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## Age Differences in Health-Related Quality of Life among South Korean Elderly

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### Research Article

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#### ABSTRACT

**Purpose:** The purpose of this study was to understand the variations in the health-related quality of life (HRQoL) of older adults according to age differences and to help plan health programs for this group based on age.

**Method:** A cross-sectional design was used. A total of 1,666 older adults drawn from the non-institutionalized civilian population in South Korea were surveyed using a written questionnaire and an interview that incorporated the EQ-5D-3L. The study was conducted between 2010 and 2012. The data were analyzed using linear regression analysis of complex sampling design.

**Results:** Scores of EQ-5D-3L differed according to each age group. Mobility, self-care and usual activities domains of the EQ-5D-3L and EQ-5D VAS had significant differences among the age groups.

**Conclusion:** The HRQoL showed differences according to age in older populations. Healthcare providers must consider the differences in HRQoL based on age when planning healthcare programs.

## INTRODUCTION

As in many countries around the world, South Korea's population is aging. In South Korea, people 65 years and older comprised 7.2% of the total population in 2000, and by 2018, South Korea is expected to become an 'aging society,' with seniors expected to comprise 14.3% of the population <sup>[1]</sup>. The overall life expectancy in South Korea is 79.5 years, while a healthy life expectancy is 71 years; this means that adults who live past 71 often have acute or chronic diseases that need medical and social care for the remaining years their lives <sup>[2]</sup>. According to "Increased Health Care Utilization and Implications for the Elderly" by the Korea Institute for Health and Social Affairs (KIHASA), the population of chronic disease in older people from 1999 to 2010 gradually increased. Increasing age brings about the degradation of physical organs and functioning, and it typically incurs health problems. Specifically, elderly adults (above 85 years old) had lower cardiovascular-respiratory functions, such as in lung capacity and diastolic blood pressure, than adults 65-74 years old <sup>[3]</sup>. As physical and psychological health is closely associated with one's quality of life (QoL), health and social care providers' most important goal is to promote and improve patients' QoL <sup>[4]</sup>.

Health-related quality of life (HRQoL) focuses on the impact that an individual's perceived health status has on aspects of his or her life <sup>[5]</sup>. The HRQoL in older adults is associated with health factors such as mobility, social factors such as economic status, jobs, participation, and environmental factors <sup>[6-8]</sup>. Particularly Olivares *et al.* found that physical function had a positive correlation with HRQoL elements such as mobility, self-care, usual activities, pain/discomfort, and anxiety/depression <sup>[9]</sup>. At 85 years of age, a lower HRQoL was associated with an increased risk of depression, an increased use of medication, an increased number of chronic diseases, and a greater amount of problems with instrumental activities of daily living (IADL) <sup>[10]</sup>. At 80 years of age, people with poor IADL ability had a 50% survival rate after 5 years <sup>[11]</sup>. The age variable is important to one's HRQoL and survival <sup>[12]</sup>. Proportion of older people is various because of extending life. However, most studies on HRQoL focus on elderly people without

separation according to age adult or women or diagnosed groups [13-16]. In addition, few studies have examined HRQoL in relation to health factors that are relatively common to older individuals.

To optimize health care for older people, health care providers should focus on identifying older adults at risk of poor functional outcomes and decreased HRQoL [17]. Early recognition of those at risk due to age, physical factors, and mental factors may facilitate better targeting for treatment or prevention. Therefore, this study investigates relatively healthy adults who are 65 years of age and older with respect to their HRQoL. This investigation provides the opportunity to make appropriate distinctions in subgroups based on age and to understand the variations in functioning according to age differences in older adults. Having a better comprehension of older adults' HRQoL can help healthcare professionals better design program activities to maintain and promote the health of this population. The purpose of this study is to compare the differences of HRQoL (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) among age groups of 65-69 years, 70-74 years, 75-79 years, 80-84 years, and above 85 years old.

## METHOD

### Study design

This study used a cross-sectional design to identify HRQoL among older adults.

### Sample and data collection

The data of this study included a subset of the fifth Korea National Health and Nutrition Examination Survey (KNHANES) conducted from 2010 to 2012 by the Korea Center for Disease Control and Prevention (KCDC). The sampling protocol for the KNHANES was designed to involve a representative sample of the non-institutionalized civilian population in South Korea. KNHANES used a stratified, multistage, probability-cluster, complex sampling design to select household units based on region, sex, and age. The survey was performed by the Korean Ministry of Health. The target population of the survey was all non-institutionalized, South Korean civilian aged 1 year or older.

This study used the data of people ages 65 years and older (n=1,666). The data were collected using face-to-face interviews in conjunction with a structured questionnaire. The researchers were individually trained about the purpose and methods of study, and they performed interviews at the homes of each of the participants. South Korea has racial and linguistics homogeneity. However, the researchers in the area conducted interviews considering linguistic differences such as dialect or accent. The content of the interview included demographic data and the EuroQoL, EQ-5D-3L [18,19]. The demographic data addressed questions regarding age, gender, marital status, family, educational level, economic status, government aid, and physical status, such as smoking, drinking alcohol, and feeling stress. In this study, age of participants was divided into young-old (65-74 years old), middle-old (75-84 years old), and old-old (above 85 years old) in the general classification [3]. In addition, the young-old and the middle-old were divided into two groups for the purpose of differentiating investigation according to age [3,20].

### Ethical considerations

The study was conducted after receiving approval from the KCDC Institutional Review Board (IRB no. 2012-01EXP-01-2C). Written informed consents were obtained from all voluntary participants.

### Instrument

#### Health-related quality of life

EQ-5D-3L (3 level version of the EuroQoL 5 dimensional questionnaire) is a generic instrument that assesses HRQoL five dimensions, namely mobility, self-care, usual activities, pain/discomfort and anxiety/depression [21,22]. Each domain was scored by the 3-point Likert scale: no problem (1), a moderate problem (2), or an extreme problem (3). A higher score represents a greater limitation on the corresponding dimension.

In addition, EQ-5D-3L involves in a visual analogue scale that record the individual's self-rated health (EQ-5D-VAS), range from 0 (worst imaginable health status) to 100 (best imaginable health status). This instrument is one of the most widely used HRQoL questionnaires due to its brevity, ease-of-use, and value in health economics analyses [23].

### Data analysis

Statistical analysis was performed using the IBM SPSS 20.00 statistical package and a complex sampling design. The collected data were analyzed to take into account the stratification, clustering and weighted factor for representation of South Korean population. Linear regression analysis was also performed to identify differences in HRQoL according to each age.  $P < 0.05$  was considered statistically significant.

## RESULTS

The descriptive data on the participants are presented in **Table 1**. A total of 1,666 people participated. The participants of aged 65-69 years were 508 (30.5%), 70-74 years were 542 (32.5%), 75-79 years were 391 (23.5%), 80-84 years were 167

(10.0%), and 85 above were 58 (3.5%). In the all ages, the female population was higher than the male population and 'non-having a job' population was higher than 'having a job' population. In the marry statues, the population of 'living together with spouse' was highest in 65-79 years old, while the population of 'window/separated/divorced' was highest in 80 above old years. Most were feeling stress in all ages except above 85 years old. Most participants did not smoke (87.1-100%). The participants rarely had stroke or myocardial infarction/Angina, while older adults often had arthritis (22.9-30.5%). EQ-5D VAS showed the highest in the 65-69 years old and the lowest in the 80-84 years old adults.

**Table 1.** Descriptive data of participants (N = 1,666). Unit: N (%).

Variables		Age					
		65-69	70-74	75-79	80-84	Above 85	
<b>Total</b>		<b>508 (30.5)</b>	<b>542 (32.5)</b>	<b>391 (23.5)</b>	<b>167 (10.0)</b>	<b>58 (3.5)</b>	
Gender	Male	224 (44.1)	248 (45.8)	162 (41.4)	63 (37.7)	12 (20.7)	
	Female	284 (55.9)	294 (54.2)	229 (58.6)	104 (62.3)	46 (79.3)	
Marry	No marry, Single	1 (0.0)	1 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
	Marry	408 (84.4)	311 (73.5)	228 (58.5)	75 (45.2)	6 910.3)	
	Window/separated/divorced	96 (19.0)	146 (31.9)	162 (41.5)	91 (54.8)	52 (89.7)	
Family	Alone	63 (12.5)	88 (16.3)	99 (25.3)	49 (29.5)	17 (29.3)	
	With spouse (couple)	244 (48.3)	270 (50.0)	186 (47.6)	64 (38.6)	4 (6.9)	
	With other family	198 (39.2)	182 (33.7)	106 (27.1)	53 (31.9)	37 (63.8)	
Economic status	Having a job	207 (44.3)	174 (36.2)	83 (25.4)	21 (16.6)	1 (3.4)	
	Non-having a job	260 (55.7)	307 (73.8)	244 (84.6)	106 (93.4)	28 (96.6)	
Government aid	Yes	15 (3.1)	25 (4.6)	25 (6.4)	18 (10.9)	4 (6.9)	
	No	472 (96.9)	515 (95.4)	366 (93.6)	147 (89.1)	54 (93.1)	
Stress	Very mostly feeling stress	23 (4.9)	19 (4)	14 (4.3)	6 (4.8)	2 (6.9)	
	Mostly feeling stress	73 (15.7)	80 (16.6)	52 (15.9)	24 (19.4)	3 (10.3)	
	Feeling stressed	257 (55.3)	239 (49.7)	137 (41.9)	47 (37.9)	10 (34.5)	
	Rarely feeling stressed	112 (24.1)	143 (29.7)	124 (37.9)	47 (37.9)	14 (48.3)	
Smoking statues	Smoking	59 (12.7)	51 (12.7)	31 (9.5)	7 (5.6)	0 (0.0)	
	Often smoking	1 (0.2)	1 (0.2)	10 (3.0)	0 (0.0)	0 (0.0)	
	Smoking past, but non-smoking now	117 (25.2)	136 (33.9)	86 (26.2)	39 (31.0)	9 (31.0)	
	Non-experience	288 (61.9)	214 (53.2)	201 (61.3)	80 (63.4)	20 (69.0)	
Alcohol habits (during recent 1year)	Never drinking alcohol	81 (17.4)	115 (23.9)	75 (22.8)	28 (22.2)	4 (13.9)	
	Less than 1 time/month	93 (20.0)	81 (16.8)	39 (11.9)	10 (7.9)	0 (0.0)	
	1 time/month	37 (8.0)	35 (7.3)	24 (7.3)	5 (4.0)	1 (3.4)	
	2-4 times/month	62 (13.3)	60 (12.5)	39 (11.9)	10 (7.9)	2 (6.9)	
	2-3 times/week	41 (8.8)	31 (6.5)	11 (3.3)	8 (6.4)	1 (3.4)	
	More than 4 times/week	34 (7.3)	41 (8.5)	37 (11.2)	12 (9.5)	6 (20.7)	
	Non-experience	117 (25.2)	118 (24.5)	104 (31.6)	53 (42.1)	15 (51.7)	
Chronic illness conditions	Stroke	Yes	13 (2.7)	9 (1.8)	13 (3.8)	5 (3.6)	0 (0.0)
		No	464 (97.3)	488 (98.2)	330 (96.2)	135 (96.4)	36 -100
	Myocardial infarction/angina	Yes	21 (4.5)	40 (8.2)	23 (6.9)	2 (1.6)	2 (6.7)
		No	447 (95.5)	446 (91.8)	310 (93.1)	127 (98.4)	28 (93.3)
	Arthritis	Yes	107 (22.9)	137 (28.3)	97 (29.1)	39 (30.5)	9 (30.0)
		No	361 (77.1)	347 (71.7)	236 (70.9)	89 (69.5)	21 (70.0)

EQ-5D-3L scores differed according to age in mobility ( $p=0.029$ ), self-care ( $p=0.001$ ), usual activities ( $p=0.000$ ), and EQ-5D VAS ( $p=0.021$ ) (**Table 2**). Mobility, self-care, and usual activities domains showed differences between reference group (65-69 years old) and 75-74 years old group. In addition, Mobility, self-care, and usual activities domains showed differences between reference group and 80-84 years old group. In the EQ-5D VAS, when age increased, mean of score was low except to group of 85 years and over.

**Table 2.** EQ-5D-3L according to age (N = 1,666).

Domain	65-69	70-74	75-79	80-84	Above 85	F
	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	
Mobility	1.37 (0.03)	1.42 (0.05)	1.52 (0.05) <sup>a</sup>	1.56 (0.07) <sup>a</sup>	1.52 (0.15)	2.782*
Self-care	1.1 (0.01)	1.12 (0.02)	1.21 (0.04) <sup>a</sup>	1.26 (0.05) <sup>a</sup>	1.26 (0.14)	4.934*
Usual activities	1.19 (0.02)	1.26 (0.03)	1.35 (0.04) <sup>a</sup>	1.37 (0.05) <sup>a</sup>	1.39 (0.15)	5.867*
Pain/ discomfort	1.39 (0.04)	1.47 (0.05)	1.5 (0.06)	1.55 (0.09)	1.45 (0.14)	1.3
Anxiety/ depression	1.22 (0.02)	1.21 (0.03)	1.21 (0.04)	1.16 (0.04)	1.16 (0.08)	0.606
EQ-5D VAS	69.75 (1.43)	65.54 (1.95) <sup>a</sup>	63.29 (2.39) <sup>a</sup>	60.11 (3.89) <sup>a</sup>	61.32 6.88	2.983*

**Note:** Reference category = 65-69 years old group; M ± SE: mean ± error; \* $p<0.05$ ; <sup>a</sup> significantly difference between reference group and age group.

## DISCUSSION

This study found differences in HRQoL (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) between 65-69 years old group and group of 85 years and over. Higher age was found to be associated with problems of mobility, self-care, usual activities and EQ-5D VAS.

This study is based on participants' self-reported perceptions of their HRQoL using EQ-5D-3L. EQ-5D-3L had validity and was used various domestic and foreign studies [3,10,11,24]. According to this study, the domains of mobility, self-care, usual activities of EQ-5D-3L and EQ-5D VAS were difference according to age groups. Participant' mobility differed between 65-69 years old group and 75-79 years old group and between 65-69 years old group and 80-84 years old group. A similar pattern was also observed in the realms of self-care and usual activities. Mobility was the first domain to appear in the evolution of adult disability [23]. Physical health and physical activity correlated strongly with HRQoL in older adults [24]. According to Chen *et al.* study, the ability to perform activities of daily living in the young-old group was higher than in the old-old group ( $p=0.015$ ). The ability to walk outside ( $p<0.001$ ) and the ability to do housework ( $p<0.001$ ) were different among the young-old, middle-old, and old-old groups.

However, the results regarding the domains of pain/discomfort and anxiety/depression were differed from the results of physical functions such as mobility, self-care, and usual activities. Psychological functioning seems to be less affected by age compared with physical functioning. These results were similar to Jeste *et al.*'s and Alonso-Morán *et al.*'s studies [25,26]. Jeste *et al.* reported that age was not related to one's level of depression, optimism, or resilience. However, older age was significantly associated with decreased physical functioning ( $r=-0.35$ ,  $p<0.001$ ), objective cognitive functioning ( $r=-0.46$ ,  $p<0.001$ ), and subjective cognitive functioning ( $r=0.12$ ,  $p=0.001$ ) [25]. In the Alonso-Morán *et al.*'s (2015) study for user of the Basque telecare public service ( $n=452,698$ ), age had a special emphasis on mobility, self-care and activities of daily living of EQ-5D-3L. The oldest persons (85 or more) had the highest scores on mobility, self-care and activities of daily living domains. However, the oldest persons (85 or more) presented less pain/discomfort and anxiety/depression domains than younger age groups (65-74).

In the Chin *et al.*'s study using EQ-5D-3L, distribution of each domain showed difference according to each age in older population ( $n=621$ ) [22]. In all age groups, self-care domain and anxiety/depression domain were the highest on the no problem and pain/discomfort domain was the highest on the moderate problems. The domains of mobility and usual activities were the highest on the moderate problems in 90-99 years old. Andersson *et al.* performed the EQ-5D-3L in 85-year-olds in Sweden ( $n=360$ ). Distribution of each domain showed the highest on the no problem except to domain of pain/discomfort [11].

EQ-5D VAS of Andersson *et al.*'s study was  $67.5 \pm 18.8$ . The result of this study was 61.32 ( $n=58$ ) [12]. Based on the EQ-5D VAS results, South Koreans over 85 years reported worse health than their counterparts in Sweden. However, the results of this study also showed scores better than 54.2 in an Italian cohort study in patients with Parkinson's disease [27].

The strengths of the present study are related to its design. The data of this study were stratified, multi-stage probability sampling units based on geographic area, gender, and age. Therefore, these results can be generalized to the South Korean population of older adults. One limitation was that the study had missing data. Some participants answered "I do not know" or did not complete the questionnaire. Further studies that do not have missing data would improve the validity of said studies. In addition, studies that address physical status as well as psychological states associated with HRQoL are needed. Assessment tools for psychological states are required.

## CONCLUSION

The specific age of older populations was an important factor in participants' HRQoL, as explored through the domains of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. As a result of these findings, we conclude that health

care providers should design their interventions or programs so as to address these factors as early as possible to prevent a decrease in HRQoL. The interventions or program type should consider the specific age of older adults. For example, health care providers will be more effective to establish physical programs (mobility or self-care improvement) than mental programs (pain or depression management) for middle-old age group in a nursing home or community welfare center.

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