

# Comparison of Functional Independence among Community-dwelling Older Adults in Rural Areas in South Korea and the United States

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**Purpose:** The purpose of the study was to compare level of functional independence and its correlates among community-dwelling older adults in rural areas between South Korea and the United States. **Methods:** The study employed a comparative and correlational design. Data were collected from 198 community-dwelling older adults in rural areas (South Korea=100, & US = 98). Functional independence, cognitive function, obesity and general characteristics were measured. **Results:** From both countries, approximately fifteen percent of older adults living independently had cognitive problems without any treatments. Among Korean older adults functional independence was associated with a number of chronic diseases and aging while in the United States the participants had a negative correlation with obesity and aging. **Conclusion:** For Korean older adults in rural areas, nurses should focus on monitoring older adults' abilities to manage chronic illness and designing self-management programs while in the United States the focus should be on healthy lifestyle programs about exercise and diet to increase functional independence.

**Key Words:** Functional independence, Older adults, Rural area

## INTRODUCTION

In South Korea eleven percent of the total population were older adults in 2010 and the rate will increase to 24.3% by 2030 (Korean Statistical Information Service, 2010). Moreover, older adults living alone are up to 20.6% of them and rising continuously (Seok & Yu, 2007). The proportion of older population in rural areas is much higher than that of the general older population and expected to grow from 39.4% in 2010 to 63.0% in 2020 due to continuous movements of young adults to urban areas for job and returning home of older adults after retirement (Korean Statistical Information Service [KSIS], 2011). As the proportion of the older population in rural areas increases, loss of independence of older adults becomes a great health care concern. If they have sudden injuries or other urgent health problems, difficulties in transportation or lack of family caregivers will be barriers to get prompt health care services.

Functional independence is the strongest component

of independence in older adults and threatened by various negative factors such as cognitive decline and obesity leading to loss of independence (Suh & Kim, 2009; Stuck et al., 1999). However, older adults and their caregivers may overlook cognitive decline because they may consider it a normal aging process. The Korean government has run a dementia prevention project from 2008 to screen community-living older adults with mild cognitive impairment or dementia at an early stage and then nurses provide cognitive function programs or early treatments (Ministry of Health and Welfare [MHW], 2011). In addition, as the lifestyle of the older population has been westernized, a frequency of obesity, hypertension or diabetes is increasing in South Korea (KISIS, 2010). Comorbidities and age may also influence functional independence (Tierney et al., 2011).

The Korean government has implemented the long-term care insurance from July 1, 2008 nationwide for older adults with geriatric diseases. Services include home care services, long-term care facility services, and cash

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grants (MHW, 2010). The beneficiaries are limited to older adults with moderate-to-severe difficulties in function from geriatric diseases such as dementia or stroke due to lack of budget. Therefore, many older adults in rural area who are not severely enough to be eligible to the criteria are living independently under potential health risks. On the other hand, the US government has administered Medicare as a social insurance program for older population from 1965 and didn't limit to persons with specific geriatric diseases. Medicare provides hospital insurance, medical insurance, Medicare advantage plans, and prescription drug plans for older adults while Medicaid covers persons with low income (U.S. Department of Health and Human Services, 2011). However, decreasing budget and low quality of care are still problems, especially, in rural areas.

Therefore, nurses need to recognize reversible or irreversible factors of functional independence among independently living older adults in rural areas to provide efficient health services. Comparing health status among independently living older adults in rural areas between Korea and the US may provide current health care issues and evidences to change health care policies for older adults. The purpose of this study was to compare functional independence and its correlates among community-dwelling older adults in rural areas between Korea and the US.

## METHODS

### 1. Design and sample

The study employed a comparative and correlational design to compare the functional independence and its correlates between Korean and the US older adults in rural areas. The total sample consisted of 198 older adults, including 100 Koreans and 98 Americans. Exclusion criteria were 1) anyone not likely to be testable due to severe cognitive impairment, as indicated by a score of less than 16 on the Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975; Simmons & Schnelle, 2001) or the Korean version of Mini-Mental State Examination (MMSE-K) (Park & Kwon, 1990), and 2) persons who are bedbound or chairbound from geriatric diseases.

The sample size was calculated using the G\*Power sample size calculation program (Erdfelder, Faul, & Buchner, 1996) as 98 for each group, with six independent variables (age, gender, co-morbidity, cognitive function, obesity, and amount of exercise), a medium effect size of .15 for multiple regression,  $\alpha = .05$ , and power of

80%. Data were collected from January 2006 to March 2007 at three community centers located in central rural agricultural areas of Korea and two community club houses in the rural Midwest of the US.

### 2. Measures

Functional independence was measured by the motor subtotal scores of the Functional Independence Measure (FIM) (Uniform Data System for Medical Rehabilitation, 1990). The motor-FIM consisted of 13 items (6 items for self-care, 2 items for sphincter control, 3 items for mobility, and 2 items for locomotion). Each item is rated from 1 (total assist) to 7 (complete independence). It evaluates the level of assistance required by a person to perform basic activities of daily living. The higher scores mean higher level of functional independence. The intraclass correlation coefficient was .92 in 73 stroke survivors (Daving, Andren, Nordholm, & Grimby, 2001). In this study the internal consistency measured by Cronbach's alpha was .94 for Koreans and .96 for the US participants.

Cognitive function was measured by the Mini-Mental State Examination (Folstein et al., 1975) for the US older adults and by the Korean version of the Mini-Mental State Examination (MMSE-K) (Park & Kwon, 1990) for Koreans. The MMSE-K is scored from 0 to 30, the same as the MMSE, but several items were modified based on Korean culture. For example 'No ifs, ands, or buts' from the MMSE was changed to 'Kan-jang-gong-jang-gong-jang-jang' in the MMSE-K. These instruments test orientation (10 items), registration (3 items), attention and calculation (5 items), recall (3 items), language (7 items), and understanding and judgment (2 items). The MMSE-K has a good internal consistency of .87, as measured by the Kuder-Richardson formulas (KR-20) in Korean older adults (Kim, 2006). The inter-rater reliability using Kappa in this study was .83 for 20 Koreans and .80 for 20 Americans.

Obesity was measured by the Body Mass Index (BMI). The BMI was calculated as weight in kilograms divided by height in meters-squared ( $\text{kg}/\text{m}^2$ ). Height and weight were measured by research nurses using scales.

Others. Age, gender, education, marital status, type of disease, co-morbidity (number of diseases), and amount of exercise were recorded to capture demographic characteristics. Amount of exercise was measured by the total minutes of exercise per week using the diary for 7 days. Exercise includes dynamic physical activities such as walking, running, swimming, dancing, physical labor and

other sports. The diary had tables including food, physical activity and non-active pastimes. They documented type of physical activity and its time spent every day.

### 3. Study procedure and ethical consideration

Data collection started after the approvals of the Institutional Review Boards from both countries. The principal investigator managed the study sites by visiting and training the research nurses both countries. The research nurses met the volunteers in community centers for Koreans and in community club houses for Americans, fully explained the study, and received written consents. To prevent tripping during the performance tests of the motor-FIM, research nurses stood beside the participants to assist if they lost their balance during the procedure. During the tests, none of them lost their balance.

The research nurses conducted an interview with questionnaires after a 5-minute break when the motor-FIM performance tests were finished. If participants expressed any discomfort or fatigue, they had an additional short break. Every participant received a 10-dollar grocery ticket after the interview. Nurses explained how

to fill in the lifestyle diary and took back by mail or telephone after 7 days.

### 4. Analytic strategy

The  $\chi^2$ -test was used to compare nonparametric variables such as gender, education, marital status, and type of disease between two groups. The independent sample t-test was used to compare the parametric variables such as age, functional independence, cognitive function, obesity, and amount of exercise. Multiple linear regression was performed to identify factors influencing functional independence.

## RESULTS

### 1. Demographic characteristics of the study sample

The total of 198 participants aged with a mean of  $76.7 \pm 5.8$  years for Koreans and  $77.9 \pm 6.1$  years for Americans, and the majority were females (68.7%) (Table 1). Approximately 80% of the US participants were Non-Hispanic whites, followed by Non-Hispanic blacks (8.2%), Hispanics (7.1%) and Asians (5.1%). Most Korean and

**Table 1.** Demographic Characteristics between Korean and the US Older Adults (N=198)

Characteristics	Categories	Korean older adults (n=100)	US older adults (n=98)	$\chi^2$ or t	p
		n (%) or M $\pm$ SD	n (%) or M $\pm$ SD		
Age (year)		76.7 $\pm$ 5.8	77.9 $\pm$ 6.1	1.42	.575
Gender	Male	33 (33.0)	29 (29.6)	0.13	.716
	Female	67 (67.0)	69 (70.4)		
Race	Asian	100 (100.0)	5 (5.1)	179.00	< .001
	White, non hispanic	0 (0.0)	78 (79.6)		
	Black, non hispanic	0 (0.0)	8 (8.2)		
	Hispanic	0 (0.0)	7 (7.1)		
Marital status	Single	9 (9.0)	8 (8.2)	0.39	.942
	Married	31 (31.0)	27 (27.5)		
	Widowed	56 (56.0)	59 (60.2)		
	Divorced	4 (4.0)	4 (4.1)		
Education	Less than 6 years	43 (43.0)	0 (0.0)	89.90	< .001
	6~12 years	37 (37.0)	25 (25.5)		
	Some college	18 (18.0)	24 (24.5)		
	Bachelor's degree	2 (2.0)	20 (20.4)		
	Graduate degree	0 (0.0)	29 (29.6)		
Type of disease	Arthritis	66 (46.1)	26 (17.6)	81.69	< .001
	Hypertension	16 (11.2)	37 (25.0)		
	Diabetes Miletus	11 (7.7)	11 (7.4)		
	Heart	7 (4.9)	34 (23.0)		
	Stroke	7 (4.9)	3 (2.0)		
	Others	12 (8.4)	13 (8.8)		
	No specific diseases	24 (16.8)	24 (16.2)		

the US older adults didn't have their spouses (69.0% & 72.3%, respectively). The education level of Korean older adults was lower than that of the US participants. The most frequent disease was arthritis (46.1%) in Koreans while hypertension (25.0%) and heart disease (23.0%) were in the US group.

### 2. Differences in study variables between groups

There were significant differences in the study variables between Korean and the US older adults (Table 2). Functional independence in the Korean group was significantly higher than the US group ( $t = 10.57, p < .001$ ). The US group showed significantly higher cognitive function than Koreans ( $t=9.26, p < .001$ ). The level of obesity of Koreans was significantly lower than those of Americans ( $t=8.04, p < .001$ ). Korean group reported more amount of exercise than the US group ( $t=5.79, p < .001$ ).

### 3. Functional independence and its correlates between groups

Comparison of functional independence and its correlates between Korean and the US groups was described in the Table 3. In South Korea the multiple R-square for the model was .37, with age and co-morbidity as the strongest predictors ( $b=-.37, p=.004; b=-.37, p=.003$ , respectively), followed by amount of exercise ( $b=.32, p=.005$ ).

In the US participants the multiple R-square for the model was .43, with age as the strongest predictor ( $b=-.52, p < .001$ ), followed by obesity ( $b=-.31, p=.007$ ), gender ( $b=-.26, p=.026$ ), and amount of exercise ( $b=.29, p=.010$ ).

## DISCUSSION

The study examined functional independence and its correlates among independently living older adults in rural areas and compared the relationships among variables between South Korea and the US. Korean older adults in rural areas showed relatively higher level of functional independence than the US older adults. An explanation may be that most Korean older adults in rural areas still actively work for a living leading to continuous physical activities. Brach and her colleagues (2004) found that older adults who performed 20-30 minutes of moderate-intensity exercise or lifestyle activity on most days of the week had better functional independence than those who were inactive. In this study the US older adults performed significantly less amount of exercise than Koreans.

The mean score of the BMI in Koreans was 21.6 and significantly lower than that of the US participants (BMI =25.0). This score was similar to the results of the 770-older adult study in Korean rural areas reporting 21.9 of BMI (Cho, 2007). Approximately 32% of Koreans were overweight and 16% of them were obese. On the other

**Table 2.** Variable Differences between Korean and the US Older Adults

(N=198)

Variables	Korean older adults (n=100)	US older adults (n=98)	t	p
	M±SD	M±SD		
Functional independence	77.63±8.27	65.42±7.98	10.57	< .001
Cognitive function	23.57±3.58	27.87±2.91	9.26	< .001
Obesity	21.61±3.30	25.03±2.64	8.04	< .001
Amount of exercise	136.81±107.45	69.64±41.22	5.79	< .001

**Table 3.** Functional Independence and its Correlates

Predictors	Korean older adults (n=100)			US older adults (n=98)		
	b	SE	p	b	SE	p
Age	-.37	.01	.004	-.52	.02	< .001
Gender	.05	.16	.673	-.26	.16	.026
Co-morbidity	-.37	.06	.003	.18	.05	.092
Obesity	.11	.02	.375	-.31	.02	.007
Cognitive function	.12	.02	.344	.07	.01	.508
Amount of exercise	.32	.03	.005	.29	.05	.010
F=5.43, df=6, 94, Adjusted R <sup>2</sup> =.37, p=.001			F=8.32, df=6, 92, Adjusted R <sup>2</sup> =.43, p< .001			

hand, approximately 44% of the US group was overweight and more than 30% of them were obese. The BMI scores of 25.0 among the US participants in this study were more likely lower than a study of 1,452 community-dwelling elders in New York reporting a BMI score of 26.8 (Luchsinger, Patel, Tang, Schupf, & Mayeux, 2008).

On the other hand, in this study two of the US participants were underweight while nine of the Koreans. This result might be because Korean older adults lived in agricultural areas, their main foods include vegetables, while the US participants lived in the Midwest, and their main foods include beef. Moreover, over 40% of the US older adults ate instant food as their main meal in this study.

Korean older adults had significantly lower scores of MMSE than the US participants. As the MMSE score needs to be adjusted by educational attainment (Crum, Anthony, Bassett, & Folstein, 1993), this result might be due to the lower education level of Koreans. In the US older adults 18.5% had scores less than 25 of the MMSE, indicating mild or moderate cognitive impairment (Mungas, 1991), while 17.5% of Korean older adults were under 25 of the MMSE. Although the scores were adjusted by level of education, over 15% of participants from each country were cognitively impaired. Among both Korean and American participants, those with mild-to-moderate cognitive impairment were still living in the community independently without caregivers. Therefore, the regular cognitive function screening for older adults living independently is necessary to prevent further incidences or health problems.

The study also investigated correlates of functional independence and compared the results between South Korea and the US, because functional independence had the strongest impact on independence (Rejeski et al., 2009). The study found that functional independence was correlated with age, gender, co-morbidity, obesity or amount of exercise, but each country had different significant relationships. Both groups clearly showed the impact of aging on functional independence. Co-morbidity was the significant factor influencing functional independence in Korean older adults. Over 80% of Koreans had chronic illness and 40% of them had more than two chronic illnesses in this study. The most frequent chronic disease in the Korean participants was arthritis (46.1%), followed by hypertension (11.2%), while in the US participants hypertension (25.0%) and heart disease (23.0%) were common. Since Korean rural areas have difficulties in health care access compared to ur-

ban areas, low level of chronic illness management and health promotion are still health care issues. This finding gives further impetus for more preventive strategies to manage chronic illness such as degenerative arthritis in older adults, especially for individuals who are living independently in rural areas. Nurses in rural areas should design and implement preventive or management interventions to improve functional independence regarding chronic illness management in Korea.

Among the US older adults, obesity management was an important issue to maintain their functional independence. This result extends previous research findings that obesity in older adults is independently associated with poor overall lower extremity physical performance (Sharkey, Ory, & Branch, 2006) and impaired functional independence (Lang, Llewellyn, Alexander, & Melzer, 2008). The obesity management program should include healthy diet education reducing instant food intake and exercise program increasing physical activities.

The study has limitations that should be considered in the interpretation of the results. Regional variations could not be addressed because this study was conducted in the central-rural area in South Korea and in the rural Midwest of the US. Additionally, further research needs to include dietary habits and weight change to appropriately explain the reason for differences in the BMI scores.

## CONCLUSION

The study found that there were still a number of older adults with cognitive and other health problems living independently threatening their safety and functional independence. There is a need of regular and more frequent health screening for all of older adults living independently in rural area. Both countries had different health care issues. In Korean rural areas chronic illness management was a health care issue associated with physical functional decline while obesity was an important factor affecting functional independence in the US rural areas.

In South Korea there are biennial health assessments for older adults with low income but only if they apply for the service. Moreover, rural areas are still having difficulties in access to health care services, as compared to urban areas. Therefore, developing special health screening programs for older adults in rural areas is necessary for effective health management. Nurses also need to consider changes of Korean life style in rural areas such as increases of instant food and imported agricultural products leading to changes of disease pattern.

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