# Older Men Living with Spouse and Older Women Living with Spouse and Children Have Lower Frailty Prevalence: The Korean Frailty and Aging Cohort Study (KFACS)

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**Background:** In older adults, the risk of frailty is higher among those who are unmarried than among those who are married. However, no study has reported about the relationship between cohabitation status and frailty.
**Methods:** This cross-sectional study included 2,128 community-dwelling adults aged between 70 and 84 years who underwent interviews and physical function assessments for the Korean Frailty and Aging Cohort Study. The definition of frailty was derived from the Fried frailty phenotype. Cohabitation was categorized as "living alone", "with spouse only", "with children only", and "with spouse and children".
**Results:** The mean age was 76 years, and 46.3% of the adults were men. After adjusting for age, education, income, nutritional status, alcohol, smoking history, Geriatric Depression Scale, Mini-Mental State Examination, Korean Activities of Daily Living, Korean Instrumental Activities of Daily Living, urinary incontinence, and polypharmacy, the odds ratios of frailty were 0.323 (95% confidence interval [CI], 0.137–0.763; p<0.001) and 1.089 (95% CI, 0.671–1.769; p=0.730) for men and women living with a spouse, respectively. The odds ratios of frailty were 0.329 (95% CI, 0.117–0.927; p=0.035) and 0.332 (95% CI, 0.123–0.891; p=0.029) for men and women living with spouse and children, respectively.
**Conclusion:** Men living with a spouse or with a spouse and children had a lowered prevalence of frailty, and women living with a spouse and children together had a lowered prevalence of frailty.

**Key Words:** Aged, Family, Frailty, Korean, Spouses

## INTRODUCTION

Korea is the fastest aging country in the world. More than 14% of the Korean population in 2017 was above 65 years of age, making it an aged society.[1] Frailty is a common health problem associated with aging. It is defined as a significant decline in functional reserve and homeostasis of multiple organ systems, with resultant vulnerability of individuals to stressors, thereby leading to a higher risk of accelerated functional decline and negative health-related outcomes.[2-4] The most common index is the frailty phenotype by Fried et al.,[5] which defined frailty as the presence of three or more of the following five components: self-reported exhaustion, decreased grip strength, slow walking speed, low physical activity, and unintended weight loss.[5]

It is important to define frailty based on physical and social determinants for the early detection of people at a high risk of frailty, as well as for prevention of frailty.[6] Statistics Korea reported that 34.2% of individuals aged above 65 years were living in one-person

households in 2019.[7] The proportions of older adults living only with a spouse or living with a spouse and children were 33.2% and 9.6%, respectively.[7] Since living alone is considered a risk factor for frailty, cohabitation might influence the onset of frailty.[8,9] A meta-analysis revealed a nearly two-fold higher risk of frailty in unmarried people than in married people.[6] However, to date, no study has examined the relationship between cohabitation and frailty.

Several studies have shown that it is more beneficial for men than for women to get married.[10] Although another meta-analysis did not observe such gender-based differences,[6] gender-based differences did affect the relationship between marital status and mortality, i.e., marriage was more beneficial to men than to women.[11] Hence, gender may affect the relationship between frailty and cohabitation. This study aimed to clarify the association between cohabitation and frailty and the existence of a gender effect.

## MATERIALS AND METHODS

### Study Setting and Population
The participants of the Korean Frailty and Aging Cohort Study (KFACS) were aged between 70 and 84 years. The KFACS is a multicenter longitudinal study with a baseline survey conducted in 2016–2017.[12] The participants were drawn from communities living around 10 medical centers (8 hospitals and 2 public health centers). Thus, 3,014 community-dwelling older adults from urban and rural regions nationwide were recruited after stratifying them based on age and sex. This cross-sectional study analyzed the baseline data of the KFACS from 2016 to 2017. We excluded participants with cerebrovascular diseases, hemiplegia, or paraplegia and collected baseline demographic, medical, behavioral, biological, psychosocial, and socioecological data. Among the participants, 986 men and 1,142 women who completed all questionnaires on the frailty phenotype and related covariates were considered. The Institutional Review Board of the Clinical Trial Review Committee of the Kyung Hee University Medical Center approved the research plan of the present study (No. 2020-01-065). All subjects provided consent prior to or at registration.

### Measures
Cohabitants were assessed using the following interview question: "Who are you living with?", with the following seven choices: (1) alone, (2) only with a spouse, (3) only with children, (4) with a spouse and children, (5) with other family, (6) others, and (7) unidentified. Participants who chose from among options 1 to 4 were included in the analysis.

Regarding the definition of frailty, we used the Fried phenotype

that comprised five components: exhaustion, poor grip strength, slow walking speed, low physical activity level, and unintended weight loss.[5] Each component was determined as follows, and participants with a total score of 3 or more were classified as frail.
(1) Exhaustion: one point was given for exhaustion when the subject responded "yes" to either of the questions ("I felt that everything I did was an effort" or "I could not get going") for 3 or more days in a week.[13]
(2) Poor grip strength: the highest value for each hand was included in the analysis using a hand dynamometer (Takei TKK 5401; Takei Scientific Instruments, Tokyo, Japan). The cutoffs for poor grip strength were 26 kg for men and 18 kg for women.[14]
(3) Slow walking speed: one point was given for a walking speed below 1 m/s after walking 4 m at a usual gait speed using an automatic timer (Gaitspeedometer; Dyphi, Daejeon, Korea).[14]
(4) Low physical inactivity: a metabolic equivalent task in minutes per week (MET-min/week) was calculated to determine physical activity level, with one point given for values below 494.6 kcal in men and below 283.5 kcal in women, corresponding to the lowest 20% of sex-specific total energy consumed in a general population-based survey of older adults.[15]
(5) Unintended weight loss: one point was given for unintended weight loss of 4.5 kg or more in the last year.

### Covariates
The covariates were age, education level (under elementary or above), economic status (basic livelihood security recipient), Mini Nutritional Assessment (MNA; decreasingly worse), alcohol consumption (three or more alcoholic drinks a week or not), smoking (lifetime consumption of 100 or more cigarettes), Geriatric Depression Scale (GDS; range 0–15, increasingly worse), Mini-Mental State Examination (MMSE; < 24, ≥ 24), Korean Activities of Daily Living (KADL; range 7–21, increasingly worse), Korean Instrumental Activities of Daily Living (KIADL; range 0–33, increasingly worse), urinary incontinency, and polypharmacy (ingestion of 5 or more prescribed medications). The covariates were selected based on previous studies on marital status and frailty.[16,17]

### Statistical Analysis
We analyzed continuous variables using independent t-tests and categorical variables using chi-square tests. Data are presented as mean ± standard deviation or number (percentage).

We assessed the associations between cohabitants and frailty using binomial logistic regression analysis. The models were adjusted as follows:
(1) Model 1: Adjusted for age, education, and income.
(2) Model 2: Adjusted for age, education, income, MNA, alcohol

consumption, and smoking history.

(3) Model 3: Adjusted for age, education, income, MNA, alcohol consumption drinker, smoking history, GDS, MMSE, KADL, and KIADL.

(4) Model 4: Adjusted for age, education, income, MNA, alcohol consumption, smoking history, GDS, MMSE, KADL, KIADL, urinary incontinence, and polypharmacy.

Statistical analysis was performed using IBM SPSS Statistics version 23.0 for Windows (IBM Corp., Armonk, NY, USA), and significance was defined as a p-value < 0.05.

## RESULTS

### General Characteristics of the Study Population
Among 2,128 study population, the number of frail group was 211 (9.9%). By cohabitants, the number of people who live with each cohabitant was as follows: alone 508 (23.9%), living with spouse only 1,084 (50.9%), living with children only 225 (10.6%), living with both spouse and children 311 (14.6%).

Among people with frailty, 21.4% of men (table 1) and 46.8% of women (table 2) were living alone. Also, 50% of men with frailty (table 1) and 31.9% of women with frailty (table 2) were living only with spouse.

### Association between Cohabitants and Frailty
Men who lived with a spouse only were less likely to be frail compared with those who lived alone after adjusting for age, education, and income (odds ratio [OR] = 0.410; 95% confidence interval [CI], 0.203–0.827; p = 0.013) (Table 3).

In models 1–4, men who lived with a spouse only were less likely to be frail compared with those living alone. In models 3 and 4, living with a spouse and children also reduced the OR of frailty in

**Table 1.** General characteristics of participants (men, n=986)

| | Non-frail (n = 916) | Frail (n = 70) | Total (n = 986) | p-value |
|---|---|---|---|---|
| Age (y) | 76.3 ± 3.8 | 79.39 ± 3.1 | 76.5 ± 3.9 | < 0.001 |
| Education ≤ 5 y | 70 (7.6) | 14 (20) | 84 (8.5) | < 0.001 |
| Occupation with income | 647 (70.6) | 51 (72.8) | 698 (70.7) | 0.693 |
| Unmarried | 91 (9.9) | 18 (25.7) | 109 (11.0) | < 0.001 |
| Basic livelihood security recipient | 44 (4.8) | 6 (8.5) | 50 (5.0) | 0.166 |
| Smoking (lifetime) | 702 (76.6) | 53 (75.7) | 755 (76.5) | 0.860 |
| Alcohol drinker | 293 (31.9) | 17 (24.2) | 310 (31.4) | 0.181 |
| Hypertension | 585 (63.8) | 44 (62.8) | 629 (63.7) | 0.866 |
| Diabetes mellitus | 255 (27.8) | 21 (30) | 276 (27.9) | 0.698 |
| Osteoarthritis | 137 (14.9) | 15 (21.4) | 152 (15.4) | 0.148 |
| Rheumatoid arthritis | 8 (0.8) | 0 (0) | 8 (0.8) | 0.432 |
| Osteoporosis | 32 (3.4) | 6 (8.5) | 38 (3.8) | 0.033 |
| Urinary incontinence | 10 (1.0) | 3 (4.2) | 13 (1.3) | 0.024 |
| Polypharmacy | 366 (39.9) | 40 (57.1) | 406 (41.1) | 0.005 |
| KADL score | 7.0 ± 0.2 | 7.2 ± 0.7 | 7.0 ± 0.3 | < 0.001 |
| KIADL score | 13.2 ± 3.5 | 14.1 ± 4.1 | 13.2 ± 3.5 | 0.035 |
| GDS score | 2.1 ± 2.8 | 5.9 ± 4.4 | 2.4 ± 3.1 | < 0.001 |
| MMSE score < 24 | 115 (12.5) | 26 (37.1) | 141 (14.3) | < 0.001 |
| MNA score < 12 | 106 (11.5) | 28 (40) | 134 (13.5) | < 0.001 |
| Weekly physical activities (kcal) | 4,269.0 ± 4,511.7 | 1,761.3 ± 2,909.5 | 4,091.0 ± 4,462.8 | < 0.001 |
| Cohabitants | | | | < 0.001 |
| Alone | 79 (8.6) | 15 (21.4) | 94 (9.5) | |
| With spouse only | 634 (69.2) | 35 (50) | 669 (67.8) | |
| With children only | 23 (2.5) | 6 (8.5) | 29 (2.9) | |
| With spouse and children | 180 (19.6) | 14 (20) | 194 (19.6) | |

Values are presented as mean±standard deviation or number (%).

Polypharmacy implied ingestion of five or more prescribed medications, alcohol consumption implied weekly three or more alcoholic drinks, and smoking (lifetime) implied lifetime consumption of 100 or more cigarettes. The Korean Activities of Daily Living (KADL; range 7 to 21, increasingly worse), Korean Instrumental Activities of Daily Living (KIADL; range 0 to 33, increasingly worse), Geriatric Depression Scale (GDS; range 0 to 15, increasingly worse). MMSE, Mini-Mental State Examination; MNA, Mini Nutritional Assessment.

**Table 2.** General characteristics of participants (women, n=1,142)

| | Non-frail (n = 1,001) | Frail (n = 141) | Total (n = 1,142) | p-value |
|---|---|---|---|---|
| Age (y) | 75.4 ± 3.7 | 78.2 ± 3.7 | 75.5 ± 3.8 | < 0.001 |
| Education ≤ 5 y | 262 (26.1) | 86 (60.9) | 348 (30.4) | < 0.001 |
| Occupation with income | 796 (79.5) | 113 (80.1) | 909 (79.6) | 0.693 |
| Unmarried | 509 (50.8) | 89 (63.1) | 598 (52.3) | < 0.001 |
| Basic livelihood security recipient | 53 (5.2) | 16 (11.3) | 69 (6.0) | 0.166 |
| Smoking (lifetime) | 23 (2.3) | 9 (6.3) | 32 (2.8) | 0.860 |
| Alcohol drinker | 34 (3.4) | 7 (4.9) | 41 (3.5) | 0.181 |
| Hypertension | 704 (70.3) | 102 (72.3) | 806 (70.5) | 0.866 |
| Diabetes mellitus | 209 (20.8) | 41 (29.0) | 250 (21.8) | 0.698 |
| Osteoarthritis | 378 (37.7) | 59 (41.8) | 437 (38.2) | 0.148 |
| Rheumatoid arthritis | 33 (3.3) | 7 (4.9) | 40 (3.5) | 0.432 |
| Osteoporosis | 311 (31.0) | 45 (31.9) | 356 (31.1) | 0.033 |
| Urinary incontinence | 53 (5.2) | 16 (11.3) | 69 (6.0) | 0.024 |
| Polypharmacy | 302 (30.1) | 83 (58.8) | 385 (33.7) | 0.005 |
| KADL score | 7.1 ± 0.3 | 7.3 ± 0.6 | 7.1 ± 0.3 | < 0.001 |
| KIADL score | 10.4 ± 1.2 | 11.2 ± 2.5 | 10.5 ± 1.5 | < 0.001 |
| GDS score | 3.4 ± 3.6 | 7.0 ± 4.6 | 3.8 ± 3.9 | < 0.001 |
| MMSE score < 24 | 234 (23.3) | 72 (51.0) | 306 (26.8) | < 0.001 |
| MNA score < 12 | 130 (12.9) | 43 (30.4) | 173 (15.1) | < 0.001 |
| Weekly physical activities (kcal) | 2,629.7 ± 2,838.0 | 1,066.1 ± 1,739.1 | 2,436.6 ± 2,774.0 | < 0.001 |
| Cohabitants | | | | 0.010 |
|   Alone | 348 (34.7) | 66 (46.8) | 414 (36.2) | |
|   With spouse only | 370 (36.9) | 45 (31.9) | 415 (36.3) | |
|   With children only | 172 (17.1) | 24 (17.0) | 196 (17.1) | |
|   With spouse and children | 111 (11.0) | 6 (4.2) | 117 (10.2) | |

Values are presented as mean±standard deviation or number (%).
Polypharmacy implied ingestion of five or more prescribed medications, alcohol consumption implied weekly three or more alcoholic drinks, and smoking (lifetime) implied lifetime consumption of 100 or more cigarettes. The Korean Activities of Daily Living (KADL; range 7 to 21, increasingly worse), Korean Instrumental Activities of Daily Living (KIADL; range 0 to 33, increasingly worse), Geriatric Depression Scale (GDS; range 0 to 15, increasingly worse). MMSE, Mini-Mental State Examination; MNA, Mini Nutritional Assessment.

men compared with living alone.

For women, living with a spouse did not decrease the OR of frailty, whereas living with a spouse and children together showed lower risks of frailty (model 4; OR = 0.332).

## DISCUSSION

This study analyzed the relationship between cohabitation and frailty. Previous studies found that marital status was related to frailty but only a few studies have shown a gender-based effect.[18] Moreover, no study has explored the additional effect of living with children on frailty. In our study, we analyzed gender separately and observed differences based on gender. In men, the prevalence of frailty decreased when living with a spouse or with a spouse and children, whereas in women, the prevalence of frailty was low only when living with a spouse and children together. Therefore, merely living with someone else did not necessarily lead to lower risks of

frailty in men in this study, rather only when they lived with their spouse. This finding is consistent with the results of a study in Italy that concluded that unmarried men are at a higher risk of being frail than married men.[16] Likewise, other studies have reported an association between being married and longevity or better health, especially in men.[11,19-25] One study concluded that eating with others was an independent survival factor in older men.[26]

A previous meta-analysis study concluded that unmarried individuals were more likely to be frail than married individuals, irrespective of gender.[6] However, in this study, no significant difference was observed in the prevalence of frailty in women with respect to living with a spouse. Although not statistically significant, women living with a spouse had a higher prevalence of frailty than those living alone. Therefore, for older women, living with a spouse may negatively affect frailty. A cohort study that analyzed marital status and frailty found that widowed women had a lower risk of frailty than married women.[16] A sociological study reported

**Table 3.** Association between cohabitants and frailty

| | Type of cohabitant | Men | | | Women | | |
|---|---|---|---|---|---|---|---|
| | | OR | 95% CI | p-value | OR | 95% CI | p-value |
| Model 1 | Alone | | | | | | |
| | With spouse | 0.410 | 0.203–0.827 | 0.013 | 1.092 | 0.698–1.708 | 0.701 |
| | With children | 1.264 | 0.408–3.919 | 0.684 | 0.814 | 0.476–1.394 | 0.454 |
| | With spouse and children | 0.634 | 0.275–1.460 | 0.284 | 0.451 | 0.182–1.116 | 0.085 |
| Model 2 | Alone | | | | | | |
| | With spouse | 0.362 | 0.173–0.756 | 0.007 | 1.163 | 0.738–1.832 | 0.516 |
| | With children | 1.284 | 0.393–4.197 | 0.679 | 0.806 | 0.467–1.389 | 0.437 |
| | With spouse and children | 0.550 | 0.230–1.318 | 0.180 | 0.422 | 0.167–1.066 | 0.068 |
| Model 3 | Alone | | | | | | |
| | With spouse | 0.329 | 0.141–0.765 | 0.010 | 1.101 | 0.682–1.777 | 0.695 |
| | With children | 0.908 | 0.247–3.348 | 0.885 | 0.673 | 0.370–1.221 | 0.192 |
| | With spouse and children | 0.337 | 0.122–0.934 | 0.036 | 0.347 | 0.131–0.920 | 0.033 |
| Model 4 | Alone | | | | | | |
| | With spouse | 0.323 | 0.137–0.763 | 0.010 | 1.089 | 0.671–1.769 | 0.730 |
| | With children | 0.869 | 0.236–3.205 | 0.833 | 0.612 | 0.332–1.129 | 0.116 |
| | With spouse and children | 0.329 | 0.117–0.927 | 0.035 | 0.332 | 0.123–0.891 | 0.029 |

Reference category for types of cohabitants is the "living alone" group. Model 1, adjusted for age, education, income; Model 2, adjusted for age, education, income, MNA, alcohol drinker, smoking history; Model 3, adjusted for age, education, income, MNA, alcohol drinker, smoking history, GDS, MMSE, KADL, KIADL; Model 4, adjusted for age, education, income, MNA, alcohol drinker, smoking history, GDS, MMSE, KADL, KIADL, urinary incontinence, polypharmacy.

OR, odds ratio; CI, confidence interval; MNA, Mini Nutritional Assessment; GDS, Geriatric Depression Scale; MMSE, Mini-Mental State Examination; KADL, Korean Activities of Daily Living; KIADL, Korean Instrumental Activities of Daily Living.

that an unmarried status is much more disadvantageous to men than to women.[27,28] Spitze and Ward[29] found that a higher percentage of men preferred receiving care from their spouse during illness than did women. This is consistent with the result that after the spouse's death, mortality in men is higher than that in women.[30]

A 1998 survey in Korea reported that most Korean women were exclusively responsible for housework, including cooking at home.[31] The Korean tradition strictly defines women's role in rearing children and maintaining the household. They were considered to be supportive of men rather than being proactive in workplaces and houses.[32,33] This finding is closely related to our study results. In addition, according to a recent study, among older adults, men were more likely to report limitations in performing household activities than women. This effect may be another explanation for frailty in men living alone.[34] Thus, cultural factors such as gender roles may have influenced the natural course of frailty.

In men and women, those living with spouse and children had a lower prevalence of frailty. Since this cohort study lacked such specific questions, it was difficult to determine whether participants lived with grandchildren. However, considering the age of the participants living with children, it is likely that they were living with

their grandchildren. Therefore, caring for grandchildren might have beneficial health effects. A study in China reported that older adults caring for grandchildren had better self-rated health and fewer limitations than those who did not.[35] However, because the relationship between living with children and frailty was not statistically significant, no definitive conclusions could be reached.

Our study had some limitations. First, it was a cross-sectional study. Hence, the causality of the result must be carefully considered. Further prospective longitudinal studies would be helpful to verify our results. Second, we could not take into account how long the participants had lived alone. This could be another confounding factor because the duration of widowhood was related to health in a cohort study in India.[36] Third, only three of the 2,128 participants (0.1%) reported being unmarried. As this proportion was significantly small, the effects were almost none, and we excluded the three people. However, further studies considering marriage and frailty are warranted to determine this relationship. Finally, considering the age of the participants, they most likely had grandchildren. Further investigation of the effects of living with grandchildren on frailty is needed.

Nevertheless, this study was the first to reveal that living with a spouse was crucial for the prevention of frailty in men, while living with a spouse and children was beneficial for the prevention of

frailty in women.

Effective intervention methods for the prevention of frailty remain scarce in Korea.[37] The results of this study indicate that additional methods related to cohabitants should be developed for the prevention of frailty.

In conclusion, men living with a spouse or with a spouse and children had a lower prevalence of frailty, whereas women living with a spouse and children together had a lowered prevalence of frailty.

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**AUTHOR CONTRIBUTIONS**

Conceptualization, HS, SK, CWW; Data curation, SK, CWW; Funding acquisition, CWW; Investigation, CWW, SK; Methodology, HS, CWW, SK, MK, EJ, YJL; Writing original draft, HS; Writing review & editing, HS, SK, CWW.

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