RCPHN
Research in Community and Public Health Nursing

Original Article

pISSN 2983-0648 · eISSN 2288-4203
Res Community Public Health Nurs 2025;36(3):315-327
https://doi.org/10.12799/rcphn.2025.01067

Path Analysis of Factors Influencing Health-Related Quality of Life for Community-Dwelling Vulnerable Older Adults with Chronic Diseases in Korea

Hyun-Ju Lee

Associate Professor, College of Nursing, Catholic University of Pusan, Busan, Korea

Purpose: This study aims to construct and verify a path model for the factors influencing health-related quality of life (HRQoL) in community-dwelling vulnerable older adults with chronic diseases in Korea.
Methods: The sample included 195 community-dwelling vulnerable older adults aged 65 years and above with chronic diseases in Korea. Structured questionnaires were collected from April to June 2022. Data were analyzed using SPSS 28.0 and AMOS 28.0 programs.
Results: The hypothesized path model significantly explained HRQoL in community-dwelling vulnerable older adults with chronic diseases, with a high explanatory power (48.0%). Self-rated health (SRH) and self-efficacy for managing chronic disease (SEMCD) had a significant direct effect on HRQoL. The number of diseases, depressive symptoms, social support, and digital literacy indirectly affected HRQoL.
Conclusion: To improve HRQoL in community-dwelling vulnerable older adults with chronic diseases, integrated community health-management programs should focus on enhancing SEMCD and SRH, while incorporating depression screening, social support, and digital literacy education.

Keywords: Aged; Chronic diseases; Health information management; Quality of life; Vulnerable population

Introduction

Background

As life expectancy increases with advancements in medical technology, the population of older adults in Korea continues to grow. Adults aged 65 years and older constitute approximately 20.3% of the total population in 2025, and this proportion is expected to sharply increase to approximately 40.1% by 2050 [1]. Korea is experiencing the fastest rate of population aging worldwide [2]. Moreover, it has a high proportion of vulnerable older adults. According to a report by the Organization for Economic Co-operation and Development (OECD), Korea has been reported as the country with the highest poverty rate among older adults since 2009 [3]. The 2023 National Basic Livelihood Security Survey in Korea also reports that the proportion of households with members aged 65 years and above among all recipient households is approximately 40.3%, which continues to increase, resulting in significant social burdens [4].

Vulnerable older adults with chronic diseases often experience overall functional decline due to aging and illness, leading to improper disease management, such as lifestyle improvements, including diet and physical activity, medication adherence, and regular checkups [5-7]. Moreover, psychosocial problems, such as social isolation, decreased self-esteem, uncertainty, and depression resulting from the loss of social roles and economic difficulties, serve as negative factors in managing diseases and maintaining functionality for older adults with chronic diseases [8,9]. These problems progress the diseases, ultimately leading to a de-

Received: March 28, 2025; **Revised:** August 22, 2025; **Accepted:** August 23, 2025
Corresponding author: Hyun-Ju Lee
College of Nursing, Catholic University of Pusan 57, Oryundae-ro, Geumjeong-gu, Busan, 46252, Korea
Tel: +82-51-510-0776 Fax: +82-51-510-0747 Email: iodes@cup.ac.kr

© 2025 Korean Academy of Community Health Nursing
This is an Open Access article distributed under the terms of the Creative Commons Attribution NoDerivs License (https://creativecommons.org/licenses/by-nd/4.0) which allows readers to disseminate and reuse the article, as well as share and reuse the scientific material. It does not permit the creation of derivative works without specific permission.

cline in the health-related quality of life (HRQoL) of older adults with chronic diseases [8,10]. This has severe consequences for vulnerable older adults who lack access to healthcare services compared with the access available to non-vulnerable older adults, resulting in health disparities [10,11]. Accordingly, community-based medical welfare policies are required to actively manage health and improve the HRQoL of vulnerable older adults with chronic diseases. In line with this, Korea is preparing to implement the "Act on Integrated Support for Community Care Including Medical Care and Nursing Services" in 2026, which aims to enhance the delivery of comprehensive, community-based services for vulnerable populations, including older adults living with chronic conditions [12].

Recently, healthcare access has shifted from traditional methods involving medical professionals or mass media to online sources through digital media, including various information and communication technologies (ICTs) [13]. Since the COVID-19 pandemic, individual use of digital technology in daily life has become a necessity rather than a choice [11,14]; however, the digital literacy of older adults remains lower than that of other generations [15,16]. Vulnerable older adults, in particular, have a lesser ability to use digital information [17].

Digital literacy of older adults affects their psychological well-being, quality of life (QoL), and life satisfaction [18]. Internet use has been reported to contribute to life satisfaction and health among older adults [19]. Several countries are applying health-promoting activities, such as disease management, diet, online exercise classes, smartphone applications, and robots based on ICTs, to improve the HRQoL [20]. The Korean government attempted to expand the infrastructure for digital healthcare services targeting older adults to keep health disparities from growing during the COVID-19 pandemic [21].

To promote health equity by improving the HRQoL of community-dwelling vulnerable older adults with chronic diseases and reducing social costs of their treatment and disease management, it is necessary to implement continuous and integrated community-based interventions and policies. To this end, it is necessary to comprehensively analyze factors influencing the HRQoL, including digital literacy. However, most studies on community-dwelling older adults with chronic diseases have focused on the QoL of individuals with specific chronic diseases [11,22,23] or the relationship between sociodemographic factors or a few physical and psychological variables and QoL or their fragmentary influence [5,8,9,24-27]. In addition, although several studies have examined health-related outcomes using digital interventions [28,29], few have investigated the structural pathways through which digital literacy influences HRQoL, especially among socioeconomically vulnerable populations.

Wilson and Cleary's [30] model presented the HRQoL by integrating the biomedical paradigm (focusing on the causes of disease) with the social science paradigm (focusing on the functioning and overall well-being of patients). The model has five health concepts—biological and physiological variables, symptom status, functional status, general health perceptions, and overall QoL [30].

This model has been used as a theoretical framework in previous studies to assess the overall HRQoL of individuals with osteoarthritis [31], older women following bilateral total knee replacement [32], older adults in long-term care facilities [33], and community-dwelling older adults with chronic diseases [8,34]. Therefore, it serves as a valuable framework for explaining the HRQoL of vulnerable older adults with chronic conditions from an integrated perspective. However, few studies have applied this model to examine the multidimensional factors influencing HRQoL in this population using path analysis. Moreover, no studies have incorporated digital literacy into the model, despite the increasing reliance on digital platforms for healthcare access and information. Thus, Wilson and Cleary's model [30] remains a useful and comprehensive theoretical framework for understanding the HRQoL of vulnerable older adults with chronic diseases in today's digital healthcare environment.

Aim and Objectives

The purpose of this study is to assess the HRQoL of community-dwelling vulnerable older adults with chronic diseases and to develop and validate a path model that investigates the relationships between the key factors influencing the HRQoL based on Wilson and Cleary's model [30]. Furthermore, the aim is to provide foundational data for developing ICTs-based health intervention programs to improve the HRQoL of community-dwelling vulnerable older adults with chronic diseases. The specific research goals are as follows:

- To develop a hypothetical path model explaining the HRQoL of community-dwelling vulnerable older adults with chronic diseases.
- To propose a final path model that explains and predicts the HRQoL of community-dwelling vulnerable older adults with chronic diseases by validating the fit between the hypothetical path model and the collected data.

Methods

Study design

A path analysis of a hypothetical model for the HRQoL of community-dwelling vulnerable older adults with chronic diseases and related factors based on Wilson and Cleary's [30] model was developed.

Participants and setting

The participants were community-dwelling vulnerable older adults aged 65 years or older with chronic diseases residing in one metropolitan city and five rural areas in Korea. The selection criteria included those who had been diagnosed with, were receiving treatment for one or more major chronic diseases (e.g., hypertension, hyperlipidemia, chronic lower back pain, diabetes mellitus, cerebrovascular disease, and osteoarthritis), and were receiving livelihood benefits from the government owing to economic difficulties. Participants with cognitive disorders were excluded.

A minimum sample size of 150 is required to apply the maximum likelihood method for path analysis; the recommended sample size is 15–20 times the number of parameters to be estimated [35]. Thus, considering an expected dropout rate of approximately 20%, the target number of participants was set at 210. Two hundred and four questionnaires were collected, and data from 195 participants were used for the final analysis, excluding nine cases with invalid responses.

Conceptual framework

This study's conceptual framework was grounded in Wilson and Cleary's model [30], which posits that biological/physiological variables influence symptom status, symptom status influences functional status, functional status shapes general health perceptions, and these perceptions ultimately determine overall quality of life (QoL). Individual and environmental characteristics are assumed to affect all levels except the biological/physiological level.

The components were operationalized as follows: number of diseases (biological/physiological variables) [8,31-33]; depressive symptoms (symptom status) [8,32,33]; self-efficacy for managing chronic diseases (SEMCD; functional status) [32]; self-rated health (SRH; general health perceptions) [8,31,34,36]; and HRQoL (overall QoL) [8,36]. Social support represented environmental characteristics [8,31-34,36].

Drawing on prior studies [8,31-34,36], a primary sequence was specified whereby a greater number of diseases would be associated with more depressive symptoms, higher depressive symptoms with lower SEMCD, lower SEMCD with poorer SRH, and poorer SRH with lower HRQoL. In addition, social support was hypothesized to influence depressive symptoms, SEMCD, SRH, and HRQoL. Furthermore, depressive symptoms were allowed to affect SRH and HRQoL directly, and SEMCD was allowed to affect HRQoL directly.

As previous research has linked digital literacy to self-efficacy, QoL, and social connectedness [15,37,38], associations between digital literacy, SEMCD, SRH, social support, and HRQoL were also posited. Sociodemographic characteristics (e.g., sex and age) known to influence HRQoL [39] were included as control variables (Figure 1).

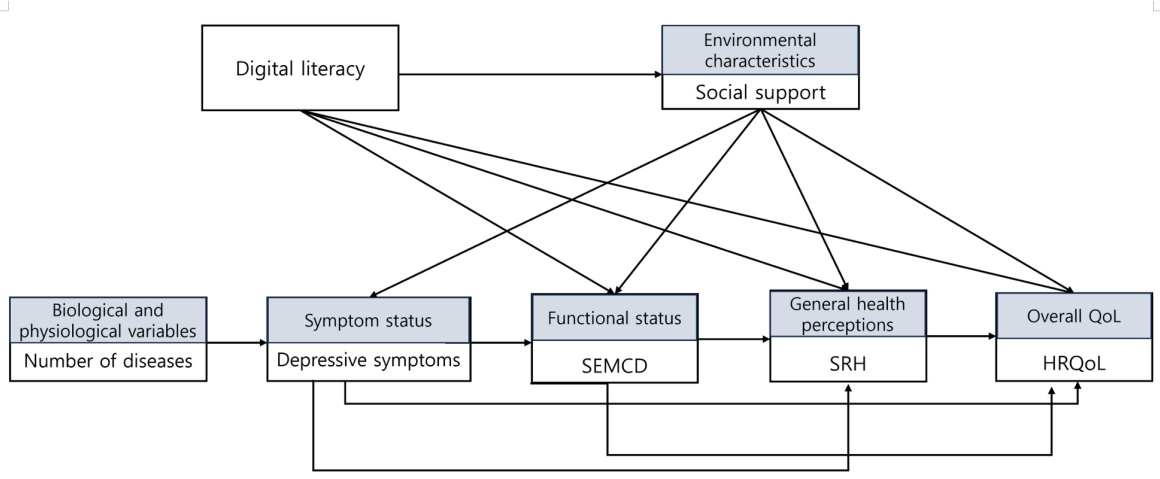


Figure 1. Conceptual framework of this study.

Measurements

Sociodemographic questionnaire

The general and health-related characteristics included sex, age, marital status, religion, educational level, living arrangement, region of residence, employment status, number of diseases, and number of medications.

Depressive symptoms

Depressive symptoms were measured using the Short Form Geriatric Depression Scale, developed by Yesavage and Sheikh [40] and translated into Korean by Kee [41]. This scale consists of 15 dichotomous items in short form, scoring "yes" as 1 and "no" as 0, with higher scores indicating higher depressive symptom levels. Participants were categorized as having no depressive symptoms (0–4 points), mild depressive symptoms (5–9 points), or severe depressive symptoms (10 points or above). Cronbach's α was .90 at the time of the tool's development and .86 in this study.

SEMCD

SEMCD was measured using the SEMCD 6-item Scale developed by Lorig et al. [42] and translated into Korean by Kim et al. [43]. The six items include four on symptom management and two on health behavior. The instrument uses a 10-point Likert scale ranging from "not at all confident" (1 point) to "totally confident" (10 points), with higher scores indicating greater SEMCD. Cronbach's α was .96 in Kim et al. [43] and .94 in this study.

Social support

Social support was measured using the Multidimensional Scale of Perceived Social Support developed by Zimet et al. [44] and translated into Korean by Shin and Lee [45]. This scale consists of 12 items, divided into three subcategories—family, friends, and a significant other—each with four items. It is rated on a Likert scale ranging from "very strongly disagree" (1 point) to "very strongly agree" (5 points), with higher scores indicating higher levels of social support. Cronbach's α was .91 in Shin and Lee [45] and .95 in this study.

Digital literacy

Digital literacy was measured using the tool developed by An et al. [46] to assess older adults' ability to utilize health information on the internet. The instrument consists of 18 items, divided into four domains: instrumental use, information production and sharing, network expansion, and social participation. Each item is rated on a 5-point Likert scale ranging from "strongly disagree" (1 point) to "strongly agree" (5 points), with higher scores indicating greater digital literacy. Cronbach's α was .98 in both An et al. [46] and this study.

SRH

SRH was assessed using one item from the Korea National Health and Nutrition Examination Survey (KNHANES) [47], conducted annually by the Korea Disease Control and Prevention Agency. This item is rated on a 5-point Likert scale ranging from "very good" to "very poor."

HRQoL

HRQoL was assessed using the Korean Euro-QoL 5-dimension (EQ-5D) [27]. The EQ-5D asks respondents to select one of five responses (no, slight, moderate, severe problems, and unable) for five items: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The health status is calculated by applying weights to the measures for each of the five items to obtain the EQ-5D index, which is the HRQoL score. The maximum and minimum scores are 1 and −1, respectively, with scores closer to 1 indicating better HRQoL. Cronbach's α was .88 in this study.

Data collection

Data were collected for two months from April 2022 using a structured questionnaire at three community welfare centers in the metropolitan city and at a single primary health care post in each of the five rural areas. Prior to data collection, the administrators of each institution were asked for their cooperation in conducting this study. The questionnaire took 15 to 20 minutes to complete, and a research assistant helped those who had any difficulty.

Ethical considerations

Before data collection, approval was obtained from the Institutional Review Board of the Catholic University of Pusan (IRB No. CUPIRB-2021-067). For all measurements, except the sociodemographic questionnaire, the developers and adaptors were contacted by email, and permission to use the instruments was obtained. Before conducting the survey, the study's purpose and methods were explained to the participants, and they were ensured confidentiality. They were allowed to withdraw at any time from the study. Written informed consent was obtained from all participants. Personal information was coded to maintain anonymity. All participants who completed the survey were given a small gift voucher as compensation.

Data analysis

The data were analyzed using SPSS 28.0 and Amos 28.0 (IBM Corp., Armonk, NY, USA). The general and health-related characteristics of the participants were analyzed using descriptive statistics, and the correlations between the variables were examined using the Pearson correlation coefficient. Model fit testing was conducted using the chi-square statistic (χ^2), goodness of fit index (GFI), comparative fit index (CFI), normed fit index (NFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA). The model was considered an acceptable fit if the RMSEA was less than .08, other fit indexes were .90 or higher and closer to 1, and normed χ^2 (χ^2/df) was less than 3.0 [35].

Results

Participants' characteristics and HRQoL

Of the participants, 74.4% were female, and most were over 80 years of age (47.2%). Meanwhile, 72.3% of the participants were widowed, and 70.3% lived alone. The majority (85.6%) did not engage in economic activities. The mean number of diseases among the participants was 3.24, and the number of medications per day was 7.67 (Table 1).

Among the participants' characteristics, the HRQoL level showed significant differences regarding age (F = 3.33, p = .038), marital status (t = 5.26, p < .001), living arrangement (t = 9.74, p < .001), type of residence (t = −4.59, p < .001), employment status (t = −5.46, p < .001), number of diseases (F = 5.18, p < .001), number of medications (F = 3.14, p = .045), and depression group

Table 1. Health-related Quality of Life according to Participants' Characteristics (*N*=195)

Characteristics	Categories	Mean ± SD	n (%)	HRQoL		
				Mean ± SD	t/F	*p*
Sex	Male		50 (25.6)	0.67 ± 0.19	1.00	.318
	Female		145 (74.4)	0.64 ± 0.21		
Age (years)	65–69[a]	78.12 ± 6.87	31 (15.9)	0.66 ± 0.22	3.33	.038
	70–79[b]		72 (36.9)	0.69 ± 0.18		c < a,b[†]
	≥ 80[c]		92 (47.2)	0.61 ± 0.22		
Marital status	Yes		54 (27.7)	0.75 ± 0.15	5.26	< .001
	No		141 (72.3)	0.61 ± 0.21		
Religion	Yes		99 (50.8)	0.65 ± 0.21	0.17	.866
	No		96 (49.2)	0.64 ± 0.21		
Educational level	None		56 (28.7)	0.60 ± 0.19	1.87	.135
	Elementary school		59 (30.3)	0.64 ± 0.21		
	Middle school		35 (17.9)	0.69 ± 0.21		
	≥ High school		45 (23.1)	0.68 ± 0.22		
Living arrangement	Alone[a]		137 (70.3)	0.61 ± 0.21	9.74	< .001
	With spouse[b]		44 (22.6)	0.75 ± 0.16		a,c < b[†]
	With children[c]		14 (7.2)	0.66 ± 0.24		
Region of residence	Urban		152 (77.9)	0.62 ± 0.22	-4.59	< .001
	Rural		43(22.1)	0.74 ± 0.13		
Employment status	Yes		28 (14.4)	0.78 ± 0.12	-5.46	< .001
	No		167 (85.6)	0.62 ± 0.21		
Number of diseases	≤ 3	3.24 ± 1.83	117 (60.0)	0.71 ± 0.18	5.18	< .001
	≥ 4		78 (40.0)	0.55 ± 0.22		
Number of medications	≤ 5[a]	7.67 ± 6.08	87 (44.6)	0.68 ± 0.21	3.14	.045
	6–8[b]		38 (19.5)	0.65 ± 0.21		c < a,b[†]
	≥ 9[c]		70 (35.9)	0.60 ± 0.21		
Depression group (GDS score)	Normal (< 5)[a]		76 (39.0)	0.76 ± 0.16	28.95	< .001
	Mild (5–9)[b]		60 (30.8)	0.63 ± 0.19		c < b < a[†]
	Severe (≥ 10)[c]		59 (30.2)	0.52 ± 0.20		

[†]Scheffe's test; GDS = geriatric depression scale; HRQoL = health-related quality of life.

Table 2. Descriptive Statistics of the Study Variables (*N*=195)

Variables	Mean ± SD	Min	Max	Skewness	Kurtosis
Number of diseases	3.24 ± 1.83	1	11	0.79	1.07
Depressive symptoms	6.77 ± 4.30	0	15	0.21	-1.14
SEMCD	5.43 ± 2.32	1.00	10.00	0.08	-0.78
Digital literacy	1.42 ± 0.81	1.00	4.78	2.21	4.23
Social support	3.19 ± 1.03	1.00	5.00	-0.35	-0.65
SRH	2.57 ± 0.92	1.00	5.00	0.00	-0.32
HRQoL	0.65 ± 0.21	0.01	0.90	-0.74	-0.53

SEMCD = self-efficacy for managing chronic disease; SRH = self-rated health; HRQoL = health-related quality of life.

Table 3. Correlations among Observed Variables (*N*=195)

Variables	1	2	3	4	5	6	7
	r (*p*)						
1. Number of diseases	1						
2. Depressive symptoms	.27 (< .001)	1					
3. SEMCD	-.25 (< .001)	-.48 (< .001)	1				
4. SRH	-.37 (< .001)	-.50 (< .001)	.47 (< .001)	1			
5. Digital literacy	-.20 (.004)	-.25 (< .001)	.23 (.001)	.32 (< .001)	1		
6. Social support	-.23 (.001)	-.59 (< .001)	.33 (< .001)	.35 (< .001)	.27 (< .001)	1	
7. HRQoL	-.39 (< .001)	-.51 (< .001)	.51 (< .001)	.64 (< .001)	.26 (< .001)	.39 (< .001)	1

SEMCD = self-efficacy for managing chronic disease; SRH = self-rated health; HRQoL = health-related quality of life.

(F = 28.95, p < .001) (Table 1).

Descriptive statistics and normality test of the observed variables

The means of key variables were depressive symptoms 6.77 ± 4.30, SEMCD 5.43 ± 2.32, social support 3.19 ± 1.03, digital literacy 1.42 ± 0.81, SRH 2.57 ± 0.92, and HRQoL 0.65 ± 0.21 (Table 2). The skewness of the measured variables was −0.74 to 1.21, which is within ± 2, and the kurtosis was −1.14 to 3.23, which is within ±4, indicating the data can be assumed to follow a normal distribution.

Correlations among the observed variables

HRQoL showed a significant correlation with the number of diseases (r = −.39, p < .001), depressive symptoms (r = −.51, p < .001), SEMCD (r = .51, p < .001), digital literacy (r = .64, p < .001), social support (r = .26, p < .001), and SRH (r = .39, p < .001) (Table 3).

Verification of hypothesis model path analysis

The hypothesis path model demonstrated acceptable fit ($\chi^2(p)$ = 4.61(.100), χ^2/df = 2.31, GFI = .99, CFI = .99, NFI = .99, TLI = .93, RMSEA = .06). The path model and standardized path coefficients are presented in Figure 2.

Table 4, which presents the standardized estimates effect of the final model, shows that digital literacy had a significant direct effect on social support (β = .27, p < .001) and number of diseases (β = .14, p = .012), and social support (β = −.56, p = .001) had a significant direct effect on depressive symptoms. Depressive symptoms had a direct effect on SEMCD (β = −.41, p < .001). Digital literacy and social support had a significant indirect effect (β = .80, p < .001; β = .23, p < .001) and total effect (β = .19, p = .015; β = .29, p < .001) on SEMCD.

SEMCD had a direct effect on SRH (β = .25, p = .002). depressive symptoms and digital literacy had a significant direct (β = −.29, p < .001; β = .18, p = .004), indirect (β = −.11, p = .002; β = .10, p < .001), and total effect (β = −.39, p < .001; β = .29, p = .002) on SEMCD. Social support had an indirect effect (β = .23, p < .001) and a total effect (β = .28, p < .001) on SEMCD. SRH had a direct effect on HRQoL (β = .43, p < .001). SEMCD had a direct (β = .19, p = .004), indirect (β = .11, p < .001), and total effect (β = .30, p < .001) on HRQoL. Depressive symptoms, digital literacy, and social support had a significant indirect effect (β = −.25, p < .001; β = .21, p < .001; β = .25, p < .001) and total effect (β = −.38, p < .001; β = .23, p < .001; β = .35, p < .001) on

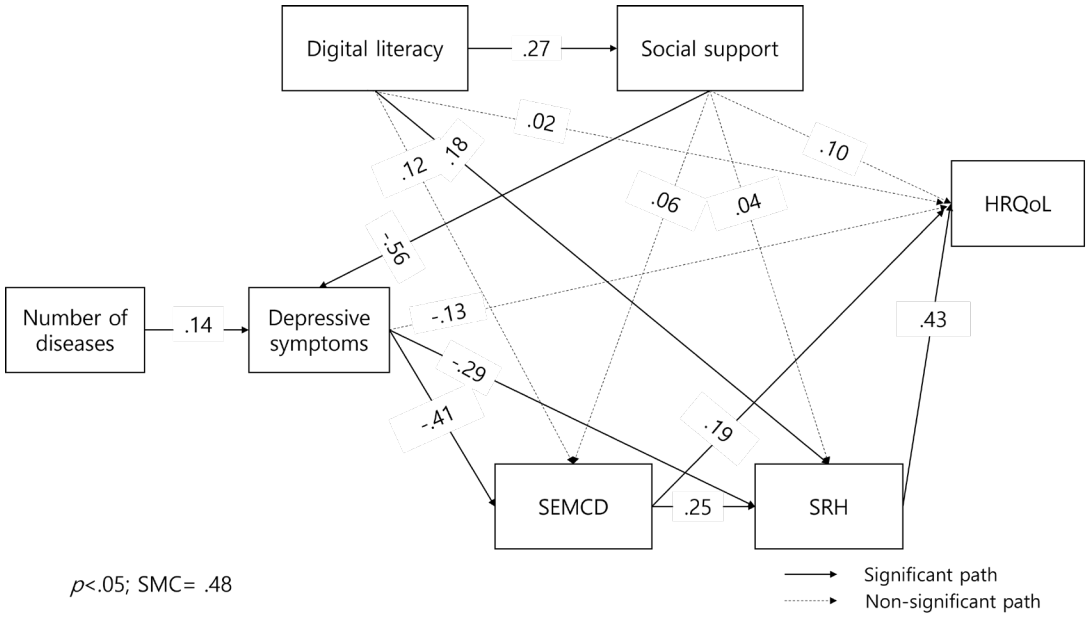


Figure 2. Path diagram in the final model.

Table 4. Standardized Estimates Effect of the Final Model (N=195)

Endogenous variables	Predicting variables	β	SE	CR	*p*	Direct effect β (*p*)	Indirect effect β (*p*)	Total effect β (*p*)	SMC
Social support	Digital literacy	.27	.09	3.90	< .001	.27 (< .001)		.27 (< .001)	.07
Depressive symptoms	Number of diseases	.14	.14	2.40	.016	.14 (.012)		.14 (.012)	.37
	Social support	-.56	.24	-9.59	< .001	-.56 (< .001)		-.56 (< .001)	
SEMCD	Number of diseases						-.06 (.009)	.06 (.009)	.24
	Depressive symptoms	-.41	.04	-5.30	< .001	-.41 (< .001)		-.41 (< .001)	
	Digital literacy	.12	.19	1.77	.077	.12 (.103)	.08 (< .001)	.19 (.015)	
	Social support	.06	.18	0.75	.453	.06 (.461)	.23 (< .001)	.29 (< .001)	
SRH	Number of diseases						.06 (.007)	.06 (.007)	.33
	Depressive symptoms	-.29	.02	-3.74	< .001	-.29 (< .001)	-.11 (.002)	-.39 (< .001)	
	SEMCD	.25	.03	3.89	< .001	.25 (.002)		.25 (.002)	
	Digital literacy	.18	.07	2.96	.003	.18 (.004)	.10 (< .001)	.29 (.002)	
	Social support	.04	.07	0.60	.551	.04 (.583)	.23 (< .001)	.28 (< .001)	
HRQoL	Number of diseases						.05 (.007)	.05 (.007)	.48
	Depressive symptoms	-.13	.00	-1.81	.070	-.13 (.070)	-.25 (< .001)	-.38 (< .001)	
	SEMCD	.19	.01	3.09	.002	.19 (.004)	.11 (< .001)	.30 (< .001)	
	SRH	.43	.01	6.84	< .001	.43 (.001)		.43 (< .001)	
	Digital literacy	.02	.01	0.33	.738	.02 (.677)	.21 (< .001)	.23 (< .001)	
	Social support	.10	.01	1.49	.137	.10 (.113)	.25 (< .001)	.35 (< .001)	

CR = critical ratio; SE = standard error; SMC = squared multiple correlations; SEMCD = self-efficacy for managing chronic disease; SRH = self-rated health; HRQoL = health-related quality of life.

HRQoL. These variables explained 48.0% of the variance in HRQoL.

Discussion

In this study, a path analysis was conducted to develop and validate a hypothetical model based on Wilson and Cleary's [30]

model and previous studies to determine factors affecting the HRQoL of community-dwelling vulnerable older adults with chronic diseases. The HRQoL score of the participants was 0.65 ± 0.21 out of 1 point, which was lower than the 0.84–0.88 reported in previous studies of community-dwelling older adults [48] and older adults with complex chronic diseases [8] using the same instrument. Compared with a previous finding that the QoL of older adults with chronic diseases receiving medical care benefits was significantly lower than that of those with health insurance [23], the lower QoL in the present study may be attributable to the participants being older adults with low economic status who were receiving livelihood benefits from the government.

Vulnerable older adults with chronic diseases have weak social support systems and lack access to healthcare services compared with the access available to non-vulnerable older adults owing to lower education and economic status [49,50]. This causes diseases to worsen and manifest as psychosocial problems, such as social isolation, lower self-esteem, and depression, leading to lower HRQoL [51,52]. Therefore, to improve the HRQoL of community-dwelling vulnerable older adults with chronic diseases, the public sector, including government organizations, should provide them with financial support, social support, and education on disease and health management in association with various related institutions.

Path analysis showed that, in community-dwelling vulnerable older adults with chronic diseases, SRH exerted the largest direct effect on HRQoL, and depressive symptoms and SEMCD were significant predictors of SRH. In other words, higher SRH levels, led to higher HRQoL, which aligns with Yu et al. [53], who analyzed KNHANES data and reported that SRH had the greatest impact on the QoL of older Koreans. Moreover, a path analysis of HRQoL in community-dwelling older adults receiving long-term care insurance in-home services [33] similarly revealed that SRH had the greatest direct effect on HRQoL. The centrality of subjective health appraisals is further supported by a structural model of QoL in patients with thyroid cancer [36], in which illness perception emerged as the most influential determinant of QoL.

SRH is a subjective indicator of an individual's health status, including physical, mental, social, and functional aspects [54]. For older adults, it has a greater impact on life satisfaction or QoL than do objective health indicators, such as the type or severity of diseases [55,56]. Sadeghipour Rousari et al. [57] reported that older adults who strongly perceive SRH demonstrated greater independence in daily life than did in those with lower SRH. Therefore, to improve HRQoL for community-dwelling vulnerable older adults with chronic diseases, it is necessary to improve SRH.

SEMCD had a significant effect on HRQoL, both directly and indirectly via SRH. This pattern is consistent with findings based on Wilson and Cleary's model [30], including a study in community-dwelling older adults reporting an effect of self-care agency on HRQoL through SRH [33] and a study of older women with knee osteoarthritis after bilateral total knee replacement showing that self-efficacy exerted both direct and indirect effects on HRQoL [32].

In individuals with chronic diseases, SEMCD denotes perceived capability to undertake disease management actions [42]. Patients with higher SEMCD more proactively engage in and sustain disease management behaviors despite disease-related physical and psychological functional decline [58]. This finding supports reports of concomitant improvements in SEMCD and SRH in health management interventions for individuals with chronic diseases [59], as well as prior evidence that higher self-efficacy is associated with better SRH and higher HRQoL [60]. Previous studies on improving HRQoL for patients with chronic diseases have used SEMCD as a primary outcome to evaluate intervention effectiveness [61,62]. Accordingly, communities may consider implementing integrated health management programs to strengthen SEMCD among community-dwelling vulnerable older adults with chronic diseases, thereby positively influencing SRH and HRQoL.

Depressive symptoms were higher among individuals with more comorbidities and lower social support, and they had a significant indirect effect on HRQoL via SEMCD and SRH. This supports Wilson and Cleary's model [30], in which symptom burden, shaped by biological and physiological variables, influences HRQoL primarily through proximal mediators such as functional status and general health perceptions. According to the present findings—and as observed in a structural model of older adults with degenerative arthritis [33]—the direct path from depressive symptoms to HRQoL was not significant once SEMCD and SRH were included.

Nevertheless, previous studies have identified depression as a key factor affecting the HRQoL of older adults with chronic diseases [8,63]. This apparent discrepancy may indicate that, in vulnerable community-dwelling older adults, the influence of depressive symptoms operates primarily through self-management capability and SRH rather than as a unique direct effect. In particular, vulnerable older adults have weaker economic and social support systems, resulting in continuous social isolation, anxiety, and depression that can lead to severe outcomes, including suicide [64]. From a practical perspective, community programs for vulnerable older adults with chronic diseases should facilitate ac-

cess to local resources (e.g., community mental health and welfare centers) for routine depression screening and sustained counseling, and foster social connectedness through peer support groups. In parallel, strengthening public social support through social security policies can help mitigate social isolation, anxiety, and depression. By enhancing SEMCD and SRH, these strategies are expected to improve HRQoL.

Social support did not have a significant direct effect on HRQoL; rather, it had a direct effect on depressive symptoms and thereby an indirect effect on HRQoL through SEMCD and SRH. This differs from prior studies reporting that social support exerts direct effects not only on depressive symptoms but also on SEMCD [33] and HRQoL [31,32,34,36]. The present findings suggest that, in this population, the influence of social support on HRQoL operates primarily through proximal mediators—depressive symptoms, SEMCD, and SRH—rather than via a distinct direct path, and that discrepancies with previous reports may reflect differences in the types of social support assessed, HRQoL measurement instruments used, and sample characteristics. Accordingly, future longitudinal and intervention studies that control for support type and measurement differences are warranted to re-examine the relative contributions of direct and indirect effects.

Digital literacy did not exhibit a significant direct effect on HRQoL; rather, it contributed indirectly through a sequential mediation pathway in which higher digital literacy was associated with greater social support, reduced depressive symptoms, and subsequent increases in SEMCD and SRH, culminating in improved HRQoL. In addition, digital literacy showed a significant association with SRH, suggesting an auxiliary SRH pathway to HRQoL. These findings partly accord with prior reports indicating that, among community-dwelling older adults with low socioeconomic status, digital literacy exerts a positive indirect effect on well-being and QoL via social connectedness [65], and with studies reporting significant correlations between digital literacy and older adults' QoL [18,37,38].

The average digital literacy score was 1.42 ± 0.81, lower than the 2.02 ± 0.74 reported in previous research [46], supporting the result that digital literacy is lower among vulnerable older adults than among the general population of older adults [17]. Given the expanding role of ICT—and their heightened salience for chronic disease management in the post-COVID-19 era [11]—community-based programs to enhance digital literacy among vulnerable older adults are warranted. Such programs should be delivered in partnership with local resources and provide sustained, practical instruction (e.g., basic smartphone use, online messaging competence, and health app utilization) to strengthen social connectedness and alleviate depressive symptoms, thereby improving SEMCD and SRH and, in turn, HRQoL.

Given the global trend of population aging [8], establishing and implementing a community-based integrated healthcare delivery system is essential to enable older adults to maintain their QoL within familiar environments [66]. In response, the Korean government has implemented policies to provide integrated care for vulnerable community-dwelling populations. Building on the present findings, interventions to improve HRQoL among community-dwelling vulnerable older adults should prioritize strengthening SRH and SEMCD. SRH may be enhanced through tailored health information and counseling, and SEMCD through self-management coaching; in parallel, while integrating depression screening and intervention, linkage to social support networks and digital literacy training can strengthen the indirect pathways influencing HRQoL

Conducted in Korea—a country with the highest old-age poverty rate among OECD members [3]—this study delineates, within the Wilson and Cleary model [30], the path-level determinants of HRQoL in vulnerable older adults and provides a theory-grounded foundation for community-integrated strategies, including programs to enhance digital literacy and ICT-enabled health promotion initiatives. These contributions constitute the significance of this study.

However, caution is required in generalizing the results because participants were selected through convenience sampling. Furthermore, as individual characteristics (e.g., age, marital status, living arrangement, region of residence, and employment status) were set as control variables to examine the direct and mediating effects of key variables on HRQoL, the scope for capturing the full direct and indirect effects of related factors was limited. Future research should address these limitations and rigorously test the proposed sequential mediation whereby digital literacy influences HRQoL through social support, depressive symptoms, SEMCD, and SRH.

Conclusions

Based on the path analysis, the HRQoL of community-dwelling vulnerable older adults was explained primarily by the largest direct effect of SRH, and SEMCD showed both a direct effect on HRQoL and an additional indirect effect via SRH, identifying SEMCD as a key mediator and a primary target for intervention. The number of diseases, depressive symptoms, social support, and digital literacy influenced HRQoL indirectly. This overall pattern is consistent with the Wilson and Cleary's framework

[30], in which symptoms, functioning, and general health perceptions contribute to QoL.

Accordingly, integrated community health management programs aimed at improving HRQoL in community-dwelling vulnerable older adults should be designed, with the enhancement of SEMCD and SRH as first-line objectives. In conjunction, screening and targeted interventions for depressive symptoms, strengthening of social support systems, and education to improve digital literacy should be combined to bolster the indirect pathways, adopting a multidimensional, patient-centered approach. Furthermore, future research should enhance explanatory power and extend the model by considering various physical functioning and sociodemographic factors set as control variables in this study.

ORCID

Hyun-Ju Lee, https://orcid.org/0000-0002-7824-6559

Conflict of interest

The author declared no conflict of interest.

Funding

This work was supported by a grant from the National Research Foundation of Korea, funded by the Korean government (MSIT) (No. 2021 R1F1A1048080). The funder had no role in the study design, data collection, analysis, or interpretation, nor in the writing of the report or the decision to submit the article for publication.

Authors' contributions

Hyun-Ju Lee contributed to conceptualization, data curation, formal analysis, funding acquisition, methodology, writing-original draft, review & editing, and investigation.

Data availability

The data used in this study are available on reasonable request from the corresponding author, Hyun-Ju Lee. The data are not publicly available because of ethics and privacy restrictions.

Acknowledgements

I would like to express my gratitude to Jae-Hyun Ha for assisting with data collection and Sangjin Lee for advising on data analysis.

References

1. Statistics Korea. Population status board [Internet]. Seoul: Statistics Korea; 2025 [cited 2025 Mar 20]. Available from: https://kosis.kr/visual/populationKorea/PopulationDashBoardMain.do
2. Kim CH, Kim AT. Aging and the rise in bottom income inequality in Korea. Research in Social Stratification and Mobility. 2024;89:100882. https://doi.org/10.1016/j.rssm.2023.100882
3. Organization for Economic Co-operation and Development. Pensions at a glance 2023: OECD and G20 indicators [Internet]. Paris: OECD Publishing; 2023 [cited 2024 Sep 17]. Available from: https://doi.org/10.1787/678055dd-en
4. Lim W, Kim M, Kim T, Kim K, Hwang D, Oh M, et al. Survey on basic living assurance and evaluation in 2021–2023 (Policy Report No: 2023-61) [Internet]. Sejong: Korea Institute for Health and Social Affairs; 2023 [cited 2024 Sep 17]. Available from: https://www.mohw.go.kr/board.es?mid=a10411010100&bid=0019&act=view&list_no=1479532&tag=&nPage=1
5. Kumar SG, Majumdar A, Pavithra G. Quality of life (QOL) and its associated factors using WHOQOL-BREF among elderly in urban Puducherry, India. Journal of Clinical and Diagnostic Research. 2014;8(1):54–57. https://doi.org/10.7860/JCDR/2014/6996.3917
6. Min SH, Kim JI. Construction of explanatory model for medication adherence in older people with chronic disease. Journal of Korean Academy of Fundamentals of Nursing. 2012;19(4):463–473. https://doi.org/10.7739/jkafn.2012.19.4.463
7. Yi HS. Factors affecting the self-care agency of elderly people with chronic disease [master's thesis]. [Gwangju]: Honam University; 2015. 56 p.
8. Lee HJ, Yun JM. Health-related quality of life in South Korean community-dwelling older adults with multimorbidity: A convergent parallel mixed-methods approach. Quality of Life Research. 2020;29(3):721–732. https://doi.org/10.1007/s11136-019-02360-0
9. Parker L, Moran GM, Roberts LM, Calvert M, McCahon D. The burden of common chronic disease on health-related quality of life in an elderly community-dwelling population in the UK. Family Practice. 2014;31(5):557–563. https://doi.

org/10.1093/fampra/cmu035
10. Jang SM. Factors influencing subjective health status in the adults with chronic disease: Focusing on the socio-economic status of diabetics. Mental Health and Social Work. 2015;43(2):32–59.
11. Yi YE, Lee HJ. Influence of digital literacy and patient activation on sick role behavior in vulnerable older adults with diabetes. Journal of Korean Academy of Fundamentals of Nursing. 2024;31(2):179–190. https://doi.org/10.7739/jkafn.2024.31.2.179
12. Shin HY. Implications of the [Act on integrated support for community care including medical cure and nursing care]. Korean Journal of Geriatrics and Gerontology. 2024;25(3):123–128. https://doi.org/10.15656/kjgg.2024.25.3.123
13. Chang SJ, Yang EJ, Ryu HJ, Kim HJ, Yoon JY. Cross-cultural adaptation and validation of the eHealth literacy scale in Korea. Korean Journal of Adult Nursing. 2018;30(5):504–515. https://doi.org/10.7475/kjan.2018.30.5.504
14. Chouko MA, Sanchez-Ramirez DC, Pol M, Uddin M, Monnin C, Syed-Abdul S. COVID-19 infodemic and digital health literacy in vulnerable populations: A scoping review. Digital Health. 2022;8:20552076221076927. https://doi.org/10.1177/20552076221076927
15. Hwang NH, Kim HS, Kim KR, Joo BH, Hong SH, Kim JH. Older adults and the digital divide: Current conditions and policy implications (Report No. 2020-46) [Internet]. City: Korea Institute for Health and Social Affairs; 2020 [cited 2025 Mar 5]. Available from: https://repository.kihasa.re.kr/handle/201002/37360
16. Kim MY, Jun HJ. The influences of IT use and satisfaction with IT use on depression among older adults. Korean Journal of Gerontological Social Welfare. 2016;71(1):85–110. https://doi.org/10.21194/kjgsw.71.1.201603.85
17. Yoon HW, Jang YR, Vaughan PW, Garcia M. Older adults' internet use for health information: Digital divide by race/ethnicity and socioeconomic status. Journal of Applied Gerontology. 2020;39(1):105–110. https://doi.org/10.1177/0733464818770772
18. Lee SY. The effects of digital literacy in the elderly on quality of life and mediating effect of social network. Journal of Humanities and Social Sciences 21. 2021;12(6):307–322. https://doi.org/10.22143/HSS21.12.6.22
19. Ju KH, Kim DS, Kim JH. Analysis of factors influencing digital divide on elderly and difference of gender. Social Welfare Policy. 2018;45(2):95–121. https://doi.org/10.15855/swp.2018.45.2.95
20. Singh B, Ahmed M, Staiano AE, Gough C, Petersen J, Vandelanotte C, et al. A systematic umbrella review and meta-meta-analysis of eHealth and mHealth interventions for improving lifestyle behaviours. NPJ Digital Medicine. 2024;7(1):179. https://doi.org/10.1038/s41746-024-01172-y
21. Park NY. AI-IoT-based health management services: Their effect and improvement directions. Health and Welfare Policy Forum. 2023;322:22–37. https://doi.org/10.23062/2023.08.3
22. Saqlain M, Riaz A, Ahmed A, Kamran S, Bilal A, Ali H. Predictors of health-related quality-of-life status among elderly patients with cardiovascular diseases. Value in Health Regional Issues. 2021;24:130–140. https://doi.org/10.1016/j.vhri.2020.11.003
23. Yoo JS, Ham IS. Factors influencing quality of life in the community-dwelling vulnerable older women with chronic joint pain. Journal of the Korea Academia-Industrial Cooperation Society. 2018;19(1):355–367. https://doi.org/10.5762/KAIS.2018.19.1.355
24. Chang HK, Gil CR, Kim HJ, Bea HJ. Factors affecting quality of life among the elderly in long-term care hospitals. Journal of Nursing Research. 2021;29(1):e134. https://doi.org/10.1097/jnr.0000000000000413
25. de Labra C, Maseda A, Lorenzo-López L, Lopez-López R, Buján A, Rodríguez-Villamil JL, et al. Social factors and quality of life aspects on frailty syndrome in community-dwelling older adults: The verisaúde study. BMC Geriatrics. 2018;18(1):66. https://doi.org/10.1186/s12877-018-0757-8
26. Frontera-Escudero I, Bartolomei JA, Rodríguez-Putnam A, Claudio L. Sociodemographic and health risk factors associated with health-related quality of life among adults living in Puerto Rico in 2019: A cross-sectional study. BMC Public Health. 2023;23(1):2150. https://doi.org/10.1186/s12889-023-17115-3
27. Kim JI. Levels of health-related quality of life (EQ-5D) and its related factors among vulnerable elders receiving home visiting health care services in some rural areas. Journal of Korean Academy of Community Health Nursing. 2013;24(1):99–109. https://doi.org/10.12799/jkachn.2013.24.1.99
28. Park SH, Park JH. Effects of digital self-care intervention for Korean older adults with type 2 diabetes: A randomized controlled trial over 12 weeks. Geriatric Nursing. 2024;58:155–161. https://doi.org/10.1016/j.gerinurse.2024.05.019
29. Lee J, Lee HJ. The effects of smart program for patients who underwent percutaneous coronary intervention (SP-PCI) on disease-related knowledge, health behavior, and quality of life: A non-randomized controlled trial. Journal of Korean Acade-

my of Nursing. 2017;47(6):756–769. https://doi.org/10.4040/jkan.2017.47.6.756
30. Wilson IB, Cleary PD. Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. JAMA. 1995;273(1):59–65. https://doi.org/10.1001/jama.1995.03520250075037
31. Oh JH, Yi MS. Structural equation modeling on quality of life in older adults with osteoarthritis. Journal of Korean Academy Nursing. 2014;44(1):75–85. http://doi.org/10.4040/jkan.2014.44.1.75
32. Lee HO, Yoo JS. A structural equation model of health-related quality of life among older women following bilateral total knee replacement. Journal of Korean Academy of Nursing. 2020;50(4):554–570. https://doi.org/10.4040/jkan.19216
33. Kim JH, Park SM. A path analysis for health-related quality of life in long-term care insurance in-home service users. Research in Community and Public Health Nursing. 2023;34(1):1–11. https://doi.org/10.12799/rcphn.2022.00283
34. Shiu ATY, Choi KC, Lee DTF, Yu DSF, Ng WM. Application of a health-related quality of life conceptual model in community-dwelling older Chinese people with diabetes to understand the relationships among clinical and psychological outcomes. Journal of Diabetes Investigation. 2014;5(6):677–686. https://doi.org/10.1111/jdi.12198
35. Han SS, Lee SC. Nursing and health statistical analysis. 2nd ed. Seoul: Hannarae; 2018. p. 520.
36. Lee SY, Kim HK. Structural equation modeling on health-related quality of life among patients with thyroid cancer. Korean Journal of Adult Nursing. 2018;30(2):171–182. https://doi.org/10.7475/kjan.2018.30.2.171
37. Ang S, Lim E, Malhotra R. Health-related difficulty in internet use among older adults: Correlates and mediation of its association with quality of life through social support networks. The Gerontologist. 2021;61(5):693–702. https://doi.org/10.1093/geront/gnaa096
38. Choi HI, Song IU. The mediating effect of self-efficacy between the elderly's digital information literacy and life satisfaction. Journal of the Korea Academia-Industrial Cooperation Society. 2020;21(6):246–255. https://doi.org/10.5762/KAIS.2020.21.6.246
39. Yu JP. The re-examination of the conceptual model, which contains control variables in structural equation modeling: Focusing on power, satisfaction, and long-term orientation. Journal of Channel and Retailing. 2015;20(3):43–62. https://doi.org/10.17657/jcr.2015.07.31.3
40. Yesavage JA, Sheikh JI. 9/Geriatric Depression Scale (GDS): Recent evidence and development of a shorter version. Clinical Gerontologist. 1986;5(1–2):165–173. https://doi.org/10.1300/J018v05n01_09
41. Kee BS. A preliminary study for the standardization of the geriatric depression scale short form-Korea version. Journal of Korean Neuropsychiatric Association. 1996;35(2):298–307.
42. Lorig K, Stewart A, Ritter P, González VM, Laurent D, Lynch J. Outcome measures for health education and other health care interventions. Thousand Oaks CA: Sage Publications; 1996. p. 112.
43. Kim SN, Lee HJ, Kim SY, Lee N. Validity and reliability of Korean version of the Self-Efficacy for Managing Chronic Disease 6-Item Scale. Journal of Korean Academy of Nursing. 2021;51(5):617–629. https://doi.org/10.4040/jkan.21069
44. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. Journal of Personality Assessment. 1988;52(1):30–41. https://doi.org/10.1207/s15327752jpa5201_2
45. Shin JS, Lee YB. The effects of social supports on the psychosocial well-being of the unemployed. Korean Journal of Social Welfare. 1999;37:241–269.
46. An ST, Lim YJ, Chung SD. Psychological wellbeing through health information behavior: Effects of the elderly's digital literacy. Journal of the Korean Gerontological Society. 2020;40(5):833–854. https://doi.org/10.31888/jkgs.2020.40.5.833
47. Korea Disease Control and Prevention Agency. Korea National Health and Nutrition Examination Survey (KNHANES), 2019 [Internet]. Cheongju: KDCA; 2020 [cited 2021 Mar 7]. Available from: https://knhanes.kdca.go.kr/
48. Kim SY, Lee HJ, Kim SN. Recognition of well-dying, health-related quality of life and repulsion-related nursing home of community-dwelling older adults. Journal of Muscle and Joint Health. 2024;31(1):31–41. https://doi.org/10.5953/JMJH.2024.31.1.31
49. Khanassov V, Pluye P, Descoteaux S, Haggerty JL, Russell G, Gunn J, et al. Organizational interventions improving access to community-based primary health care for vulnerable populations: A scoping review. International Journal for Equity in Health. 2016;15(1):168. https://doi.org/10.1186/s12939-016-0459-9
50. So KS, Hwang HJ, Kim EM. The impact of medical utilization on subjective health and happiness index and quality of life according to the economic level of the elderly. Journal of the Korea Academia-Industrial Cooperation Society. 2019;20(3):544–552. https://doi.org/10.5762/KAIS.2019.20.3.544
51. Van Wilder L, Pype P, Mertens F, Rammant E, Clays E, et al.

Living with a chronic disease: Insights from patients with a low socioeconomic status. BMC Family Practice. 2021;22(1):233. https://doi.org/10.1186/s12875-021-01578-7
52. Zheng X, Xue Y, Dong F, Shi L, Xiao S, Zhang J, et al. The association between health-promoting lifestyles, and socioeconomic, family relationships, social support, health-related quality of life among older adults in China: A cross-sectional study. Health and Quality of Life Outcomes. 2022;20(1):64. https://doi.org/10.1186/s12955-022-01968-0
53. Yu SJ, Kang CY, Kim YR. Correlation of quality of life in the health condition of Korean elderly: Perceived, physical, and mental health status. Korean Journal of Health Service Management. 2015;9(2):47–56. https://doi.org/10.12811/kshsm.2015.9.2.047
54. Stanojević Jerković O, Sauliūnė S, Šumskas L, Birt CA, Kersnik J. Determinants of self-rated health in elderly populations in urban areas of Slovenia, Lithuania and UK: Findings of the EURO-URHIS 2 survey. European Journal of Public Health. 2017;27(Suppl. 2):74–79. https://doi.org/10.1093/eurpub/ckv097
55. Abu-Bader SH, Rogers A, Barusch AS. Predictors of life satisfaction in frail elderly. Journal of Gerontological Social Work. 2003;38(3):3–17. https://doi.org/10.1300/J083v38n03_02
56. Kim HR. Predicting factors for health-related quality of life among older adults at senior centers in Korea. Journal of Korean Gerontological Nursing. 2014;16(2):95–106. https://doi.org/10.17079/jkgn.2014.16.2.95
57. Sadeghipour Rousari M, Payab M, Keyvanloo Shahrestanaki S, Ebrahimpur M, Mehrdad N, Naghavi Alhosseini SS, et al. Self-perceived health and functional status of older people: Telephone-based lifestyle survey of older adults in Tehran Province. Health Promotion Perspectives. 2022;12(1):37–44. https://doi.org/10.34172/hpp.2022.06
58. Freund T, Gensichen J, Goetz K, Szecsenyi J, Mahler C. Evaluating self-efficacy for managing chronic disease: Psychometric properties of the six-item Self-Efficacy Scale in Germany. Journal of Evaluation in Clinical Practice. 2013;19(1):39–43. https://doi.org/10.1111/j.1365-2753.2011.01764.x
59. Korenhof SA, Rouwet EV, Elstgeest LEM, Tan SS, Macchione S, Vasiljev V, et al. Evaluation of an intervention to promote self-management regarding cardiovascular disease: The Social Engagement Framework for Addressing the Chronic-Disease-Challenge (SEFAC). International Journal of Environmental Research and Public Health. 2022;19(20):13145. https://doi.org/10.3390/ijerph192013145
60. Gao Y, Zheng Y, He Y, Lin J, Liu F, Fu J, et al. The relationship between self-efficacy, health literacy, and quality of life in patients with chronic diseases: A cross-sectional study in China. Frontiers in Public Health. 2024;12:1430202. https://doi.org/10.3389/fpubh.2024.1430202
61. Eom SO, Lee IS. The effect of health coaching programs on self-efficacy, health behaviors, and quality of life in hypertensive people living in poverty. Journal of Korean Academy of Nursing. 2017;47(3):380–391. https://doi.org/10.4040/jkan.2017.47.3.380
62. Markle-Reid M, Ploeg J, Fraser KD, Fisher KA, Bartholomew A, Griffith LE, et al. Community program improves quality of life and self-management in older adults with diabetes mellitus and comorbidity. Journal of the American Geriatrics Society. 2018;66(2):263–273. https://doi.org/10.1111/jgs.15173
63. Akosile CO, Mgbeojedo UG, Maruf FA, Okoye EC, Umeonwuka IC, Ogunniyi A. Depression, functional disability and quality of life among Nigerian older adults: Prevalences and relationships. Archives of Gerontology and Geriatrics. 2018;74:39–43. https://doi.org/10.1016/j.archger.2017.08.011
64. Lee J, Choi KW, Jeon GS. Socioeconomic inequalities in depressive symptoms among Korean older men and women: Contribution of social support resources. Journal of Korean Academy of Community Health Nursing. 2020;31(1):13–23. https://doi.org/10.12799/jkachn.2020.31.1.13
65. Soundararajan A, Lim JX, Ngiam NHW, Tey AJY, Tang AKW, Lim HA, et al. Smartphone ownership, digital literacy, and the mediating role of social connectedness and loneliness in improving the wellbeing of community-dwelling older adults of low socioeconomic status in Singapore. PLOS One. 2023;18(8):e0290557. https://doi.org/10.1371/journal.pone.0290557
66. World Health Organization. Why palliative care is an essential function of primary health care: A WHO technical report [Internet]. Geneva: World Health Organization; 2017 Available from: https://www.who.int/docs/default-source/primary-health-care-conference/palliative.pdf