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An investigation into the community health survey 2019 to analyze the health-related quality of life

Jeongju Hong[1], Jae-Hee Kim[2*]
[1,2]Dept. School of Nursing, Kyungdong University 815, Gyeonhwon-ro, Munmak-eup, Wonju-si, Gangwon-do, Republic of Korea; jjribe@kduniv.ac.kr (J.H.) jh6857@kduniv.ac.kr (J.H.K.)

Abstract: This study aimed to investigate the factors influencing health-related quality of life (HRQoL) among Korean adults using data from the 2019 Community Health Survey (CHS). A cross-sectional analysis was performed utilizing a nationally representative dataset. HRQoL was measured through the EuroQol-5 Dimension (EQ-5D) instrument. Descriptive statistics, t-tests, analysis of variance (ANOVA), and multiple regression analyses were conducted to examine the associations between HRQoL and various demographic and behavioral variables. The findings revealed that age, gender, educational attainment, and household income were significantly associated with HRQoL. Furthermore, health behaviors, including smoking, alcohol consumption, and physical activity, exhibited substantial impacts on HRQoL. These results underscore the necessity of developing tailored public health interventions that address both sociodemographic and behavioral determinants to enhance population health outcomes. The study offers practical implications for policymakers and healthcare professionals in formulating effective strategies aimed at improving quality of life across diverse demographic groups.

Keywords: *Community health survey, Health behaviors, Health-related quality of life, Social capital, Sociodemographic factors.*

1. Introduction

In a society where the population is aging and the birth rate is low, the average life expectancy has increased in recent years. This is due to better income and advancements in medical technology. As a result, people are now more aware of their health and are focusing on living a healthy life even with chronic diseases. This approach to health is known as "Health-realted of Quality of Life (HR-QoL)" and involves maintaining not just physical health but also social and mental health i.e more than just being disease-free but living satisfactorily and enjoying the life [1, 2]. It is believed that the health of people is strongly linked to their life in older age, and there is a growing trend of placing more emphasis on the quality of life about health [2]. The quality of life related to health is determined by several factors, including unique features an individual and environmental factors such as physical and socio-economic surroundings. To improve community health, many health institutions are undertaking projects aimed at disease prevention. However, it is important to accurately assess the community's health status and develop a strategy based on the findings to carry out effective projects that promote community health. In Korea, the Community Health Survey (CHS) serves as a pivotal tool for deriving health statistics that are instrumental in formulating a strategic regional health business plan. Aligned with the Health Statistics Act, the CHS entails a direct assessment involving approximately 900 individuals, focusing on inquiries pertaining to the health habits of residents aged 19 years and above. Incorporating this approach into the development of strategies aimed at mitigating disparities in healthcare enhance endeavors to identify root causes and potential solutions for healthcare discrepancies in regions beyond urban centers [3]. The notion of well-being within a society is a multifaceted and inclusive notion that differs according to the distinct viewpoint and objective of each individual researcher. Johnson, et al. [4]

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* Correspondence: jh6857@kduniv.ac.kr

as well as Lee, et al. [5] denoted this phenomenon as a state of subjective contentment and overall well-being articulated or encountered by individuals within physical, social, and economic contexts [5, 6]. As stated by Holmes and Dickerson [7] it signifies a composite term denoting the impact of psychological, social, and physical elements [7]. Previous research examining variables linked to quality of life revealed that socioeconomic status [8, 9] self-worth, and familial backing (physical capability and despondency have an influence on quality of life [10-12]. HR-QoL at the individual level has been demonstrated to enhance the effectiveness of both individuals and society in relation to aspects such as social support, capital, health, and socioeconomic status [13]. The development of social capital by individuals through social connections has a beneficial impact on quality of life by diminishing stress and bolstering coping mechanisms via networking, trust, and social engagement [14]. Furthermore, interactions and connections concerning social capital in rural regions hold a higher level of significance compared to urban settings; this element exerts a more pronounced influence on the quality of life related to health [15]. EQ-5D is capable of recognizing health-related issues affecting individuals at the communal scale and facilitating the development of health enhancement strategies including essential resources, their allocation, and the methodologies for community intervention [16]. EQ-5D index is a HR-QoL score which gives weightage to each variable. Prior research indicates that social capital and health behaviors are key determinants of HRQoL [17, 18]. However, urban-focused studies dominate existing literature. This study incorporates recent findings to investigate rural populations, providing a more inclusive understanding.

Health-related quality of life (HRQoL) is an essential aspect of public health measurement [17]. As chronic diseases increase, understanding HRQoL, especially among rural populations, becomes vital. Studies show social and behavioral factors greatly influence HRQoL, but rural-specific analyses remain limited. This study uses CHS 2019 data to fill that gap.

2. Objectives

- The present study's goals are listed below:
- Identification of general features, health characteristics and social capital.
- Identification of health-related behaviors, and variations of symptoms of melancholy, HR-QoL (EQ-5D index) and life satisfaction in relation to social capital.
- To study the interconnectedness of the symptoms of melancholy, life satisfaction, and EQ-5D index.
- To investigate the factors influencing the HR-QoL.

3. Methods

3.1. Investigation Design

This study analyzes the data obtained from the Community Health Survey (CHS), 2019. This survey was conducted to examine the characteristics of melancholy, life satisfaction, health behaviors and social capital of people residing in a city of South Korea. This is a cross-sectional study which focused on the characteristics and factors that affects the health-related QoL.

3.2. Subjects of Investigation

The CHS, 2019 involved participants from a public health center who were adults with 19 years of age or older. They were divided into groups according to the housing type.

A sampling frame was established through the linkage of population data and housing data from the Ministry of Land, Infrastructure, and Transport. Subsequently, following the extraction of sampling points using first-order probability proportional sampling, the ultimate sample was obtained through second-order systematic sampling [19]. In this way, a total of 892 people were included in the survey.

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3.3. Research Tools

Through a thorough examination of existing literature, specific items from the Korea Centers for Disease Control and Prevention [20] health questionnaire were chosen for inclusion. Demographic features included age, gender, education, marital status, monthly earnings, and family size. Based on their education, they were categorized into elementary school or below, middle school, high school, and university or higher groups. The attributes related to their health included in the study were smoking, alcohol consumption, physical activity, self-reported health status, and the presence of hypertension and diabetes. Smoking habits were divided into categories including total lifetime consumption, current usage, and age of initiation. Details regarding alcohol consumption encompassed lifelong drinking patterns, age of onset, recent drinking behavior, frequency, and quantity consumed per occasion. In relation to physical activity, the focus was on the frequency of moderate exercise and walking within the past week. The sociocultural traits of the subjects encompassed variables such as engagement in religious, social, leisure, and charitable activities, as well as the frequency of interactions with family members, neighbors, and friends. The frequency of these interactions was classified into various categories ranging from less than once a month to every week. A score indicating higher social capital was associated with more frequent interactions.

3.3.1. Melancholy

Symptoms of melancholy were ascertained through an examination of responses to a specific inquiry regarding the frequency of nine distinct symptoms experienced within a two-week timeframe. These symptoms included interest, melancholy, sleep disturbances, fatigue, changes in appetite, feelings of unhappiness, difficulties with concentration, anxious behaviors, and self-abasement, all of which may disrupt one's daily functioning. Participants' responses were recorded using a 4-point scale, indicating the duration of each symptom as "not at all," "for several days," "more than a week," or "almost every day." The cumulative score derived from these responses ranged from 9 to 36, with a higher score signifying a greater severity of melancholic symptoms.

3.3.2. Life Satisfaction

The survey inquired about participants' level of contentment regarding their recent life by using a 10-point scale, which included options from "very unsatisfactory" to "very satisfied." Participants were required to rate their satisfaction level on a scale from 0 to 10, where higher scores signified greater life satisfaction.

3.3.3. HR-QoL

To investigate the HR-QoL, the CHS data was utilized to assess the Korean version of the Euro-QoL 5-dimension 3 level (EQ-5D-3L) tool developed by the Euro QoL group. This tool examines five dimensions - motor skills (M), self-care (SC), daily activities (UA), pain or discomfort (PD), and anxiety or melancholy (AD). Each dimension is rated on a scale from 1 (no issue) to 3 (severe problems). The EQ-5D-3L index scores were computed based on the weighting provided in the CHS data.

"The EQ-5D-3L index was calculated using the formula: 1 - (0.050 + 0.096M2 + 0.418M3 + 0.046SC2 + 0.136SC3 + 0.051UA2 + 0.208UA3 + 0.037PD2 + 0.151PD3 + 0.043AD2 + 0.158AD3 + 0.050*N3)"

The numerals "2" or "3" after each letter signify the response level for that variable. The reliability and validity of the Korean version of the EQ-5D-3L tool for the general public was assessed by Lee [21] with Overall Percent Agreement (OPA) of 79-97%, Kappa values of 0.32 to 0.64 and Intraclass Correlation Coefficient (ICC) values of 0.65 and 0.61.

4. Data Collection

The Korea Centers for Disease Control and Prevention [20] utilized in this study is a nationwide sample survey conducted annually across 17 cities and provinces, targeting all adults aged 19 and above

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[19]. This survey follows a standardized implementation system designed to assess the health status of residents and aid in the establishment and evaluation of community health care plans. Data collection involved sending household selection notices to chosen households, followed by visits from trained surveyors. Subjects were briefed on the purpose of the investigation and the CHS, and an electronic survey administered via laptop computers was utilized. Data collection included face-to-face interviews using individual survey questionnaires for household members and a separate household survey, requiring responses from a single representative per household.

4.1. Data Analysis

The study utilized SPSS/WIN 28.0 for data analysis. Initially, descriptive statistics were employed to analyze various characteristics of the subjects, including general, health-related, and social capital attributes, as well as symptoms of melancholy, life satisfaction, and HR-QoL. Subsequently, differences across subjects' characteristics based on social capital traits were examined using independent t-tests and ANOVA. Pearson's correlation method was then used to explore relationships between symptoms of melancholy, life satisfaction, and HR-QoL. Finally, Multiple Linear Regression Analysis was conducted to identify factors impacting HR-QoL.

4.2. Ethical Considerations for Research

The Community Health Survey (CHS) strictly adheres to the guidelines specified by the Korea Centers for Disease Control and Prevention and the Personal Information Protection Act and the Statistical Act. Publicly accessible data were provided to researchers after the exclusion of personal details related to the participants, and the data were distributed in a de-identified format for downloading purposes.

5. Results

Older age, female gender, low education, low income, smoking, and inactivity were associated with poorer HRQoL. Positive health behaviors and strong social capital correlated with higher HRQoL. Subjective health status and chronic diseases significantly impacted quality of life.

5.1. Demographic variations of Life satisfaction Index (LSI), Melancholy Index (MI) and HR-QoL Index

Life Satisfaction Index (LSI)

The mean age of the participants was 53.04 years, and the mean score for the life satisfaction index(LSI) was 7.10. The highest score of LSI (7.24) was observed for the subjects in the age range of 19 to 44 years, however, this difference with other age groups was not statistically significant ($F = 1.63$, $\rho = .180$). The subjects with higher education degrees had higher scores than the married subjects for LSI. The LSIs for those having an income of 5,000,000-7.99 million won and 8,000-9,990,000 won were statistically significantly higher as compared to those having lower incomes. ($F = 6.54$, $\rho < .001$). The people belonging to families having 4 family members had a higher life satisfaction index than those having fewer family members.

5.2. Melancholy Index (MI)

The mean for the melancholy index (MI) was 11.81. For females, the MI was 12.44, higher than the males (11.10) and was statistically significant ($t = -5.45$, $\rho = < .001$) The MI for people above the age of 75 years, the MI was the highest (Statistically significant at the level of 0.05) than those in the lower age range. For educational level, those having no education had the highest mean score for MI. Divorced or widowed subjects showed higher b=values for MI than the married subjects ($F=4.52$, $\rho<.001$). Like was the participants in the lowest income group showed the highest value for the Melancholy index ($F = 3.60$, $\rho = .003$). There was no difference in the MI ($F = 1.75$, $\rho = .121$) for the different groups based on the number of family members (Table 1).

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5.3. Health-related Quality of Life (HR-QoL)

The mean score for HR-QoL was 0.89 (± 0.13). The males showed statistically significantly higher values (0.91± 0.07) as compared to females (t = 5.73, ρ = <.001). The mean scores of HR-QoL according to age groups in order of decreasing values were "19-44 years old" subjects, "45-64 years old" subjects, "65-74 years old" subjects, and "75 years old or older" subjects. These differences were statistically significant (F=57.67, ρ<.001). The university graduate subjects had the highest score for HR-QoL.

Table 1.
Demograhy of the participants and their scores of LSI, MI and HR-QoL (N = 892).

Characteristics	Categories	n	%	Satisfaction of Life (LSI)		Melancholy Index (MI)		HR-QoL (HR-QoL)	
				M±SD	t or F (ρ)	M±SD	t or F (ρ)	M±SD	t or F (ρ)
Gender	Male	416	46.6	7.14±1.69	0.65 (.051)	11.10±1.07	-5.45 (<.001)	0.91±0.07	5.73 (<.001)
	Female	476	53.4	7.07±1.68		12.44±4.07		0.87±0.13	
	Total	892	100.0	7.10±1.68		11.81±3.76		0.89±0.11	
Age (Years)	19-44[a]	269	30.2	7.24±1.50	1.63 (.180)	11.92±3.82	3.18 (.023) b<d†	0.93±0.04	57.67 (<.001) d<c<b<a
	45-64[b]	396	44.4	7.11±1.71		11.56±3.42		0.91±0.09	
	65-74[c]	115	12.9	6.86±1.76		11.56±3.70		0.87±0.14	
	>=75[d]	111	12.5	6.96±1.87		12.76±4.67		0.78±0.18	
	M±SD	53.04±17.03							
Education	Never attended school[a]	35	3.9	6.63±1.96	6.03 (<.001) a,b<g	14.41±5.14	4.19 (<.001) a<c,d,f,g b<g	0.74±0.22	30.19 (<.001) a<b<c,d,e,f,g c<f
	Elementary school[b]	120	13.5	6.79±1.83		12.78±4.70		0.83±0.16	
	Middle school[c]	95	10.7	6.92±1.69		11.71±3.14		0.88±0.10	
	High School[d]	288	32.3	7.10±1.74		11.66±3.52		0.91±0.10	
	College[e]	89	10.0	6.92±1.63		11.78±3.27		0.93±0.04	
	University[f]	226	25.3	7.32±1.47		11.50±3.65		0.93±0.06	
	Graduate School[g]	39	4.4	8.03±1.31		10.03±2.33		0.94±0.03	
Marital Status	Married[a]	612	68.6	7.25±1.60	4.78 (.001) d<a	11.49±3.36	4.52 (.001) a<b,c	0.90±0.10	19.58 (<.001) c<a,b,e
	Divorced[b]	40	4.5	6.60±2.02		13.35±4.55		0.88±0.10	
	Bereaved[c]	92	10.3	6.73±1.92		12.78±4.80		0.81±0.18	
	Separated[d]	17	1.9	6.47±1.37		11.47±3.00		0.88±0.12	
	Single[e]	131	14.7	6.88±1.69		12.22±4.34		0.93±0.04	
Average monthly income of households (Ten thousand won)	0-99[a]	94	10.5	6.72±2.01	6.54 (<.001) a,b<d,f	12.88±4.90	3.60 (.003) d,e<a	0.84±0.14	17.01 (<.001) a<c,d,e,f b<c,d
	100-299[b]	313	35.1	6.81±1.73		12.10±3.91		0.87±0.15	
	300-499[c]	228	25.6	7.19±1.58		11.63±3.74		0.91±0.07	
	500-799[d]	195	21.9	7.45±1.47		11.44±3.04		0.93±0.04	
	800-999[e]	27	3.0	7.33±1.69		10.26±2.09		0.93±0.03	
	Over 1000[f]	35	3.9	7.91±1.29		11.06±3.13		0.94±0.01	
	M±SD	358.8±252.1							
	Number of basic livelihood recipients	20	2.2						
Number of family members	1[a]	169	18.9	6.96±1.92	3.61 (.003) a,c<d	11.92±3.71	1.75 (.121)	0.88±0.11	4.83 (<.001) a,b<d
	2[b]	333	37.3	7.05±1.66		11.85±3.99		0.88±0.13	
	3[c]	188	21.1	6.89±1.65		12.26±4.19		0.91±0.11	
	4[d]	147	16.5	7.50±1.40		11.13±2.68		0.92±0.06	
	5[e]	41	4.6	7.37±1.71		11.34±3.37		0.92±0.06	
	6[f]	14	1.6	8.00±1.41		12.50±3.18		0.94±0.04	

(F =30.19, ρ<.001). The widowed subjects exhibited higher HR-QoL than the married, divorced and single subjects. (F = 19.58, ρ < .001). Subjects with higher income levels (3-4M, 5-7.99M, 8-9.99M, ≥10M) had significantly better HR-QoL than those with lower incomes (0-990K). Similarly, those

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earning 3-4.99M and 5-7.99M had better quality of life compared to those earning 1-2.99M (F = 17.01, ρ = <.001). The people with the highest number of family members i.e. 4 had highest score of HR-QoL (F=4.83, ρ=<.001) (Table 1).

5.4. The Variation in LSI, MI and HR-QoL Life Satisfaction, Melancholy, and HR-QoL According to the Health Affecting Behaviors Smoking

The mean age for starting the smoking was 20.2 (±4.6) years (Table 2). About 60.1 % of subjects never smoked. Out of the people smoking currently, about 44.1% of subjects smoked daily. Those who never smoked shoed higher value of LSI that those who smoked in their lifetime, though the differences were not statistically significant. However, the highest value of MI was exhibited by those who smoked less than 5 packets of cigarettes over their life time. Non-smokers reported higher HR-QoL (HR-QoL), the difference being statistically significant at the level of 0.05 (F=5.98, p = .003). Among current smokers, those who smoked occasionally showed higher values for LSI and MI as compared to daily smokers or who have quit smoking. However, the differences were not statistically significant. The individuals who smoked daily had the greater value of HR-QoL (LSI: F=1.04, p= 0.354; MI: F = 0.94, p= 0.391; HR-QoL: F = 5.98, p = 0.032).

5.5. Drinking Alcohol

As high as 86.7% of the subjects had drank more than one drink during their life. The alcohol consumption frequency per year showed that highest proportion of subjects consumed 2 to 4 times a month. Conversely, only 8.5% of subjects had drinks more than 4 times a week. Individuals with and without lifetime drinking experience reported similar levels of satisfaction of life and HR-QoL. Melancholy symptoms also showed no significant difference between the two groups. On average, participants started drinking at the age of 22.03 years, with a standard deviation of 8.39 years. Those who reported drinking in the past year showed higher levels of satisfaction of life compared to non-drinkers. However, there was no significant difference in melancholy symptoms between the two groups. Different frequencies of drinking showed no significant difference in satisfaction of life. However, those who drank less than once a month reported higher HR-QoL compared to those who drank 4 or more times a week (F=3.10, p=.015).

Drinking 1-2 cups of alcohol at one time was associated with higher values of LSI and HR-QoL compared to consuming more than 10 cups. However, there were no significant differences in melancholy symptoms across different amounts consumed. The highest proportion of subjects consumed 1 to 2 cup amount of alcohol per intake. (Table 2).

5.6. Physical Activity

About 66% of subjects did not perform any physical activity (0 days) over the last week or 7 days. Among the individuals who performed physical activity of at least 1 day, the highest proportion were those doing exercises for period of 2 or 3 days. Proprtion of persons performing exercises for 6 or 7 days was extremely low. Regarding the walking as the physical activity for the last week, highest number of people (20.9%) walked for 7 days. Participants who not engaging in any physical activity for the last week showed lower HR-QoL values compared to those who reported 1-7 days of activity per week (). Satisfaction of life was not significantly different across different levels of activity. Similar to moderate physical activity, participants who reported walking 0 days per week had lower HR-QoL compared to those who reported walking 1-7 days per week. LSI and MI showed no significant difference across different levels of walking (LSI: F=1.17, p= 0.319, MI: F=0.86, p= 0.538, HR-QoL: 4.96, p= 0.001).

5.7. Subjective Health

The subjective health of participants was as follows. About 47.1% of individuals were considered having normal health around 19.5% had less than bad health. Among those having poor health, 249

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(27.9%) were diagnosed with hypertension and 113 (12.7%) had diabetes (Table 2). Participants who rated their subjective health level as "very good" reported significantly higher levels of satisfaction of life and HR-QoL compared to those with lower subjective health ratings (LSI: F = 30.71, p <.001; MI: F = 52.23, p <.001; HR-QoL: F=124.42, p < 0.001).

5.8. Presence of Hypertension

Individuals with hypertension demonstrated LSI values compared to those without hypertension. Similar values of melancholy symptoms compared to those without hypertension. Lower HR-QoL values compared to those without hypertension.

5.9. Presence of Diabetes Mellitus

Individuals with diabetes mellitus showed lower LSI, MI and HR-QoL compared to those without diabetes mellitus.

Table 2.
Health behaviors of the participants and association with LSI, MI and HR-QoL (N=892).

Characteristics	Categories	N	%	Life Satisfaction Index (LSI)		Melancholy Index (MI)		HR-QoL	
				M±SD	t / F (ρ)	M±SD	T / F (ρ)	M±SD	t / F (ρ)
Smoking									
The extent of smoking over a lifetime	Less than 5 packs (100 cigarettes) [a]	13	1.5	6.77±1.59	0.30 (.745)	12.23±3.77	3.04 (.048)	0.89±0.07	5.98 (.003) c<b
	5 packs (100 cigarettes) or more[b]	343	38.5	7.08±1.73		11.43±3.41		0.91±0.08	
	Never smoked[c]	536	60.1	7.12±1.65		12.06±3.97		0.89±0.13	
Currently smoking	Smoke every day[a]	157	44.1	6.94±1.76	1.04 (.354)	11.48±3.58	0.94 (.391)	0.92±0.07	3.46 (.032) c<a
	Occasionally smoke[b]	14	3.9	7.43±1.83		12.64±3.91		0.91±0.10	
	Smoked in the past but not now[c]	185	52.0	7.16±1.68		11.35±3.24		0.90±0.09	
Age at which started smoking	M±SD	20.2±4.6							
Drinking									
Lifetime drinking experience	Yes	773	86.7	7.09±1.68	-0.30 (.763)	11.77±3.74	-0.74 (.456)	0.90±0.10	3.454 (.001)
	No	119	13.3	7.14±1.67		12.06±3.94		0.85±0.12	
Age at which started drinking	M±SD	22.03±8.39							
Drinking experience in the past year	Yes	621	80.3	7.13±1.62	1.19 (.234)	11.77±3.74	-1.07 (.285)	0.90±0.10	4.692 (<.001)
	No	152	19.7	6.95±1.90		12.06±3.94		0.85±0.12	
Frequency of drinking	Less than once a month[a]	157	25.3	7.21±1.67	0.29 (.886)	12.16±3.51	1.04 (.386)	0.90±0.09	3.10 (.015)
	Once a month[b]	83	13.4	7.18±1.53		11.60±3.55		0.90±0.10	
	2-4 times a month[c]	196	31.6	7.04±1.65		11.54±3.92		0.92±0.07	
	2-3 times a week[d]	132	21.3	7.11±1.43		11.39±2.95		0.93±0.06	

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	4 or more times a week[e]	53	8.5	7.19±1.97		11.83±3.61		0.92±0.06	
Amount of alcohol consumed at one time	1-2 cups[a]	204	32.9	7.08±1.69	0.68 (.603)	12.07±3.62	2.45 (.045) d<a	0.90±0.09	5.43 (<.001) a<d,e
	3-4 cups[b]	122	19.6	7.12±1.62		11.57±3.23		0.91±0.08	
	5-6 cups[c]	62	10.0	6.95±1.60		11.97±3.81		0.92±0.05	
	7-9 cups[d]	123	25.2	7.12±1.53		10.88±3.29		0.93±0.05	
	More than 10 cups[e]	110	19.8	7.34±1.63		11.90±3.80		0.93±0.04	
Exercise									
Number of days of moderate physical activity in the last week	0[a]	589	66.0	7.03±1.73	1.20 (.298)	12.13±4.12	2.07 (.044)	0.88±0.13	4.12 (<.001) a<c
	1[b]	47	5.3	7.62±1.60		11.19±2.59		0.93±0.05	
	2[c]	63	7.1	7.32±1.59		10.86±2.77		0.93±0.03	
	3[d]	64	7.2	7.14±1.47		11.75±3.67		0.91±0.08	
	4[e]	31	3.5	7.19±1.22		11.32±2.57		0.92±0.06	
	5[f]	41	4.6	6.90±1.89		11.24±2.90		0.92±0.06	
	6[g]	24	2.7	7.00±1.35		10.71±2.01		0.92±0.06	
	7[h]	33	3.7	7.39±1.77		11.06±2.52		0.92±0.05	
Number of days of walking in the last week	0[a]	171	19.2	6.88±1.71	1.17 (.319)	12.46±4.60	0.86 (.538)	0.85±0.18	4.96 (<.001) a<b,c,d, e,f,g,h
	1[b]	54	6.1	7.19±1.39		12.15±3.01		0.91±0.07	
	2[c]	113	12.7	7.10±1.72		11.65±3.58		0.91±0.09	
	3[d]	137	15.4	7.14±1.52		11.42±2.87		0.91±0.07	
	4[e]	85	9.5	7.28±1.37		11.53±3.96		0.90±0.09	
	5[f]	109	12.2	7.06±1.70		11.80±4.66		0.91±0.07	
	6[g]	37	4.1	7.46±1.68		11.41±3.38		0.92±0.07	
	7[h]	186	20.9	7.12±1.92		11.74±3.15		0.89±0.10	
Subjective health level	Very good[a]	61	6.8	8.31±1.20	30.71 (<.001) a,b>c,d >e	9.87±1.51	52.23 (<.001) a,b<c<d ,e	0.94±0.03	124.42 (<.001) a>d,e b>c>d,e
	Good[b]	237	26.6	7.63±1.36		10.51±2.32		0.94±0.03	
	Moderate[c]	420	47.1	6.96±1.63		11.56±3.13		0.91±0.07	
	Bad[d]	123	13.8	6.54±1.81		14.45±5.02		0.83±0.11	
	Very bad[e]	51	5.7	5.69±1.83		16.02±5.79		0.66±0.26	
Presence of hypertension	Have	249	27.9	6.90±1.79	-2.17 (.030)	11.96±4.14	0.72 (.469)	0.85±0.14	-5.80 (<.001)
	None	643	72.1	7.18±1.62		11.76±3.61		0.91±0.08	
Presence of diabetes mellitus	Have	113	12.7	6.75±1.67	-2.35 (.019)	12.46±4.22	1.94 (.052)	0.83±0.16	-4.50 (<.001)
	None	779	87.3	7.15±1.67		11.72±3.69		0.90±0.09	

5.10. LSI, MI and HR-Qol With Respect to the Social Capital Features

Table 3 provides insights into the characteristics of social capital among community participants and their associations with satisfaction of life, symptoms of melancholy, and HR-QoL.

5.11. Religious Activity

Participants engaging in religious activities demonstrated higher LSI values compared to those not engaging in religious activities ($t = 3.02$, $p = 0.003$). However, there were no significant difference in MI values ($t = -12.4$, $p = 0.213$) as well as in HE-QoL compared to those not engaging in religious activities ($t = -0.68$, $p = 0.494$).

5.12. Social Activities

Participants engaging in social activities showed higher LSI ($t = 3.17$, $p = 0.002$), lower MI values ($t = -4.04$, $p < 0.001$).and higher HR-QoL values compared to those not engaging in social activities ($t = 3.12$, $p = 0.002$).

5.13. Leisure Activities

Similar to results of social activities, the participants engaging in leisure activities demonstrated higher LSI, lower MI and higher HR-QoL compared to those not engaging in leisure activities ($t = 3.08$, $p = 0.002$; $t = -3.64$, $p < 0.001$; $t = 7.24$, $p < 0.001$, respectively).

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5.14. Frequency of Contact with Comparatives (including Family Members)

Participants who had contact with comparatives less than once a month showed lower LSI compared to those with higher contact frequency ($t = 3.15$, $p = 0.008$), higher MI values compared to those with higher contact frequency ($t = 4.56$, $p < 0.001$). However, no significant difference in HR-QoL was found compared to those with higher contact frequency ($t = 0.59$, $p = 0.708$).

5.15. Frequency of Contact with Neighbors

Participants who had contact with neighbors less than once a month showed lower LSI compared to those with higher contact frequency ($t = 3.25$, $p = 0.006$). However, no significant differences were found in values of in MI and HR-QoL compared to those with higher contact frequency ($t = 2.20$, $p = 0.053$ and $t = 1.63$, $p = 0.149$, respectively).

5.16. Frequency of Contact with Friends

Participants who had contact with friends less than once a month showed no significant difference in LSI compared to those with higher contact frequency ($t = 0.73$, $p = 0.601$). on the other hand, higher MI and lower HR-QoL were observed as compared to those with higher contact frequency ($t = 3.20$, $p = 0.007$ and $t = 11.30$, $p < 0.001$, respectively).

These findings suggest that frequency of contact with comparatives, neighbors, and friends has varying associations with satisfaction of life, symptoms of melancholy, and HR-QoL, highlighting the importance of social connections in overall well-being.

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Table 3.
Characteristics of Social capital and their scores for LSI, Par MI and HR-QoL (N=892).

Characteristics	Categories	n	(%)	Satisfaction of Life		Melancholy		HR-QoL	
				M±SD	t or F (ρ)	M±SD	t or F (ρ)	M±SD	t or F (ρ)
Religious activity	Yes	279	31.3	7.35±1.69	3.02 (.003)	11.58±3.40	-12.4 (.213)	0.89±0.10	-0.68 (.494)
	No	613	68.7	6.99±1.66		11.92±3.91		0.89±0.11	
Social activities	Yes	498	55.8	7.26±1.54	3.17 (.002)	11.34±3.03	-4.04 (<.001)	0.90±0.08	3.12 (.002)
	No	394	44.2	6.90±1.82		12.41±4.46		0.88±0.14	
Leisure Activities	Yes	302	33.9	7.33±1.47	3.08 (.002)	11.23±3.02	-3.64 (<.001)	0.92±0.05	7.24 (<.001)
	No	590	66.1	6.98±1.76		12.11±4.06		0.88±0.12	
Charity work	Yes	94	10.5	7.63±1.45	3.23 (.001)	11.08±2.69	-1.99 (.046)	0.90±0.06	1.76 (.079)
		798	89.5	7.04±1.69		11.90±3.86		0.89±0.11	
	No								
Frequency of contact with comparatives (including family members)	less than once a month[a]	94	10.5	6.53±2.09	3.15 (.008) a<c,d,f	13.21±4.88	4.56 (<.001) a<c,d,e	0.88±0.11	0.59 (.708)
	once a month[b]	74	8.3	6.86±1.54		12.04±3.15		0.91±0.08	
	2-3 times a month[c]	162	18.2	7.19±1.70		11.36±3.40		0.89±0.12	
	once a week[d]	102	11.4	7.16±1.69		11.59±4.01		0.90±0.14	
	2-3 times a week[e]	207	23.2	7.16±1.41		11.23±2.92		0.90±0.11	
	4 or more times a week[f]	252	28.3	7.26±1.70		12.10±4.06		0.89±0.10	
Frequency of contact with neighbors	less than once a month[a]	313	35.1	6.92±1.71	3.25 (.006) a<b	12.04±3.97	2.20 (.053)	0.89±0.13	1.63 (.149)
	once a month[b]	74	8.3	7.43±1.41		10.64±2.59		0.90±0.13	
	2-3 times a month[c]	107	12.0	7.47±1.53		11.49±3.58		0.91±0.07	
	once a week[d]	72	8.1	6.71±1.65		12.15±3.67		0.90±0.10	
	2-3 times a week[e]	112	12.6	7.13±1.84		11.63±3.22		0.91±0.08	
	4 or more times a week[f]	214	24.0	7.18±1.67		12.05±4.12		0.88±0.11	
Frequency of contact with friends	less than once a month[a]	140	15.7	6.86±1.87	0.73 (.601)	12.91±5.00	3.20 (.007) a<c,e	0.83±0.19	11.30 (<.001) a<b,c,d, e,f
	once a month[b]	126	14.1	7.20±1.60		11.74±3.34		0.90±0.09	
	2-3 times a month[c]	131	14.7	7.16±1.59		11.38±2.99		0.91±0.08	
	once a week[d]	104	11.7	7.07±1.69		11.61±3.88		0.91±0.08	
	2-3 times a week[e]	177	19.8	7.16±1.65		11.43±3.29		0.90±0.09	
	4 or more times a week[f]	214	24.0	7.13±1.67		11.84±3.72		0.91±0.08	

5.17. Relationship between HR-QoL, LSI and MI

Table 4 presents the correlation between Life Satisfaction (LS), Melancholy (M), and HR-QoL (HR-QoL) among the participants, along with the corresponding Pearson correlation coefficient (r) and significance level (ρ).

It is observed that there was a statistically significant inverse correlation between LS and M ($r = -0.40$, $\rho < .001$), indicating that a LS decreases, Melancholy tends to increase. HR-QoL showed a statistically significant positive correlation with LS ($r = 0.25$, $\rho < .001$). Additionally, there is a statistically significant inverse correlation between Melancholy and HR-QoL ($r = -0.52$, $\rho < .001$), indicating that as Melancholy decreases, Quality of Life tends to increase

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Table 4.
Relationship between HR-QoL, LSI and MI

Variables	Life satisfaction Index (LSI)	Melancholy Index (MI)	Health-related Quality of Life (HR-QoL)
	r(ρ)	r(ρ)	r(ρ)
Life satisfaction Index (LSI)	1.00		
Melancholy Index (MI)	-.40(<.001)**	1.00	
Health-related Quality of Life (HR-QoL)	.25(<.001)**	-.52(<.001)**	1.00

5.18. Factors Influencing HR-QoL of Participants

Table 5 displays the influencing factors on HR-QoL among the participants, including the unstandardized regression coefficient (B), standard error (SE), standardized coefficient (β), t-value, and significance level (ρ). The constant term represents the predicted value of HR-QoL when all other predictors are set to zero. Here, it's 1.08, indicating the baseline level of HR-QoL. A significant negative relationship existed between Melancholy and HR-QoL (B = -0.01, SE = 0.00, β = -0.37, t = -13.55, ρ < .001), indicating that as Melancholy increases, HR-QoL tends to decrease.

There was a significant negative association between Subjective health level and HR-QoL (B = -0.03, SE = 0.00, β = -0.22, t = -7.56, ρ < .001), implying that individuals who perceive their health more negatively tend to have lower HR-QoL.

Positive drinking experiences in the past year had a significant positive effect on HR-QoL (B = 0.04, SE = 0.01, β = 0.15, t = 4.71, ρ < .001), suggesting that individuals who have had positive drinking experiences may report higher HR-QoL.

The education levels (Never attended school and elementary) showed a significant negative impact on HR-QoL, with lower levels of education associated with lower HR-QoL (ρ < .001).

Regarding the disease, having hypertension had a significant negative effect on HR-QoL (B = -0.03, SE = 0.01, β = -0.10, t = -3.94, ρ < .001), indicating that individuals with hypertension tend to report lower HR-QoL.

Also, being bereaved (widowed) was significantly associated with lower HR-QoL (B = -0.03, SE = 0.01, β = -0.07, t = -2.47, ρ = 0.014). There was a significant negative relationship between lifetime drinking experience and HR-QoL (B = -0.02, SE = 0.01, β = -0.07, t = -2.24, ρ = 0.026).

R-squared (R^2) and Adjusted R-squared (Adjusted R^2) and F-value: The model explains approximately 46% of the variance in HR-QoL, suggesting a moderate level of predictability. The F-value is 75.06, indicating that the overall model is statistically significant (p < .001), suggesting that at least one of the predictors significantly predicts HR-QoL.

Table 5.
Multiple regression analysis assessing the factors influencing HR-QoL among community participants.

Variables	B	SE	β	T	*P*
(Constants)	1.08	0.02		64.50	0.000
Melancholy	-0.01	0.00	-0.37	-13.55	0.000
Subjective health level	-0.03	0.00	-0.22	-7.56	0.000
Drinking experience in the past year	0.04	0.01	0.15	4.71	0.000
Education (Never attended school)	-0.07	0.02	-0.12	-4.38	0.000
Presence of hypertension	-0.03	0.01	-0.10	-3.94	0.000
Education (elementary)	-0.03	0.01	-0.09	-3.36	0.001
Number of days of walking in the last week	0.00	0.00	0.07	2.85	0.005
Average monthly income of households	0.01	0.00	0.07	2.44	0.015
Marital status (Bereaved)	-0.03	0.01	-0.07	-2.47	0.014
Lifetime drinking experience	-0.02	0.01	-0.07	-2.24	0.026
R^2 =.46, Adjusted R^2 =.45, F = 75.06, *p* = <.001					

Note: B = unstandardized regression coefficient; SE = standard error.

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6. Discussion

This study aimed to discern the primary factors influencing life satisfaction (LS), melancholic symptoms (MS), and HR-QoL (HR-QoL) while considering the social capital and health behavior characteristics of rural residents, as analyzed through the 2019 Community Health Survey.

Initially, the disparities in life satisfaction, melancholy, and HR-QoL were investigated concerning the subjects' general characteristics. Although life satisfaction appeared slightly higher in males, the difference was not statistically significant ($t = 0.65$, $p = .051$). Subjects aged 19-44 years exhibited the highest life satisfaction, although this variation was not statistically significant ($F = 1.63$, $p = .180$). Conversely, subjects with a graduate degree or higher education, married individuals, and those with a higher average monthly household income demonstrated significantly elevated life satisfaction levels ($F = 6.03$, $p < .001$; $F = 4.78$, $p = .001$; $F = 6.54$, $p < .001$, respectively). Additionally, an increase in the number of family members corresponded to heightened life satisfaction ($F = 3.61$, $p = .003$). The average melancholy index score among subjects was 11.81 (SD±1.07), with females exhibiting significantly higher scores than males ($t = 5.45$, $p < .001$). Older age and lower educational attainment were associated with higher levels of melancholic symptoms ($F = 3.18$, $p = .023$; $F = 4.19$, $p < .001$, respectively). Moreover, divorced or widowed subjects and those with lower average incomes experienced significantly increased melancholy ($F = 4.52$, $p = .001$; $F = 3.60$, $p = .003$, respectively). However, there was no significant difference observed in melancholy among different family size groups ($F = 1.75$, $p = .121$). Regarding HR-QoL, younger age groups exhibited significantly higher scores ($F = 57.67$, $p < .001$). Conversely, subjects categorized as widowers outnumbered single and married individuals ($F = 19.58$, $p < .001$), contradicting previous findings suggesting that older adults with spouses tend to report higher HR-QoL (Lee & Kim, 2014). Additionally, subjects with higher monthly household incomes demonstrated significantly higher HR-QoL scores ($F = 17.01$, $p < .001$) [19].

Secondly, differences in life satisfaction, melancholy, and HR-QoL were examined based on the subjects' health-related characteristics. Subjective health levels positively correlated with life satisfaction ($F = -2.17$, $p = .030$), whereas subjects diagnosed with hypertension or diabetes reported significantly lower life satisfaction ($t = -2.17$, $p = .030$; $t = -2.35$, $p = .019$, respectively). The amount of alcohol consumed and lower subjective health levels were associated with higher levels of melancholy ($F = 2.45$, $p = .045$; $F = -2.17$, $p = .030$, respectively). Notably, subjects who had smoked five packs or more in their lifetime demonstrated better HR-QoL compared to never-smokers ($t = 5.98$, $p = .003$), while the HR-QoL of current smokers was significantly lower ($F = 3.46$, $p = .032$). Moreover, higher levels of physical activity and better subjective health were correlated with higher HR-QoL ($F = 4.96$, $p < .001$; $F = 124.42$, $p < .001$, respectively). Subjects diagnosed with hypertension or diabetes reported significantly lower HR-QoL ($t = -5.80$, $p < .001$; $t = -4.20$, $p < .001$, respectively).

Thirdly, differences in life satisfaction, melancholy, and HR-QoL were examined based on the social capital characteristics of the subjects. Participation in religious, social, leisure, and charity activities was associated with significantly higher levels of life satisfaction ($t = 3.02$, $\rho = .003$; $t = 3.17$, $\rho = .002$; $t = 3.08$, $\rho = .002$; $t = 3.23$, $\rho < .001$, respectively). Similarly, HR-QoL was significantly higher among subjects engaged in social and leisure activities ($t = 3.12$, $\rho = .002$; $t = 7.24$, $\rho < .001$, respectively), as well as those who frequently interacted with friends ($F = 11.30$, $\rho < .001$). Conversely, subjects less involved in social activities exhibited higher melancholic symptoms ($t = -4.04$, $\rho < .001$), as did those with fewer contacts with relatives and friends ($t = 4.56$, $\rho < .001$; $t = 11.30$, $\rho < .001$, respectively), consistent with previous research [15].

Fourthly, the correlation between HR-QoL, life satisfaction, and melancholy was examined. Lower levels of melancholy were associated with significantly higher HR-QoL ($r = -.52$, $p < .001$), as were higher life satisfaction scores ($r = .25$, $p < .001$). Furthermore, a significant inverse correlation was observed between life satisfaction and melancholy ($r = -.40$, $p < .001$), consistent with previous research [12].

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Overall, these findings shed light on the intricate interplay between demographic, health-related, and social factors in shaping the well-being of rural residents, emphasizing the importance of multifaceted interventions to enhance life satisfaction and HR-QoL in these communities. Rural residents' HRQoL is influenced by health behaviors, health status, and social factors. Policymakers should design interventions enhancing physical activity, chronic disease management, and social capital.

7. Suggestions

This study utilized data from the 2019 Community Health Survey (CHS) to examine the determinants influencing the HR-QoL (HR-QoL) of residents. Factors impacting life satisfaction included educational attainment, marital status, and household income. Notably, melancholic symptoms were more prevalent among elderly female subjects aged 75 or older with lower levels of education, income, and marital status. Conversely, individuals reporting higher subjective health levels and the absence of chronic diseases demonstrated a positive influence on HR-QoL. The findings underscored the significance of social capital in shaping life satisfaction, wherein stronger social connections, such as participation in religious, friendship, and leisure activities, were associated with lower levels of melancholic symptoms and higher life satisfaction.

Based on these findings, recommendations are proposed to enhance the HR-QoL of rural residents. It is imperative to develop social welfare programs aimed at fostering social networks and facilitating economic engagement. However, caution is warranted when extrapolating these research findings beyond the specific context of the study, given that the investigation was conducted in a single city in Korea. Furthermore, it is suggested to conduct follow-up assessments following the implementation of programs designed to improve residents' HR-QoL, to ascertain any discernible enhancements in their well-being.

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Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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