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Effects of integrated care on the subjective quality of life and social relationships of older adults in South Korea

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Abstract

Objectives This study examined the effects of integrated care on the subjective quality of life and social relationships of older adults in South Korea.

Methods We combined data from the National Health Insurance Service and a survey of older adults across local governments participating in a pilot project for integrated care and the final number of study subjects was 9,924 participants. To compare before and after participation in the pilot project, regression analysis was performed using the generalized estimation equations. The dependent variables were subjective quality of life and social relationships comprising the number of people who can help and the number of people met.

Results Older adults' subjective quality of life significantly improved by 0.35 points, and the number of people who could help them significantly increased by 0.09 people after participation in the pilot project for integrated care. The results were similar when analyzed by sex and age. When analyzed by sex, subjective quality of life increased by 0.36 for men and by 0.34 for women. The number of people who can help increased by 0.12 for men and by 0.07 for women. As a results of analysis according to age, subjective quality of life significantly increased by 0.45 for older adults aged 65–74, by 0.31 for older adults aged 75 and over. The number of people who can help significantly increased by 0.13 for older adults aged 65–74 and by 0.07 for aged 75 and over. The number of people met decreased slightly overall.

Discussion Integrated care in Korea has increased life satisfaction among older adults and strengthened their social relationships by enabling them to live in their own homes and communities instead of nursing hospitals or facilities. This study is the first to evaluate the achievements of an integrated care conducted in Korea in terms of subjective quality of life and social relationships, and this can serve as the basis for developing integrated care in the future.

Keywords Integrated care, Older adults, Quality of life, Social relationships

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Introduction

As population aging has become a serious worldwide phenomenon, social and economic problems, such as "the burden of supporting older adults" and "medical expenditure on older adults," are being actively discussed [1, 2]. Accordingly, various efforts are being made for the well-being, enhancing the quality of life, and aging in place (AIP) for older adults in various countries [3, 4]. South Korea is a country with one of the fastest aging populations, which is expected to exceed 40% of the national population by 2050 [5].

In response, the Korean government implemented long-term care insurance (LTCI) in July 2008 to improve the quality of life of older adults and reduce the burden on caregivers [6]. LTCI provides home- or facility-based care services to adults aged 65 years or older according to criteria such as physical functioning and behavioral and cognitive problems [7, 8]. Concurrently, the Korean government implemented customized care services for frail older adults who were unable to receive LTCI services because they did not meet the qualification criteria despite having trouble completing daily activities [9]. Nevertheless, the LTCI and customized care services remained insufficient to meet the needs of older adults who wanted to live at home. A further limitation was that the application process and qualification criteria were different for each service, such that either the necessary services could not be provided or it was difficult to receive related services because of segmentation of services [10].

In response to these problems, the Korean government announced an integrated care roadmap in December 2018 and promoted a pilot project for integrated care in 2019. These pilot projects have been conducted by 13 of the 229 local governments over the past four years (2019–2022). The purpose of integrated care was to enable older adults to spend their old age in their own homes rather than entering a nursing hospital or facility, ultimately enhancing older adults' well-being and relieving caregivers' burden [11, 12]. Integrated care aimed to enhance the connection between NHI (national health insurance) service (e.g., inpatient, outpatient, and prescription drug services), LTCI (e.g., home bathing, nursing services, day and night care services), and other necessary services (e.g., housework support, home repairs, meal assistance and moving support) [10]. In addition, the government planned a service delivery system centered on local governments to specifically evaluate the various needs of older adults and provide appropriate services suited to the local environment and resources.

To evaluate the outcomes of integrated care, we measured subjective quality of life and social relationships among important elements of well-being. Many studies on the well-being of older adults have primarily focused on the concept of subjective quality of life [13, 14]. Social relationships are also an important factor in successful aging. And Connections with society, including friends and family, contribute to older adults' happiness and life satisfaction [15]. In addition, it not only improves individual emotional well-being but is also prevent cognitive deterioration [16], and reduce rates of readmission to hospital [17].

To the best of our knowledge, no study has been conducted that has observed the effects of integrated care in Korea in terms of subjective quality of life and social relationships. Overseas, there have been studies that have observed the effects of the integrated care model conducted in the Netherlands in various aspects, including quality of life, were observed; however, the observation period was only three months, which was too short to observe changes in the participants [18]. This study is meaningful because it includes all different participation periods for each person and observes more participants for a long period of 3 years. And this study aimed to evaluate the effect of integrated care by observing changes in the subjective quality of life and social relationships of the older adults who participated in the integrated care pilot project implemented in Korea. Additionally, because previous studies have shown that quality of life and social relationships differ by sex and age, we performed subgroup analyses to determine whether the effectiveness of integrated treatment differs by sex and age [19–21].

Methods

Data and study sample

In this study, we combined National Health Insurance Service (NHIS) data and a survey conducted by local governments that participated in the pilot project for integrated care. In Korea, the entire population subscribes to the NHI, and the NHIS holds all claims data for medical services in the NHI and LTCI as a single insurer. The data included information on birth, death, residence, disability, and income [22]. The data comprised the results of a survey conducted before and after the pilot project to measure changes in the older adults who participated in the pilot project. The survey period was from August 2019 to August 2022, and the survey was conducted at the time of registration and at the end of the pilot project. It comprised questions that measured individual perceptions, such as subjective quality of life and social relationships, which could not be observed in the NHIS data. In addition, personal information, dates of registration and termination of the pilot project, and the type of service used during the pilot project were included.

Among the 28,669 individuals who participated in the pilot project over four years (2019–2022), 3,047 who participated in the project more than once and were entered in duplicate were excluded, leaving only the most recent registration standard data. We also excluded individuals

with incorrect residence registration numbers in the promotion performance data ($n = 18$), individuals under the age of 65 ($n = 1,101$), older adults who did not fill in the project selection or termination dates ($n = 69$), and integrated care services that were not linked or those that were canceled ($n = 1,889$). Additionally, those who were not linked to the NHIS data ($n = 39$) and those who did not agree to the use of their personal information ($n = 72$) were excluded from the analysis. Among the 22,434 study participants, 12,510 without pre–post survey data for observation were excluded, and the final study comprised 9, 924 participants (Fig. 1).

Interventions

The central government designed a service delivery system that focuses on local governments. The finances for operation were comprised of a mix of national and local government funds. Participants in the pilot project were selected either by directly applying for integrated care services or by being identified by local governments as individuals in need of comprehensive care. And the local governments evaluate the multiple care needs of participants at a single place within the local governments. Although there are differences in details depending on the local government, the pilot project for integrated care provided meal support such as lunch box delivery, housework support, house repair, movement assistance when going out. Additionally, the pilot project provided LTCI services (Home-visit care, Home-visit nursing, Home-visit bath, day or night care, short-term care, etc.) for eligible, and home-based primary care (HBPC) for homebound older patients discharged from the hospital so they could remain at home. The HBPC services was usually provided counseling or education on arrangement of medications and healthy lifestyle. And in some cases, a team consisting of nurses, physical therapists, etc. provided injections for pain, exercise therapy and rehabilitation [23].

Measurements

We measured "subjective quality of life" and "social relationships", which consisted of "the number of people who can help" and "number of people met". The measurement method and definition of each indicator were as follows, and all variables were measured as a continuous variable.

Subjective quality of life refers to "the degree of satisfaction with one's life over the past week" and responses consist of a score between 0 (very low) and 10 (very high) [24]. Social relationships among older adults were measured using two indicators: "the number of people who can help" and "the number of people met". "the number of people who can help" refers to the number of people who can help when there is a problem in daily life, measured by the number of friends or relatives excluding immediate family members [25, 26]. "The number of people met" indicates the number of people an older adult has met in the past week. It was measured focusing on the number of friends and relatives that older adults met with except for immediate family members [27, 28].

Potentially confounding factors included sex, age, region of residence, medical security, household income, Charlson Comorbidity Index (CCI), disability, living

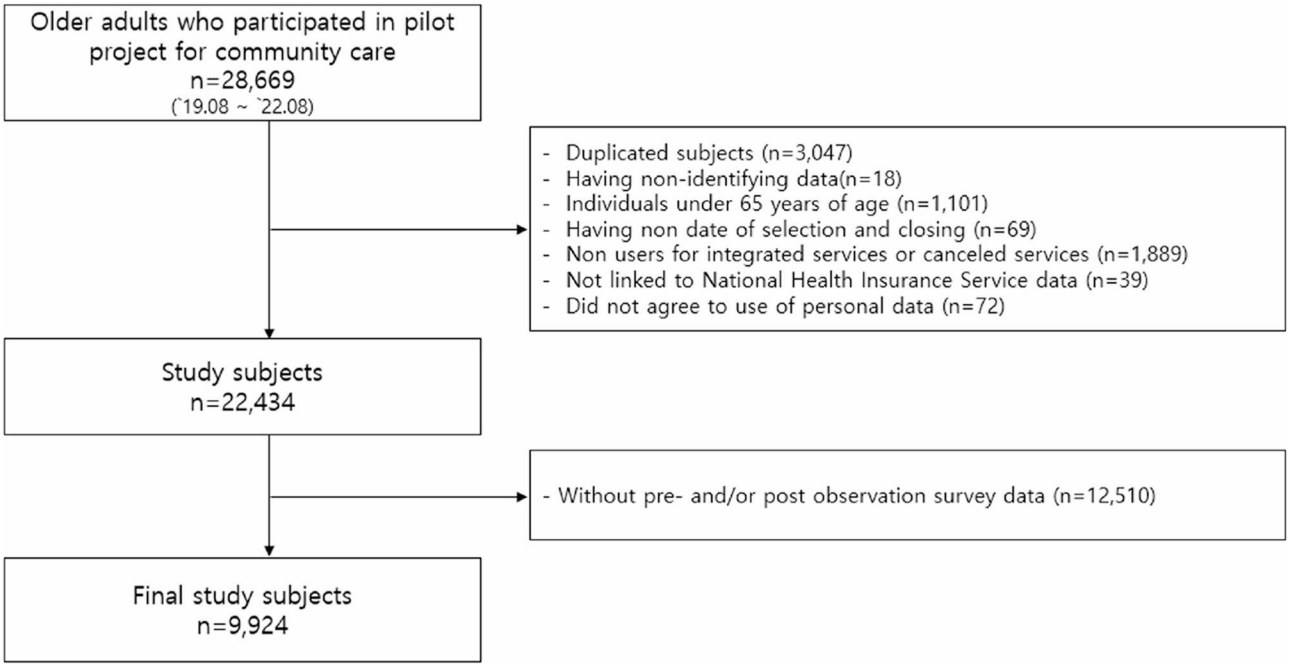

Fig. 1 Flow chart of study participants

alone. Disability refers to the presence of 15 types of disabilities classified by the Ministry of Health and Welfare of Korea, such as physical disability, disability due to brain injury, visual disability. Registration of a disabled person is done through the process of submitting documents such as an assessment report based on the functional status determined by physician to National Pension Service office [29]. Residential areas were classified according to administrative districts, with the capital city of Seoul classified as Metropolitan city, six metropolitan cities with a population of over 1 million as Urban cities, and other cities as Rural areas. The household income was categorized into five levels: Q1 (< 20th percentile, lowest), Q2 (21th–40th percentile), Q3 (41th–60th percentile), Q4 (61th–80th percentile), or Q5 (81th–100th percentile, highest). The CCI is the summation of weighted scores assigned to many major health conditions [30]. The CCI is the summation of weighted scores assigned to many major health conditions and was calculated utilizing records for one year before first utilization date of participation in the pilot project.

Statistical analysis

Data on the demographic and health characteristics of participants were collected. To observe the changes before and after participation in the pilot project, the average and standard deviation of the pre- and post-measurement results were calculated. Regression analysis was performed using the generalized estimation equations considering the characteristics of repeated measurement data. Regression results are comparative analysis of the results of repeated measurements before and after project participation for the same subject, and were analyzed by adjusting potential confounding variables. Additionally, we performed the same analysis by sex and age. Age was divided into young-old (65–75 years old) and old-old (75 years or older) [31, 32]. The survey subjects were those who participated in the pilot project and who agreed to participate in the survey and signed the informed consent to participate form. This study was approved by the Institutional Review Board of the NHIS (approval number: 2022-HR-03-024).

Results

The older adults who participated in the pilot project were observed for an average of 217.6 days (SD: 241.8). Table 1 shows the general characteristics of older adults who participated in the pilot project. Of the participants, 72.6% were women and 27.4% were men. Regarding age distribution, 8.2% were 65–70 years old, 16.2% were 70–74 years old, 28.6% were 75–79 years old, and 47.0% were 80 years old or older. Regarding the region where they lived, 78.2% of the older adults lived in rural areas, followed by 21.6% and 0.2% who lived in urban and metropolitan cities, respectively. The proportion of older adults covered by medical aid was 31.8% while 68.2% were covered by the NHI. Older adults with high household income comprised 27.2% of the participants and those with low household income comprised 31.8%. As a result of determining the CCI score, older adults with CCI scores of 1 or higher comprised 90.3% of the participants. Older adults with disability and living alone comprised 32.1% and 62.5%, respectively.

Table 2 shows the changes in subjective quality of life, number of people who can help, and the number of people met before and after the older adults participated in the pilot project. Subjective quality of life significantly increased by 0.35 (95% CI 0.31, 0.39) after participation in the pilot project. The number of people who can help significantly increased by 0.09 (95% CI 0.05, 0.12) from 1.11 before participation to 1.20 after participation. On the other hand, the number of people met significantly decreased by 0.21 (95% CI −0.28, −0.13) from an average of 2.39 before participating in the pilot project to 2.19 after participating.

Table 3 shows the results for changes in subjective quality of life, the number of people who can help, and the number of people met before and after the older adults participated in the pilot project by sex and age. When analyzed by sex, subjective quality of life of men significantly increased by 0.36 (95% CI 0.29, 0.43), and score of women increased by 0.34 (95% CI 0.30, 0.39). The number of people who can help increased significantly increased by 0.12 for men (95% CI 0.06, 0.19) and by 0.07 (95% CI 0.04, 0.11) for women. The number of people met significantly decreased by 0.18 (95% CI −0.32, −0.03) for men, and by 0.22 (95% CI −0.31, −0.13) for women.

According to the results of the analysis by age, the scores for subjective quality of life significantly increased by 0.45 (95% CI 0.37, 0.53) for older adults aged 65–74. Meanwhile, the scores for older adults aged 75 and over significantly increased by 0.31 (95% CI 0.27, 0.36). The number of people who can help significantly increased by 0.13 (95% CI 0.06, 0.20) for older adults aged 65–74 and by 0.07 (95% CI 0.04, 0.10) for aged 75 and over. The number of people met significantly decreased by 0.32 (95% CI −0.49, −0.16) for older adults aged 65–74, and by 0.17 (95% CI −0.25, 0.09).

Discussion

This study aimed to evaluate the changes in the subjective quality of life and social relationships of older adults who participated in a pilot project for integrated care. In our study, the subjective quality of life and social relationship aspects of older adults demonstrated a significant improvement after participation in the pilot project compared with before participation.

Table 1 General characteristics of study subjects

Variables	Older adults who participated in pilot project of community care	
	N	%
Total	9,924	100.0
Sex		
Men	2,720	27.4
Women	7,204	72.6
Age		
65–70	812	8.2
70–74	1,606	16.2
75–79	2,838	28.6
80≤	4,668	47.0
Region		
Metropolitan city	20	0.2
Urban city	2,140	21.6
Rural area	7,763	78.2
Medical security		
National Health Insurance	6,764	68.2
Medical Aid	3,160	31.8
Household income		
Q1 (Lowest)	3,160	31.8
Q2	1,534	15.5
Q3	1,218	12.3
Q4	1,218	12.3
Q5 (Highest)	2,696	27.2
CCI		
0	964	9.7
1	1,592	16.0
2	1,662	16.7
3	1,554	15.7
4	1,307	13.2
5	1,000	10.1
6≤	1,845	18.6
Disability		
Yes	3,188	32.1
No	6,736	67.9
Living alone		
Yes	6,207	62.5
No	3,714	37.4

A study by Looman et al. (2014) reported that integrated care for older adults had a positive effect on the quality of life in the short term (three months) [18]. Our results confirmed that integrated care was effective in improving subjective quality of life in older adults over the longer term as data were obtained from observations over a longer period of time. A study by Aroogh et al. (2020) also reported that participation in community-based activities, interpersonal interactions, and care services increase the quality of life of older adults [33].

As an indicator of social relationships, the number of people who can help increased after participating in the pilot project, which can be interpreted as lowering the risk of older adults becoming socially isolated. Social isolation of older adults is influenced by aging and deteriorating health, as well as various factors in the community, such as the living environment and neighborhood [34]. Therefore, these results might have been interpreted as indicating that a series of integrated care processes was effective in reducing social isolation among older adults by providing services related to medical care, housing, and welfare from various caregivers according to their needs. Similar findings have been reported in a study by Karacsony et al. (2022), suggesting that integrated care services promote positive social interaction among older adults [35]. Additionally, trust and positive relationships with healthcare providers, coordinators, and case managers have been reported to have a crucial impact on social relationships among older adults [36].

Table 2 Result of Pre-post comparative analysis for subjective quality of life and social relationship

Outcomes	N	Pre-participation		Post-participation		Pre-post differences	Estimate (95% CI)		*p*-value
		MEAN	STD	MEAN	STD				
Subjective Quality of Life (unit; score)	9,695	4.59	2.02	4.93	2.00	0.35	0.35	(0.31, 0.39)	<.001
Number of people who can help (unit; number)	9,691	1.11	1.62	1.20	1.59	0.09	0.09	(0.05, 0.12)	<.001
Number of people met (unit; number)	9,731	2.39	3.80	2.19	3.17	-0.20	-0.21	(-0.28, -0.13)	<.001

CI Confidence Interval, *STD* Standard Deviation

When analyzing subjective quality of life by sex, the subjective quality of life improved after participation in the pilot project for both male and female, and men improving more than women. Subjective quality of life for men was lower than women in the survey conducted before participation in the pilot project and men could be more positively affected by integrated care. Among the subjects in our study, the proportion of people living alone was high, and in previous study, socially isolated men's quality of life was significantly lower than that of women [19].

The analysis by age group shows that subjective quality of life increased in all age groups, with the young-old group (65–74 years old) improving more than the old-old group (75 years or older). These results suggest that integrated care is more effective in early old age than late old age. Hence, early intervention for older adults is important. Shapiro et al. (2002) found that community-based programs using early intervention case management had an appreciable impact on older adults' lives [20]. Netuveli et al. (2006) reported that quality of life in early old age should be improved by addressing financial difficulties, functional problems, and a lack of trusting relationships with others [37]. In addition, according to other studies, the subjective quality of life of older adults is affected not only by age, but also by various factors such as physical health and social status; therefore, care interventions that consider these factors are necessary [38].

When analyzing the 'number of people who can help' among social relationships by sex, the number of people who can help was lower for men than for women, and after participating in the pilot project, there was a greater increase in men's cases. Several previous studies have reported higher levels of isolation among older men than women, even after controlling for other sociodemographic factors [19, 39]. Some have reported that women have larger social networks than men in old age [40, 41], which may explain our finding that women are less socially isolated than men. Studies have shown that physical and mental functions decline with age, which can lead to loss of independence, loss of mobility, and social isolation [42, 43].

In this study, when analyzed by age group, social isolation was resolved than before in all age groups, with the young-old group showing greater improvement than the old-old group. This suggests that older adults are more likely to improve their social relationships through integrated care in early old age. The social isolation of older adults who are in late old age and therefore more physically and mentally vulnerable, is more difficult to improve [21]. Therefore, early intervention to quickly identify and address threats to social isolation among older adults is critical for successful integrated care implementation.

Table 3 Result of Pre-post comparative analysis for subjective quality of life and social relationship by sex and age

Outcomes	Subgroup		N	Pre-participation		Post-participation		Pre-post differences	Estimate(95% CI)		p-value
				MEAN	STD	MEAN	STD				
Subjective Quality of Life (unit; score)	sex	Men	2,642	4.57	2.00	4.93	2.00	0.36	0.36	(0.29, 0.43)	<.001
		Women	7,053	4.59	2.03	4.94	2.00	0.34	0.34	(0.30, 0.39)	<.001
Number of people who can help (unit; number)		Men	2,645	1.01	1.80	1.15	1.86	0.13	0.12	(0.06, 0.19)	<.001
		Women	7,046	1.15	1.55	1.23	1.48	0.07	0.07	(0.04, 0.11)	<.001
Number of people met (unit; number)		Men	2,661	2.29	4.13	2.14	3.52	-0.15	-0.18	(-0.32, -0.03)	0.016
		Women	7,070	2.42	3.67	2.21	3.03	-0.22	-0.22	(-0.31, -0.13)	<.001
Subjective Quality of Life (unit; score)	age	65-74	2,371	4.56	2.12	5.01	2.07	0.45	0.45	(0.37, 0.53)	<.001
		75≤	7,324	4.60	1.98	4.91	1.97	0.31	0.31	(0.27, 0.36)	<.001
Number of people who can help (unit; number)		65-74	2,369	1.18	1.85	1.33	1.97	0.15	0.13	(0.06, 0.20)	<.001
		75≤	7,322	1.09	1.54	1.16	1.45	0.07	0.07	(0.04, 0.10)	<.001
Number of people met (unit; number)		65-74	2,380	2.57	4.40	2.27	3.21	-0.30	-0.32	(-0.49, -0.16)	<.001
		75≤	7,351	2.33	3.58	2.16	3.16	-0.17	-0.17	(-0.25, -0.09)	<.001

CI Confidence Interval, *STD* Standard Deviation

Among social relationship indicators, the number of people who can help increased, whereas the number of people that older adults met decreased after the pilot project. Also, in the analysis by sex and age, the number of people met decreased. This result may have been affected by COVID-19, which began in 2019 [44, 45]. Other studies similarly reported that the social activities of older adults decreased after COVID-19, with those of women decreasing more than those of men [46]. When analyzed by age group, the number of people met decreased more in the young-old group. A study by Chen (2021) reported that older adults in late old age (old-old group) spent more time in public than those in early old age (young-old group) during COVID-19; these factors may be related to our results [47].

Limitations

Although this study showed meaningful results, it had several limitations. First, as participants who had non-identifying data or did not use integrated care services were excluded from this study, these findings may not be generalizable to all older adults who need integrated care. Second, this study did not include older adults who did not participate in the pilot project for integrated care because of data limitations. In future studies, a comparative analysis should be conducted using a comparison group to confirm these effects more accurately. Third, in the project for integrated care in Korea, the type and extent of services provided to the participants differed according to their needs and the resources available in the region. Therefore, it was difficult to determine exactly which services contributed to improving the subjective quality of life as well as social relationships among older adults. Future research should develop a standardized service model to evaluate the performance of specific services or combinations of services. Fourth, because this is a long-term observational study, other factors may have influenced the results in addition to integrated care. Finally, there were restrictions on face-to-face services and social participation due to COVID-19. In the future, greater achievements in integrated care with reduced COVID-19 restrictions are expected.

Conclusions

Despite these limitations, this study is the first study to assess the results of the pilot project for integrated care conducted in Korea in terms of older adults' subjective quality of life and social relationships. We found that allowing older adults to live in their own homes and communities, rather than in nursing hospitals or facilities, contributed to their happiness and satisfaction and reduce their risk of social isolation. These achievements can serve as the basis for developing and expanding integrated care in the future.

Authors' contributions
HJ Lee were responsible for overall research design, review of previous studies, data collection, statistical analysis, and result description, and JW Choi and JY Shin reviewed all processes. AJ Yoo and HJ Bang contributed to data collection and previous research review. All authors reviewed the manuscript.

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Data availability
The data that support the findings of this study are available from NHIS but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of NHIS.

Declarations

Ethics approval and consent to participate
The data used in this study are from National Health Insurance Service (NHIS) data and a survey conducted by local governments that participated in the pilot project for integrated care. The survey subjects were those who participated in the pilot project and who agreed to participate in the survey and signed the consent form. This study was approved by the Institutional Review Board of the NHIS (approval number: 2022-HR-03-024).

Consent for publication
Not applicable in this section.

Competing interests
The authors declare no competing interests.

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