Multidimensional Deprivation and Aging: A Cross-National Study of Older Populations in South Korea and the United States

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Introduction

Enhancing consumers' quality of life is a critical objective worldwide, engaging multiple disciplines with direct/indirect links to consumer science, including diverse research agendas and policy domains (OECD, 2024). While advancements in technology and industry contributing to generally improved living conditions in contemporary society (Townsend, 1979), efforts to alleviate consumer poverty and deprivation and to raise living standards have been a consistent focus over several decades for sustainable, decent human life (Anand & Sen, 1997). Previous research has shown that the issues of poverty and deprivation consumers face today are not simply rooted in monetary factors, but involve complex, multidimensional elements, requiring a broader perspective beyond financial metrics alone (Sen, 1985; Mitra & Brucker, 2017). This includes both monetary and non-monetary dimensions, highlighting that many consumers experience multiple types of deprivation simultaneously (Chzhen et al, 2016). Furthermore, various studies indicate that the standards defining deprivation should adapt according to the social and contextual realities unique to each consumer population (Bavier, 2009; Mitra & Brucker, 2017; Glassman, 2021).

As addressed in prior studies, it is problematic to apply the deprivation standards of developing and underdeveloped countries directly to consumers in developed countries (Glassman, 2021; Alkire et al, 2023). The specific conditions and expectations in developed societies often differ significantly, necessitating unique metrics that accurately reflect the lived experiences of deprivation among consumers in these contexts (Mitra & Brucker, 2017). To address this, multidimensional indices tailored to developed nations, such as the Multidimensional Deprivation Index (MDI) in the United States or Europe, have been significantly used and developed (Dewilde, 2008; Glassman, 2021).

This study aims to examine the reality of multidimensional deprivation among older people in South Korea and the United States, by benchmarking the MDI of the United States (US-MDI). First, this study adopts the US-MDI, which is designed to measure multidimensional deprivation in advanced countries using the Alkire-Foster (AF) method (Alkire & Foster, 2011). Based on the prior research (Nowak & Scheicher, 2017), we adapt the US-MDI by applying the AF framework to reflect cultural and social characteristics of Korean society. Specifically, we tailor the US-MDI dimensions and cut-off thresholds, thereby reflecting Korea's socioeconomic structure. In addition, we integrate culturally relevant dimensions to address unique aspects of Korean society, ensuring that the multidimensional deprivation measurement is aligned with local contexts (Nowak & Scheicher, 2017).

Using these tailored MDI indicators, the study examines and compares multidimensional deprivation patterns among older populations in the U.S. and Korea, groups widely recognized as vulnerable (UNDP, 2017). By analyzing multiple data sources from each country, this research illustrates how deprivation manifests across different dimensions within these populations,

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underscoring the value of a multidimensional approach that considers national context and social characteristics in addressing consumer deprivation (Ray & Sinha, 2015). This study will provide implications for adapting the MDI framework to each country's social structure and vulnerable groups, and contributes to expanding the application of multidimensional deprivation criteria as a proxy of consumer well-being in a contextually nuanced manner across diverse social settings.

Method

This study utilizes the Alkire-Foster (AF) method, a widely recognized approach for measuring multidimensional poverty, to analyze deprivation across multiple dimensions (Hwang & Nam, 2020; Glassman, 2021). The method's flexibility allows for the adjustment of cutoff thresholds and the incorporation of different deprivation dimensions (Alkire & Foster, 2011), making it suitable for adapting to both U.S. and Korean contexts (Nowak & Scheicher, 2017; Glassman, 2021). By applying these modified indicators to data from both countries, the study aims to assess the extent of multidimensional deprivation among the older adults and to identify the dimensions most significantly contributing to overall deprivation.

For the analysis of Korean data, two distinct approaches are employed. The (1) *Retained Dimensions – Revised Measurement Approach* adjusts only the measurement thresholds of the U.S. MDI to align with Korea's socioeconomic context (Nowak & Scheicher, 2017), while the (2*) Expanded Dimensions – Revised Measurement Approach* expands the dimensions to incorporate unique aspects of Korean society (Ntsalaze & Ikhide, 2018). By leveraging multiple data sources from both the U.S. and Korea, this study enables a comparative analysis of multidimensional deprivation patterns in both settings.

Analysis

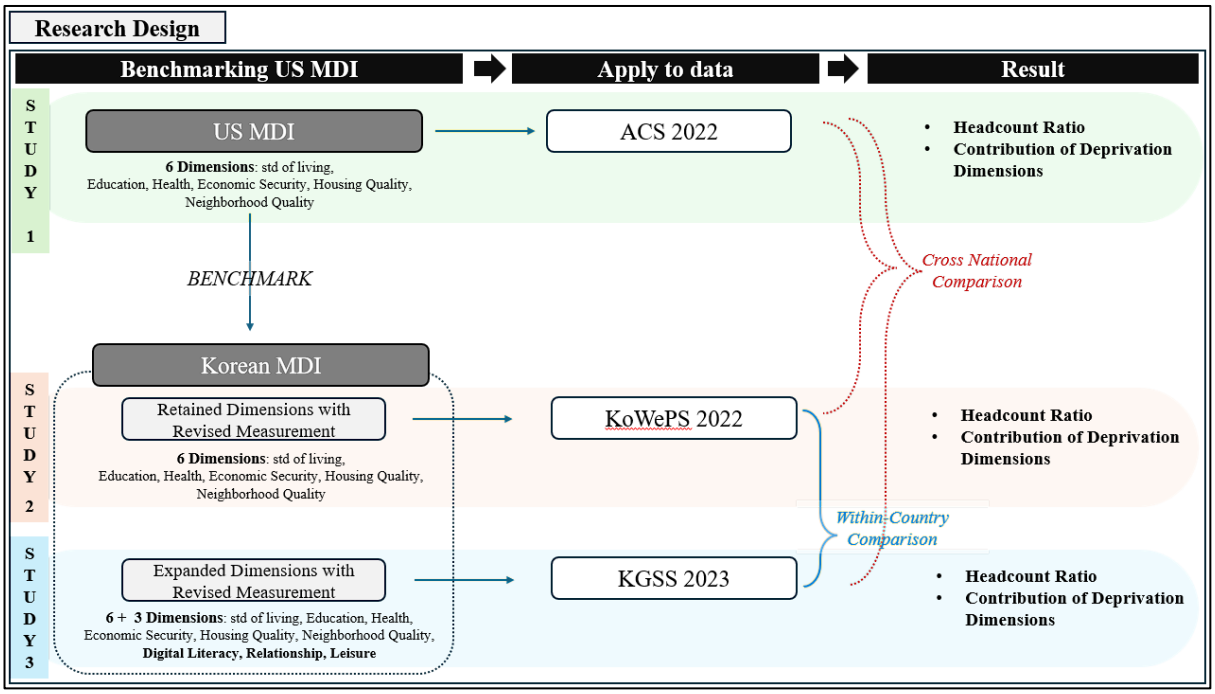
The counting approach was used to calculate two primary deprivation measures: the headcount ratio (H), representing the proportion of individuals below the deprivation threshold, and the adjusted headcount ratio (M), which accounts for both the prevalence and depth of deprivation (Alkire & Foster 2011). These measures allow for an understanding of how deprivation is distributed across different population groups (Alkire et al, 2017). Additionally, dimensions contributing most significantly to overall deprivation are identified and visualized in a radial graph. This highlights key areas of deprivation for individuals experiencing multidimensional deprivation—those deprived in 3 or more dimensions (k = 3)—allowing for a clearer understanding of the most impactful areas for those facing substantial deprivation. The analysis primarily focused on the older age group, with comparisons made to the overall population and the younger age group. Moreover, comparisons were conducted across studies to identify patterns and differences in deprivation.

Research Design

As shown in Figure 1, this study is divided into three phases: Study 1, Study 2, and Study 3. Study 1 specifically analyzes U.S. data using the six dimensions of the U.S. MDI. In Study 2, the same dimensions as those in Study 1 are applied to Korean data, with adjustments made to specific measurement indicators and thresholds to better reflect Korea's socioeconomic context (Nowak & Scheicher, 2017). To address Korea-specific factors in greater detail, Study 3 expands the dimensions to include aspects unique to Korea, providing a more context-specific analysis of multidimensional deprivation (Ntsalaze & Ikhide, 2018). These studies collectively compare deprivation patterns in the U.S. and South Korea, considering each country's unique social context.

Figure 1

Research Design



Result

Study 1: Analysis of U.S. Data Using the Six Dimensions of the U.S. MDI

Study 1 utilized the six dimensions of deprivation derived from the U.S. MDI to analyze the U.S. data. This phase examined multidimensional deprivation among the older population in the United States using the original MDI framework.

Dimensions and Measures

In this study, we applied the U.S. Census Bureau's approach to the MDI within the U.S. context (Glassman, 2021). The six dimensions and measurement approaches of multidimensional deprivation proposed as below (see Table 1 in Appendix):

(1) **Standard of Living**: Traditional income-based poverty - material deprivation
(2) **Education**: Lacks high school diploma or GED
(3) **Health**: Defined by no health insurance or disabilities. Different criteria for ages 65+ (no insurance or 2+ disabilities) and under 65 (no insurance).
(4) **Economic Security:** Employment status and income adequacy, with age-based criteria.
(5) **Housing Quality:** Physical adequacy, including overcrowding or non-residential housing.
(6) **Neighborhood Quality:** Individuals living in disadvantaged areas based on ADI (considering 17 factors: food access and air quality etc.)

Data

The American Community Survey (ACS) data, frequently used in U.S. MDI studies (Glassman, 2021), provides annual social, economic, and housing information. Using the 2022 dataset with 2.8 million records after excluding missing values, 754,000 were identified as older adults.

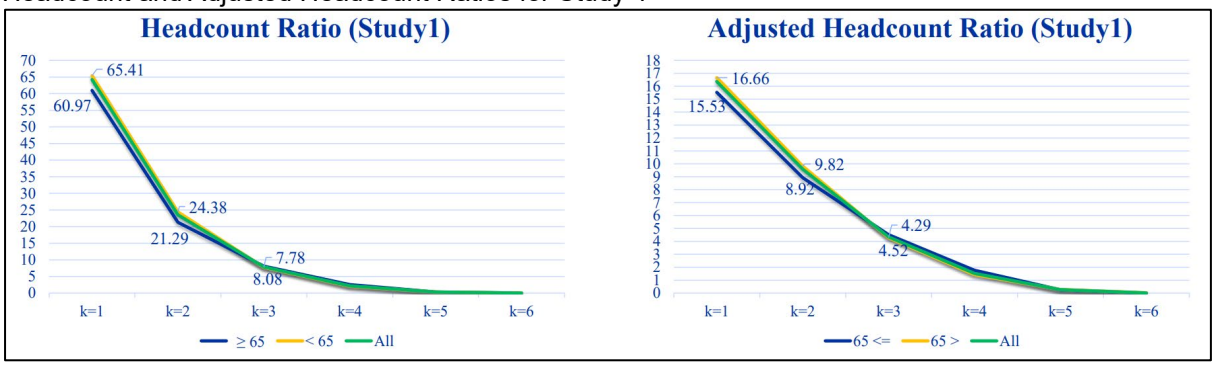
Result

(1) Headcount Ratio and Adjusted Headcount Ratio

Figure 2 and Table 2(Appendix) presents the headcount and adjusted headcount ratios

for the U.S. population, addressing the distribution of individuals by the number of deprivation dimensions they experience. According to the analysis, 60.97% of the older population in the U.S. experience deprivation in at least one dimension (k=1), and 21.29% experience deprivation in two or more dimensions (k=2), indicating that a significant portion of the older population faces multidimensional deprivation. 8.08% experience deprivation in three or more dimensions (k=3). Similarly, 65.41% of the younger population experience deprivation in at least one dimension, and 24.38% experience multidimensional deprivation (k=2). The proportion of younger people experiencing deprivation in three or more dimensions (k=3) is 7.78% for younger people. For the U.S. population, there is only minimal difference in the number of types of deprivation experienced between the older and younger populations.

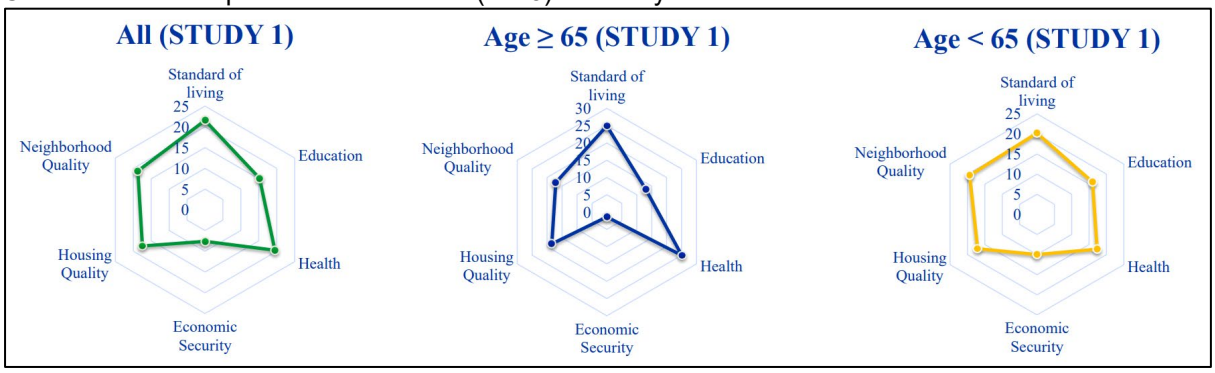
Figure 2
Headcount and Adjusted Headcount Ratios for Study 1



(2) Contribution of Deprivation Dimensions to Multidimensional Deprivation

When examining the contributions of the six deprivation dimensions (k=3) based on the U.S. MDI, the older population in the U.S. shows a higher contribution from health deprivation compared to the younger group, while contributing less in education and economic security (Figure 3). These patterns of deprivation differ notably between older and younger populations (see Table 3 in Appendix).

Figure 3
Contributions of deprivation dimensions (k = 3) for Study 1



Study 2: Adapting the U.S. MDI Dimensions to South Korean Data

In Study 2, the same six dimensions were applied to Korean data with adjusted cut-off thresholds to align with Korea's socioeconomic context. This multidimensional deprivation analysis of Korea's older population followed the *Retained Dimensions-Revised Measurement Approach*, which preserved U.S. MDI dimensions but tailored thresholds to fit the Korean context (Nowak & Scheicher, 2017; Glassman, 2021).

Dimensions and Measures

The deprivation thresholds in this part, follow the U.S. MDI domains, but measurements are adjusted to fit Korean context (see Table 4 in Appendix).

(1) Standard of living: Using an income-based poverty measure, households with an equivalized income below 50% of the median are considered deprived (Hwang & Nam, 2020).
(2) Education: Individuals without a middle school graduation are considered deprived
(3) Health: Health deprivation is measured by the presence of disabilities, lack of health insurance, overall health conditions
(4) Economic Security: Individuals unemployed or lacking essential insurance systems, such as employment or workers' compensation, are considered economically insecure
(5) Housing Quality: Individuals living in overcrowded housing or non-residential units, high housing cost burden, poor housing conditions
(6) Neighborhood Quality: Living in an area with bad odors, air pollution, noise is considered as experiencing deprivation

Data

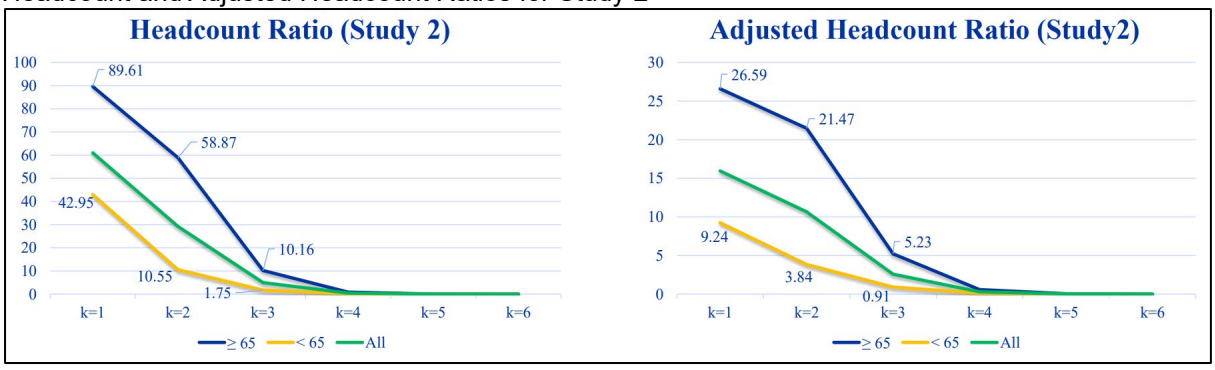
Data from the 2022 Korea Welfare Panel Study (KOWEPS) were used, commonly applied in Korean multidimensional deprivation studies (Hwang & Nam, 2020). KOWEPS includes variables on household and individual characteristics, income, social insurance, labor, and housing. The dataset, nationally representative and oversampled for low-income households (50% of total), includes 15,931 responses, with 6,161 older individuals.

Results

(1) Headcount Ratio and Adjusted Headcount Ratio

Figure 4 shows headcount and adjusted headcount ratios for Korea's overall population, and older and younger groups. Results indicate that 89.61% of older adults experience deprivation in at least one dimension (k=1), with 58.87% facing deprivation in two or more dimensions (k=2) and 10.16% in three or more (k=3), highlighting significant deprivation among older people. In contrast, 42.95% of younger adults experience deprivation in at least one dimension, only 10.55% in two or more, and 1.75% in three or more. These results show a marked disparity between older and younger groups, with a more pronounced difference compared to Study 1 (see Table 2 in Appendix).

Figure 4
Headcount and Adjusted Headcount Ratios for Study 2

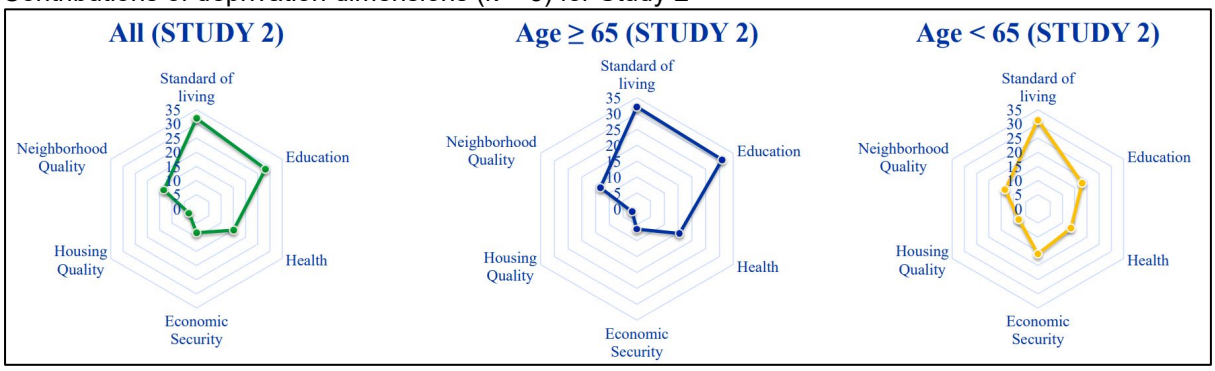


(2) Contribution of Deprivation Dimensions to Multidimensional Deprivation

Figure 5 shows revised deprivation dimensions' contribution rates to multidimensional deprivation (k=3) in Korea's socio-economic context. Among older adults, substantial contributions are noted in standard of living, education, and health. For younger adults,

health's contribution is lower, while housing quality and economic security contribute slightly more.

Figure 5
Contributions of deprivation dimensions (k = 3) for Study 2



Study 3: Expanding the Dimensions to Incorporate Unique Aspects of South Korea

Study 3 expanded the analysis by adding dimensions specific to Korean society. This approach, referred to as the *Expanded Dimensions - Revised Measurement Approach*, incorporated additional factors unique to the Korean context, enabling a more comprehensive exploration of multidimensional deprivation patterns in Korea (Ntsalaze & Ikhide, 2018).

Dimensions and Measures

Some dimensions were revised, and additional dimensions were added to reflect Korean realities (see Table 5 in Appendix for detail):

(1) Standard of living and **(2) Education** remains unchanged.
(3) Health: Chronic illnesses are also considered
(4) Economic Security: Those unemployed without welfare benefits or with unstable employment are considered deprived. Criteria based on enough working hours have been excluded due to Koreas overworking hour issue.
(5) Housing Quality: Short-term rental agreements are considered indicators of housing instability
(6) Neighborhood Quality: Individuals living in unsafe neighborhoods are considered

Expanded Dimensions:

(7) Digital Literacy Status: The inability to use digital technology, prevalent in a highly digitalized society, is a key barrier in Korea (Kang et al., 2023).
(8) Relationship Status: Social isolation is a significant issue in Korea, particularly among the elderly. The rising number of single-person households and increasing isolation among older adults have contributed to a troubling increase in unattended deaths (Kim et al., 2021).
(9) Leisure Opportunity: Referred as time poverty (Chatzitheochari & Arber, 2012). Reflecting limited access to leisure due to overworking issues in Korea which significantly impacts mental health and well-being (Yang et al., 2018).

Data

This study utilized the 2023 Korean General Social Survey (KGSS), which includes a variety of questionnaires that are applicable to MDI indicators within the Korean context. A total of 1,230 responses were analyzed, with 290 identified as older individuals.

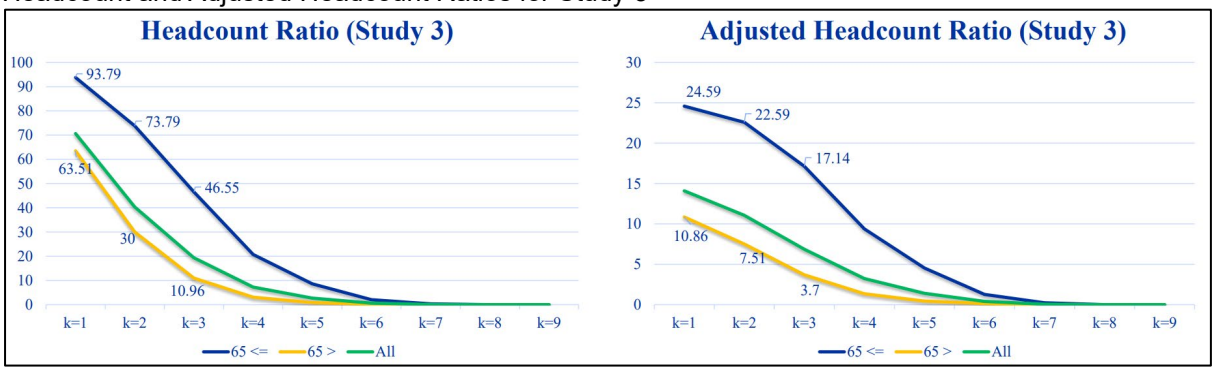
Result

(1) Headcount Ratio and Adjusted Headcount Ratio

Figure 6 presents the headcount ratios and adjusted headcount ratios for the overall population, older and younger groups in Korea. The analysis reveals that 93.79% of the older population in Korea experience deprivation in at least one dimension (k=1), while 46.55% face deprivation in three or more dimensions (k=3), indicating substantial multidimensional

deprivation among the older population. In contrast, 63.51% of the younger population experience deprivation in at least one dimension, and only 10.96% experience multidimensional deprivation (k=3), highlighting a pronounced disparity compared to the older population (see Table 2 in Appendix).

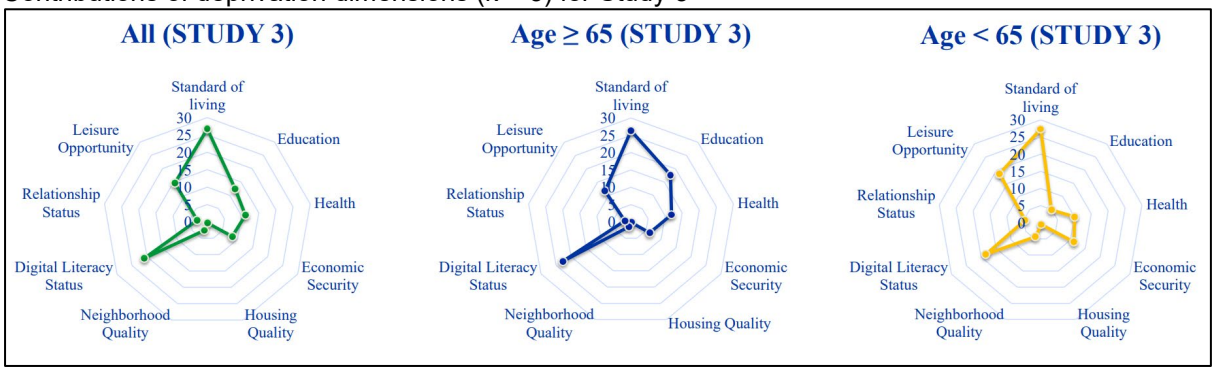
Figure 6
Headcount and Adjusted Headcount Ratios for Study 3



(2) Contribution of Deprivation Dimensions to Multidimensional Deprivation

The contribution rates of the nine deprivation dimensions, including those added to reflect Korea's social context, to multidimensional deprivation (k=3) are shown in the figure. Among older adults, the contribution rates for education and digital literacy dimensions are notably higher compared to the younger population, while the economic security dimension shows a relatively lower contribution rate for the older group compared to other age groups.

Figure 7
Contributions of deprivation dimensions (k = 3) for Study 3



Conclusions

This study measures multidimensional deprivation among older people in South Korea and the United States by examining the US-MDI as a foundational framework. The US-MDI constructs multidimensional deprivation indicators that have been applied to underdeveloped countries applicable to advanced countries into an index applicable to developed countries (Alkire & Kanagaratnam, 2020). We first compared the aspects of deprivations among older people in Korea and the United States by adjusting the criteria for the sub-indicators of the US-MDI based on the Korean context. The revised measures were applied to data from both Korea and the United States to examine and compare the nature of multidimensional deprivation in each country.

First, headcount ratio analyses of the Korean and the U.S. datasets revealed notable differences in deprivation patterns. In Korea, there was a pronounced disparity between older and younger populations in both datasets analyzed. In the KOWEPS data, which reflects the U.S. MDI domains with adjusted measurement criteria, approximately 58.87% of older individuals experienced

deprivation in two or more domains, while only 10.55% of the younger population experienced such deprivation. The KGSS data, which expanded upon these dimensions to incorporate more of the Korean social context, indicated that 46.55% of the older people experienced deprivation in three or more domains, compared to only 10.96% among the youngers. In contrast, the U.S. ACS data showed minimal difference between older and younger groups in terms of the number of deprivation types experienced. This suggests that patterns of deprivation differ significantly by subgroup across countries, underscoring the need for further exploration of other subgroups such as ethnic minorities, immigrants, and people with disabilities.

Second, the dimensions contributing to multidimensional deprivation differed significantly between Korea and the U.S. In the U.S. data, educational deprivation was a less significant contributor for the older groups. However, in the Korean data, educational deprivation was a prominent contributor among older individuals, likely reflecting the lower educational attainment among those who lived through Korea's post-war reconstruction era compared to the younger generation (Park, 2003). Additionally, in the U.S. data, health deprivation was a significant contributor among the older people, whereas the Korean data revealed similar levels of health-related deprivation for both older and younger age groups.

Third, this study expanded beyond the six core MDI dimensions by adding three additional dimensions of deprivation in accordance with the Korean context, yielding meaningful insights. Notably, digital literacy—the ability to effectively use digital services—emerged as a prominent issue not only among older individuals, who may face greater difficulties with digital adaptation, but also among younger individuals. This finding suggests the presence of another subgroup that shares common deprivation challenges beyond just age-related differences.

Limitations and Future Research

This study has several limitations. First, the dimensions examined may not comprehensively encompass all aspects of multidimensional deprivation specific to the U.S. or Korea. Future studies should expand on these findings by incorporating a broader range of deprivation dimensions and developing more in-depth indicators to better capture the nuances of each dimension. Additionally, this study utilized three distinct datasets, each with variations in survey timing and sampling methods. As a result, the findings from these datasets should be interpreted with caution, taking into account the methodological differences. Lastly, while there are unique subgroups within each country that reflect distinct deprivation patterns based on social context, this study is limited to an analysis of the older population. Because this study employed three different datasets for comparative analysis, we focused on the older adults as they were the only subgroup consistently represented across all three data sources. Future research should extend beyond the older age group to include subgroups such as immigrants, people with disabilities, and ethnic minorities, which may reveal distinctive deprivation patterns within each country.

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Appendix

Table 1
MDI Dimensions and Deprivation Thresholds for Study 1

Dimension	Indicator	Deprivation Threshold
Standard of Living	Income Based Poverty	Classified as deprived if household income falls below 100% of the poverty threshold (measured from 1% to 500%).
Education	Educational Attainment	Defined as deprivation for individuals without a high school diploma.
Health	Health Insurance (Age < 65)	Defined as deprivation for those without health insurance.
	Health Insurance (Age ≥ 65)	Defined as deprivation for those without health insurance.
	Disability Status	Considered deprived if experiencing two or more types of disabilities.
Economic Security	Employment Status (Age < 65)	Considered deprived if aged 18 or older and unemployed.
	Limited Work Hours (Age < 65)	Defined as deprivation for household heads working less than 20 hours per week or less than 26 weeks per year.
	Employment Status (Age ≥ 65)	Defined as deprivation for unemployed individuals.
	Limited Work & Insufficient Social Security Benefits (Age ≥ 65)	Defined as deprivation for those working limited hours and receiving social security benefits below the minimum threshold ($950.80 in 2022).
Housing Quality	Overcrowded Housing Unit	Defined as deprivation for households with more than two people per room.
	Inadequate shelter	Defined as deprivation for individuals living in shelters, temporary housing, etc
Neighborhood Quality	Area Deprivation Index (ADI)	Defined as deprivation for individuals residing in areas with an ADI score exceeding 90. - *calculated at the county level due to data constraints*

Table 2
Headcount and Adjusted Headcount Ratios for Each Study (Study 1, Study 2, Study 3)

	Study1			Study2			Study3		
k	**Older (n=754724)**	**Younger (n=2054666)**	**All (n=2809390)**	**Older (n=6161)**	**Younger (n=9770)**	**All (n=15931)**	**Older (n=290)**	**Younger (n=940)**	**All (n=1230)**
1	60.97(15.53)	65.41 (16.66)	64.22 (16.36)	89.61 (26.59)	42.95 (9.24)	60.99 (15.95)	93.79 (24.59)	63.51 (10.86)	70.65 (14.10)
2	21.29(8.92)	24.38 (9.82)	23.55 (9.58)	58.87 (21.47)	10.55 (3.84)	29.24 (10.66)	73.79 (22.59)	30.00 (7.51)	40.33 (11.07)
3	8.08(4.52)	7.78(4.29)	7.86 (4.35)	10.16 (5.23)	1.75 (0.91)	5.00 (2.58)	46.55 (17.14)	10.96 (3.70)	19.35 (6.87)
4	2.57(1.76)	2.05(1.43)	2.19 (1.52)	0.86 (0.58)	0.17 (0.12)	0.44 (0.30)	20.69 (9.38)	3.09 (1.34)	7.24 (3.24)
5	0.30(0.25)	0.33(0.28)	0.32 (0.27)	0.05 (0.04)	0.02 (0.02)	0.03 (0.03)	8.62 (4.55)	0.85 (0.45)	2.68 (1.41)
6	0.00 (0.00)	0.02(0.02)	0.01 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.07 (1.28)	0.21 (0.13)	0.65 (0.40)

7	-	-	-	-	-	-	0.34 (0.24)	0.00 (0.00)	0.08 (0.06)
8	-	-	-	-	-	-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
9	-	-	-	-	-	-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)

Table 3
Contributions of Deprivation Dimensions in Each Study (k = 3)

	Study1			Study2			Study3		
Dimensions	**Older**	**Younger**	**All**	**Older**	**Younger**	**All**	**Older**	**Younger**	**All**
Standard of Living	1.13(24.94)	0.87(20.21)	0.94(21.53)	1.68(32.11)	0.28(31.39)	0.82(31.95)	4.52(26.36)	1.01(27.30)	1.84(26.75)
Education	0.59(13.06)	0.69(16.02)	0.66(15.19)	1.62(30.97)	0.16(18.05)	0.73(28.18)	3.03(17.71)	0.18(4.89)	0.85(12.43)
Health	1.13(25.07)	0.74(17.32)	0.85(19.49)	0.81(15.51)	0.12(13.53)	0.39(15.09)	2.03(11.87)	0.37(10.06)	0.76(11.12)
Economic Security	0.06(1.42)	0.43(9.99)	0.33(7.59)	0.33(6.36)	0.15(15.98)	0.22(8.43)	1.07(6.24)	0.41(11.21)	0.57(8.28)
Housing Quality	0.83(18.44)	0.73(17.08)	0.76(17.46)	0.09(1.76)	0.07(7.71)	0.08(3.04)	0.03(0.20)	0.02(0.57)	0.02(0.36)
Neighborhood Quality	0.77(17.07)	0.83(19.37)	0.81(18.73)	0.70(13.29)	0.12(13.35)	0.34(13.30)	0.24(1.41)	0.16(4.31)	0.18(2.60)
Digital Literacy Status	-	-	-	-	-	-	3.90(22.74)	0.68(18.39)	1.44(20.95)
Relationship Status	-	-	-	-	-	-	0.31(1.81)	0.17(4.60)	0.20(2.96)
Leisure Opportunity	-	-	-	-	-	-	2.00(11.67)	0.69(18.68)	1.00(14.56)
Adjusted headcount ratio(M)	4.52(100.00)	4.29(100.00)	4.35(100.00)	5.23(100.00)	0.91(100.00)	2.58(100.00)	17.1(100.00)	3.70(100.00)	6.87(100.00)

Table 4
MDI Dimensions and Deprivation Thresholds for Study 2

Dimensions	**Indicator**	**Deprivation Threshold**
Standard of Living	Income Based Poverty	Considered deprived if household equivalized income is below 50% of the median, indicating significant economic hardship.
Education	Educational Attainment	Classified as deprivation if individuals did not complete middle school, based on Korea's mandatory education standards.
Health	General Health Status	Considered deprived if overall health is reported as poor.
	Disability Status	Classified as deprived if living with severe disabilities (equivalent to Korea's Disability Level 1-3), affecting daily function and independence.
	Health Insurance Coverage	Considered deprived if lacking both public and private health insurance, leaving individuals without financial protection for medical expenses.
Economic Security	Employment Status	Considered deprived if unemployed, indicating economic vulnerability.
	Job Stability	Classified as deprived if employment lacks stability, with individuals at risk of sudden job loss beyond their control.
	Labor Protection Coverage	Considered deprived if lacking both employment insurance and accident insurance, which are critical protections for job security in Korea.
	Post-Retirement Financial Stability	Classified as deprived if unable to receive both severance pay and pension, undermining financial security in retirement.

Housing Quality	Overcrowded Housing Unit	Classified as deprived if living space falls below the Korean "Minimum Housing Standard," indicating limited space and room availability per person.
	Inadequate Shelter	Considered deprived if residing in temporary or non-residential structures, such as makeshift buildings or containers, typically lacking essential amenities.
	Structurally Disadvantaged Housing	Considered deprived if residing in housing types commonly considered substandard in Korea, such as basements, semi-basements, or rooftop residences.
	Housing Cost Burden	Classified as deprived if housing costs, including rent and utilities, are disproportionately high relative to household income.
Neighborhood Quality	Environmentally Disadvantaged Area	Considered deprived if residing in areas with significant environmental challenges, such as noise, pollution, or poor air quality, impacting overall quality of life.

Table 5
MDI Dimensions and Deprivation Thresholds for Study 3

Dimensions	Indicators	Deprivation Threshold
Standard of Living	Income Based Poverty	Following Study 2 measurement criteria (Table 4)
Education	Educational Attainment	Following Study 2 measurement criteria (Table 4)
Health	General Health Status	Considered deprived if self-rated overall health is poor.
	Disability Status	When individuals have two or more disabilities, which can limit daily activities and independence.
	Chronic Health Condition	Considered deprived if individuals live with a long-term or chronic health condition that affects quality of life.
	Health Insurance Coverage	Classified as deprived if individuals have neither public nor private health insurance, leaving them vulnerable to medical expenses.
Economic Security	Employment Status	Considered deprived if individuals are in temporary or day labor employment with a high risk of sudden job loss.
	Unemployment & Lack of Other Income Sources	Classified as deprived if individuals are unemployed and lack any alternative income, such as investments, property income, pensions, or government support.
Housing Quality	Housing Tenure	Classified as deprived if residing under a monthly rental agreement without a security deposit (common arrangement in Korea for those unable to afford deposit: short-term, unstable, lower-quality housing).
Neighborhood Quality	Neighborhood Safety	Considered deprived if residing in an area with poor safety, indicating a neighborhood with high crime or low security.
Digital Literacy Status	Difficulty in Daily Life Due to Limited Digital Skills	Considered deprived if individuals experience daily inconvenience because of difficulty using digital devices.
	Difficulty Accessing Essential Services	Classified as deprived if individuals have trouble accessing essential services (e.g., banking, shopping, government support) that are primarily online-based.
	Difficulty Voicing Concerns Online	Considered deprived if individuals cannot easily express opinions or file complaints due to online-only access to such services.
	Limited Access to Information	Classified as deprived if limited digital skills prevent access to necessary information and resources.
Relationship Status	Social Isolation	When individuals experience feelings of isolation or social exclusion.

	Lack of Social Support	When individuals lack social support from family, friends, or their community.
	Low Satisfaction with Relationships	When individuals are dissatisfied with the quality of their personal relationships.
Leisure Opportunity	Limited Access to Leisure Activities	Classified as deprived if individuals have limited access to leisure activities, such as attending cultural events, visiting libraries, reading, dining out, or traveling.

Table 6
Deprivation Rates by Dimension and Age Group (Study 1, Study 2, Study 3)

Dimensions	Study 1				Study 2				Study 3			
	All n=2,809,390	**Older Age Group n=754,724**	**Younger Age Group n=2,054,666**	**x^2**	**All n=15,931**	**Older Age Group n=6,161**	**Younger Age Group n=9,770**	**x^2**	**All n=1,230**	**Older Age Group n=290**	**Younger Age Group n=940**	**x^2**
Standard of Living	419,449 (14.93)	109,284 (14.48)	310,165 (15.10)	164.7163***	7,963 (49.98)	4,961 (80.52)	3,002 (30.73)	3700***	615 (50.00)	240 (82.76)	375 (39.89)	162.8870***
Education	349,709 (12.45)	83,797 (11.10)	265,912 (12.94)	1700***	3,957 (24.84)	3,591 (58.29)	366 (3.75)	6000***	139 (11.30)	102 (35.17)	37(3.94)	215.7292***
Health	355,207 (12.64)	141,571 (18.76)	213,636 (10.40)	35000***	677 (4.25)	455 (7.39)	222 (2.27)	242.7457***	130 (10.57)	70 (24.14)	60(6.38)	73.9152***
Economic Security	204,329 (7.27)	17,210 (2.28)	187,119 (9.11)	38000***	1,338 (8.40)	320 (5.19)	1,018 (10.42)	134.1144***	187 (15.20)	42 (14.48)	145 (15.43)	0.1528
Housing Quality	289,669 (10.31)	58,023 (7.69)	231,646 (11.27)	7700***	241 (1.51)	59 (0.96)	182 (1.86)	20.7800***	6 (0.49)	1 (0.34)	5 (0.53)	-
Neighborhood Quality	1,052,020 (37.45)	273,687 (36.26)	778,333 (37.88)	616.9345***	1,071 (6.72)	444 (7.21)	627 (6.42)	3.7511	47 (3.82)	7 (2.41)	40 (4.26)	2.0451
Digital Literacy Status									369 (30.00)	179 (61.72)	190 (20.21)	181.8593***
Relationship Status									32 (2.60)	9(3.10)	23 (2.45)	0.3771
Leisure Opportunity									209 (16.99)	63 (21.72)	146 (15.53)	6.0249*