80.45±1.87	48.69±4.96	50.81±8.13	50.98±1.05	49.87±1.07 ¹⁾	59.78±1.06	54.29±15.40	56.55±15.77
Age	60~69	70	81.74±1.27	50.36±7.35	51.55±9.15	51.65±1.07	49.46±1.32	61.81±1.40	54.64±19.29	58.30±16.82
	70~79	90	80.50±1.08	48.45±6.06	51.56±7.51	49.76±1.04	47.62±1.08	60.36±1.03	52.08±16.06	55.83±13.83
	80~89	13	79.54±1.39	51.44±5.79	50.10±1.37	46.39±1.85	44.71±1.87	61.42±1.88	48.56±17.15	52.88±21.29
Degree of education	Primary school degree and below	147	80.62±1.45	49.70±6.66	51.35±8.26	49.98±1.00	48.24±1.06	61.35±1.08	53.19±16.53	56.76±15.90
	Junior high school degree	15	83.87±8.05	48.75±7.54	51.00±7.04	50.63±7.96	46.39±1.64	59.06±9.03	42.92±21.89 ²⁾	54.58±13.25
	Senior high school degree	6	75.33±6.12	46.18±5.34	52.92±1.69	54.43±3.64	46.53±4.11	59.24±5.07	55.21±12.76	53.13±20.44
	University degree or higher	5	88.00±5.70	47.92±4.89	53.75±5.64	52.81±3.89	52.50±5.78	59.69±1.54	70.00±23.96 ²⁾	62.50±12.50
Marital status	Single	126	81.06±1.25	49.69±7.14	51.05±8.44 ³⁾	49.63±1.19	47.32±1.06 ³⁾	60.97±1.09	51.19±17.35 ³⁾	56.40±16.15
	Divorce	14	83.57±2.20	50.45±3.93	56.61±7.11	55.13±9.74	55.65±9.65	66.69±1.04	67.86±11.72	62.50±15.70
	Bereft of one's spouse	33	79.33±1.35	48.11±5.42	50.76±8.64 ³⁾	50.66±8.69	48.11±1.06 ³⁾	58.83±1.09	52.84±17.48 ³⁾	54.92±13.69
Child status	Childless	146	82.14±1.05	49.89±6.88	51.81±8.30	50.54±1.07	48.40±1.07	61.60±1.08	52.40±17.31	57.79±15.44
	Deceased children	27	74.37±3.06 ⁴⁾	47.07±4.60 ⁴⁾	49.49±9.32	48.84±1.03	46.76±1.06	57.96±1.07	55.32±18.65	50.23±15.84 ⁴⁾
Economic condition	Good	19	88.95±6.68	50.00±5.38	58.55±9.83	57.15±8.58	57.68±8.39	67.27±1.90	68.75±15.45	67.11±13.79
	Average	35	79.77±1.05 ⁵⁾	49.70±4.77	52.21±7.68 ⁵⁾	53.84±9.94	48.27±9.12 ⁵⁾	59.71±1.42 ⁵⁾	53.21±17.51 ⁵⁾	56.25±14.62 ⁵⁾

	Poor	34	76.03±1 0.74 ⁵⁾	47.55±5. 39	50.96±7. 34 ⁵⁾	53.22±7. 53	47.67±1 1.75 ⁵⁾	58.13±1 0.65 ⁵⁾	53.68 ±16.4 4 ⁵⁾	53.49±13.8 6 ⁵⁾
	Very poor	85	81.58±1 1.72 ^{5) 7)}	49.98±7. 86	49.74±8. 17 ⁵⁾	46.08±1 0.91 ^{5) 6)} 7)	46.15±1 0.44 ⁵⁾	61.33±9. 99 ⁵⁾	48.82 ±16.4 9 ⁵⁾	55.66±16.5 0 ⁵⁾
Health condition	Excellent	27	86.52±8. 14	49.23±5. 70	55.60±7. 93	53.30±9. 67	56.17±9. 88	64.44±1 0.18	53.70 ±13.3 4	65.28±13.9 0
	Average	93	83.58±9. 73	49.84±6. 84	53.00±8. 00	52.40±9. 46	49.75±1 0.06 ⁸⁾	62.57±1 1.44	54.84 ±17.6 6	60.82±13.7 3
	Poor	48	73.00±1 0.91 ^{8) 9)}	48.00±4. 63	47.50±6. 96 ^{8) 9)}	46.09±1 1.22 ^{8) 9)}	41.67±7. 88 ^{8) 9)}	56.56±8. 73 ^{8) 9)}	50.91 ±16.7 6	45.05±11.6 0 ^{8) 9)}
	Very poor	5	77.60±1 9.06	57.08±1 6.04 ^{8) 9)} 10)	38.00±7. 48 ^{8) 9) 10)}	34.38±9. 04 ^{8) 9) 10)}	37.08±1 1.16 ^{8) 9)}	56.88±8. 83	30.00 ±27.3 9 ^{8) 9)} 10)	42.50±25.5 4 ^{8) 9)}
Dwelling condition	Living alone	46	81.09±9. 26	46.78±5. 52	52.66±7. 01	51.05±8. 44	54.44±8. 76	58.17±1 0.53	56.66 ±14.0 3	57.07±13.3 5
	Living with relatives	7	78.43±1 8.02	49.11±3. 78	49.82±5. 61	46.43±5. 16	57.14±1 0.75	56.92±8. 10	53.57 ±7.09	54.46±13.3 6
	Living in nursing homes	12 0	81.02±1 1.67	50.49±6. 91 ¹¹⁾	51.07±9. 11	50.20±1 1.66	45.21±1 0.17 ¹¹⁾ 12)	62.36±1 0.89 ¹¹⁾	51.35 ±18.9 2	56.56±16.7 2
Willingness toward institutional elderly care	Yes	15 7	81.50±1 1.18	49.80±6. 74	51.70±8. 75	50.14±1 1.12	48.02±1 1.12	62.07±1 0.69	52.99 ±17.6 9	57.17±15.9 6
	No	16	75.38±1 1.53 ¹⁶⁾	45.96±4. 47 ¹³⁾	48.91±4. 58	51.56±4. 94	49.35±6. 02	50.83±6. 09 ¹³⁾	51.56 ±16.0 6	51.17±11.9 1

Note: “**PHYS**” means physical domain; “**PHYCH**” means psychology domain; “**IND**” means independence domain; “**SOCIAL**” means social relation domain; “**ENVIR**” means environment domain; “**SPIR**” means spiritual support/religion/personal beliefs domain; “**OVERALL**” means overall quality of life and general health status. **1)** Compared with “Male”; **2)** Compared with “Primary school degree and below”; **3)** Compared with “Divorce”; **4)** Compared with “Childless”; **5)** Compared with “Good” economic condition; **6)** Compared with “Average” economic condition; **7)** Compared with “Poor” economic condition; **8)** Compared with “Excellent” health condition; **9)** Compared with “Average” health condition; **10)** Compared with “Poor” health condition; **11)** Compared with “Living alone”; **12)** Compared with “Living with relatives”; **13)** Compared with willing participants; all $p < 0.05$.

3.3 Multivariate analysis of the quality of life of the lonely elderly in Changsha

Taking the physiological domain, psychological domain, independence domain, social relationship domain, environmental domain, spiritual pillar/religion/personal belief domain, overall quality of life and general health status, as well as the total score of QOL as dependent variables, the variables with statistical significance in the single-factor analysis were selected as independent variables, and a multiple linear regression model was fitted. All variables were included in the model at once. The assignment of each variable is shown in Table 2.

The results of the multiple linear regression analysis showed that economic status, health condition, living situation and the willingness to receive institutional care were the main influencing factors for the quality of life of the lonely elderly ($P < 0.05$). Among them, living in a nursing home and having the willingness to receive institutional care had a positive impact on the quality of life in some areas; while poor economic status and poor health condition generally had a negative impact on all aspects of quality of life (Table 3).

Table 2 Variable assignment of the quality of life of the lonely elderly in Changsha and their influencing factors (n = 173)

Variable	Assignment
Y1: Physical domain	Actual score
Y2: Psychology domain	Actual score
Y3: Independence domain	Actual score
Y4: Social relation domain	Actual score
Y5: Environment domain	Actual score
Y6: Spiritual support/Religion/Personal beliefs domain	Actual score
Y7: Overall quality of life and general health status	Actual score
Y8: Total score of QOL	Actual score
X1: Gender	Male = 1; Female = 2
X2: Degree of education	Primary school degree and below = 1 Junior high school degree = 2 Senior high school degree = 3 University degree or higher = 4
X3: Marital status	Single=1; Divorce=2; Bereft of one's spouse=3
X4: Child status	Childless = 1; Deceased children = 2
X5: Economic condition	Good = 1; Average = 2; Poor = 3; Very poor = 4
X6: Health condition	Excellent = 1; Average = 2; Poor = 3; Very poor = 4
X7: Dwelling condition	Living alone = 1; Living with relatives = 2; Living in nursing homes = 3
X8: Willingness toward institutional elderly care	Yes = 1; No = 2

Table 3 The results of the multivariate linear regression analysis of the quality of life of the lonely elderly in Changsha (standardized coefficient β) (n = 173)

Variable	PHYS	PHYCH	IND	SOCIAL	ENVIR	SPIR	OVERALL	QOL Score
Gender (Reference group: Female)								
Male				-0.048				
Degree of education (Reference group: Primary school degree and below)								
Junior high school degree						-0.309***		
Senior high school degree						-0.051		
University degree or higher						-0.030		
Marital status (Reference group: Single)								
Divorce		0.092		0.124		0.164*		
Bereft of one's spouse		-0.010		0.004		0.032		
Child status (Reference group: Childless)								
Deceased children	-0.090						-0.053	-0.121
Economic condition (Reference group: Good)								
Average		-0.162	-0.028	-0.128	-0.227*	-0.435***	-0.105	-0.163
Poor		-0.239*	-0.060	-0.239*	-0.246*	-0.381**	-0.182	-0.296**
Very poor		-0.336**	-0.394***	-0.291*	-0.268*	-0.650***	-0.175	-0.200

Health condition (Reference group: Excellent)								
Average	0.017	-0.147	-0.097	-0.195*	-0.067	0.086	-0.140	-0.072
Poor	-0.158	-0.381***	-0.323**	-0.423***	-0.345**	0.060	-0.537***	-0.438***
Very poor	0.149	-0.313***	-0.248***	-0.196**	-0.147	-0.170*	-0.237**	-0.134
Dwelling condition (Reference group: Living alone)								
Living with relatives	0.081			0.092	-0.036			
Living in nursing homes	0.258*			-0.229**	0.196*			
Willingness toward institutional elderly care(Reference group: No)								
Yes	0.057				0.245**			0.180**
R ²	0.136	0.250	0.260	0.363	0.240	0.269	0.281	0.299
Adjusted R ²	0.099	0.214	0.234	0.319	0.198	0.219	0.251	0.264
F	3.696***	6.845***	9.743***	8.334***	5.722***	5.373***	9.216***	8.726***

Note: “**PHYS**” means physical domain; “**PHYCH**” means psychology domain; “**IND**” means independence domain; “**SOCIAL**” means social relation domain; “**ENVIR**” means environment domain; “**SPIR**” means spiritual support/religion/personal beliefs domain; “**OVERALL**” means overall quality of life and general health status. *p < 0.05, **p < 0.01, ***p < 0.001.

4. Discussion

4.1 The quality of life of the lonely elderly in Changsha

4.1.1 A comparison with other lonely elderly in other parts of the country

This study found that the total score of the quality of life for the elderly living alone in Changsha (80.93 ± 11.32 points) was at a medium level. Compared with earlier similar surveys, the quality of life score of the elderly living alone in Changsha was at a relatively high level. Li Bei conducted a survey in 2008 on the rural centralized-warded elderly recipients of the Five-Peace Allowance in Hubei Province, and the quality of life total score measured using the SF-36 scale was 67.9 points^[5], significantly lower than the results of this study. This difference may reflect the overall progress and improvement of China's elderly care service system, especially in institutions in economically developed regions, over the past decade. However, compared with the centralized-warded practices in economically developed provinces during the same period, there is still room for improvement in the subjective well-being experience of the elderly living alone in Changsha. He Xiaoqin conducted a survey in Zhejiang Province and found that 58.97% of the elderly recipients of the Five-Peace Allowance in that province felt "very happy" or "happy", and 56.65% expressed satisfaction with the service staff in the nursing home^[6]. Although as many as 90.8% of the elderly in this study expressed a willingness to receive institutional care, indicating a high acceptance rate, a direct comparison shows that there may be a certain gap in subjective well-being and service satisfaction levels compared to advanced regions such as Zhejiang. This gap suggests that in addition to ensuring basic material support, the refinement, humanization of services, and the provision of spiritual comfort are of crucial importance.

4.1.2 A comparison with the general elderly population in Changsha

In this study, the scores of the lonely elderly in Changsha were at a medium level, but there was still a certain gap compared with the ordinary elderly in the city. Peng Ting's investigation of elderly people living at home in the communities of Changsha City found that their self-assessed quality of life averaged 7.62 points (calculating on a ten-point scale), which was at a relatively high level overall, and they had a strong sense of subjective well-being. 67.2% of the elderly self-assessed as

"fairly happy"^[7]. In contrast, although the lonely elderly in Changsha have received certain basic care in institutional elderly care settings, the proportion of those who self-assess their economic situation as "very poor" is as high as 49.1%. Moreover, they generally face structural difficulties such as poor health conditions and weak social support networks. This indicates that there is a gap in the objective conditions and subjective experiences of quality of life between these elderly people and those living in communities and at home. Therefore, more targeted attention and support should be provided in policy design and service implementation.

4.2 Factors affecting the quality of life of the lonely elderly in Changsha

4.2.1 The impact of gender on quality of life

The results of this study indicate that gender has no significant impact on the quality of life of the elderly living alone in Changsha, which is inconsistent with the study conducted by Zhao Jiangang et al^[8]. The reason might be that all the samples were collected from the centralized elderly care institutions under the Five Guarantees system. In this specific environment, the institutions provided a relatively uniform and stable living and social setting.

4.2.2 The impact of educational level on quality of life

The results of this study show that in the areas of spiritual support/religion/personal beliefs, a junior high school education level has a significant negative predictive effect, while the influence of senior high school and higher education levels is not significant, which is consistent with the research of Wang Jinghua^[9]. The elderly who are illiterate and living alone are at a high risk in terms of their mental health. They are unable to fully rely on traditional belief systems and have not yet acquired sufficient methods and resources to establish their own, stable spiritual world. Therefore, elderly care institutions need to provide specialized guidance to help them explore and construct their own personalized meaning of life.

4.2.3 The impact of marital status on the quality of life

This study found that the divorced status has a significant positive predictive effect on the spiritual support/religion/personal belief domain, which is inconsistent with the research conducted by Zhu Junhong et al^[10]. This might be because the "psychological independence" they were forced to build in their earlier stages of life provided them with crucial pre-adaptation capabilities for adapting to institutionalized elderly care in later life. Therefore, care facilities can encourage them to voluntarily share their adaptation experiences in existing group activities, and guide them through daily interactions to establish informal, naturally occurring mutual assistance relationships with newly admitted or widowed elderly people.

4.2.4 The impact of children's situation on the quality of life

The status of children did not show a significant independent influence on any of the analyzed dimensions of quality of life. This might be due to the fact that only 15.6% of the elderly in this study sample were widowed with no children, resulting in a highly uneven distribution of the "children's status" variable. Therefore, the statistical effect did not reach a significant level.

4.2.5 The impact of economic conditions on the quality of life

The results of this study indicate that economic conditions are a significant factor influencing the quality of life of elderly individuals who are alone. The worse the economic situation, the stronger

the negative impacts on their psychological state, independence, social relationships, spiritual support/religion/personal beliefs, which is consistent with many research findings from both domestic and international sources^[11,12]. Compared with ordinary elderly people, the lonely elderly lack family economic support, and their economic vulnerability is more prominent. In this study, nearly half of the lonely elderly rated their economic situation as "very poor", reflecting that this group faces severe challenges in terms of economic security. It is suggested that the government further improve the economic subsidy system for the lonely elderly, such as increasing the care and nursing subsidies for the disabled and lonely elderly. At the same time, it is encouraged for social forces to participate in assistance to alleviate the economic pressure on the lonely elderly.

4.2.6 The impact of health conditions on the quality of life

Health condition is a strongly negative influencing factor for the quality of life of the lonely elderly, which is consistent with the results of previous studies^[12]. However, this study found that the impact was not simply a simple linear decline. The overall quality of life scores decreased from "average" to "poor", while in the physiological domain, the scores increased from "poor" to "very poor". This might be related to the fact that the "very poor" elderly individuals were already in medical and care facilities that combine medical treatment and care, or received high-intensity professional medical care. However, their scores in the psychological and independence domains decreased significantly, which might be related to the disintegration of self-worth and long-term extreme dependence^[13]. Therefore, it is suggested that community health centers and elderly care institutions strengthen their collaboration, conduct regular physical and mental health screenings, chronic disease management, and rehabilitation guidance^[14], and explore the "medical and elderly care integration" service model^[15] to improve the health management and quality of life of the lonely elderly.

4.2.7 The impact of living conditions on the quality of life

The impact of living conditions on quality of life varies across different fields. This study found that the lonely elderly in nursing homes scored higher in the physiological and environmental domains, but lower in the social relationship domain. This might be related to the fact that before moving into the nursing home, the lonely elderly already lacked the core family support system of "spouse - children", and their social relationship networks were usually small in scale, weak in connection, and had limited support functions. After moving into the institution, they were physically isolated from the sparse community neighbors, relatives and friends they had before, resulting in the complete breakdown of the original weak relationships. This result is consistent with the part of Li Wenjuan et al.'s study on institutional elderly care in Taixing City^[16]. Therefore, it is suggested that elderly care institutions should not only optimize the living environment and care services, but also focus on organizing social activities and providing psychological support services, so as to promote interaction and emotional support among the elderly and make up for the deficiencies in social relationships.

4.2.8 The impact of the willingness towards receive institutional care on the quality of life

This study found that the willingness towards receive institutional care significantly positively affects the quality of life in the environmental domain. From a practical perspective, the lonely elderly often encounter multiple environmental risks in the community, such as safety in residence, convenience in life, and emergency care. The willingness towards receive institutional care is essentially an active choice for an expected physical environment that is more supportive and controllable, which is consistent with the research conducted by Li Weitong et al^[17]. Therefore,

when promoting the construction of the elderly care service system, it is suggested to enhance the transparency and experienceability of the institutional environment and service information, and to concurrently establish a demand-oriented care and support system. This will effectively improve the quality of life in the environmental domain and enhance the recognition and sense of belonging of the elderly who are alone or living alone towards institutional elderly care.

In conclusion, to improve the quality of life of the lonely elderly in Changsha, multi-dimensional and systematic comprehensive intervention strategies are required. At the economic level, measures should be further implemented to improve the economic subsidies and assistance mechanisms for the lonely elderly, especially providing preferential treatment for the disabled and the elderly of advanced age, and encouraging social forces to participate in support. At the health level, collaboration between community health centers and elderly care institutions should be strengthened, regular health screenings, chronic disease management, and rehabilitation guidance should be implemented, and the "medical care and elderly care combined" service model should be explored to enhance the management of their physical and mental health. At the social support level, elderly care institutions should attach importance to providing social interaction and psychological support services, promoting emotional connections among the elderly, and compensating for the lack of their social relationship network. At the environmental level, the transparency and accessibility of the environment in elderly care institutions should be improved, a demand-oriented care system should be established, and the sense of belonging of the elderly to institutional elderly care should be enhanced.

Additionally, this study has certain limitations. For instance, the use of convenience sampling method, and the sample mainly coming from centralized support institutions for the five guarantees, may limit the generalizability of the results; the cross-sectional design makes it difficult to infer causal relationships; and some variables, such as the distribution of children's situations, may affect the statistical power. Future research can expand the sample sources, adopt longitudinal design, and include more objective indicators and qualitative interviews to explore the dynamic mechanism of the quality of life of the elderly living alone more comprehensively and deeply.

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