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Health Disparities Between Young One- and Multi-Person Households in South Korea:
A Longitudinal Analysis of Self-Rated Health Status and Mental Wellbeing, 2005 – 2019

A Thesis submitted in partial satisfaction of the
requirements for the degree Master of Arts
in Sociology

by

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March 2026

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Bomi Kim

ABSTRACT

Health Disparities Between Young One- and Multi-Person Households in South Korea:
A Longitudinal Analysis of Self-Rated Health Status and Mental Wellbeing, 2005 – 2019

by

Bomi Kim

South Korea's one-person households have doubled in two decades—a demographic transformation that unfolded over 30–50 years in other developed countries. Young adults aged 20–39 now comprise over one-third of individuals living alone. Drawing on 15 years of nationally representative panel data from the Korea Welfare Panel Study (2005–2019; 48,058 person-years of observation), this study examines associations between living alone and health outcomes—self-rated health and depressive symptoms—among young adults. Using random-effects panel models and logistic regression, the analysis shows that living alone is associated with elevated risks of poor physical health (33% higher odds) and depression (23% higher odds). These associations are partially attenuated by social insurance contributions, indicating the protective role of employment-based social protection. However, women living alone show elevated physical health risks that persist even when controlling for relationship satisfaction and social insurance, while men living alone show no comparable disadvantage. For depression, gender operates independently of living arrangement, suggesting distinct pathways for physical versus mental health. Age further moderates different patterns, with physical health disadvantages showing no

intensification over time within young adulthood, while depression shows non-linear variation across age groups. These findings highlight how household composition intersects with gender and institutional contexts to shape health inequalities. Policy responses should address not only the expansion of social insurance but also gendered labor market inequalities that structure differential vulnerability among young adults living alone in rapidly changing family landscapes.

Keywords: One-person household, Living arrangement, Health disparities, Self-rated health, Depressive symptoms, Gender inequality, Cumulative disadvantage

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I. Introduction

South Korea has experienced one of the world's fastest increases in one-person households, with its share growing from 15.5% in 2000 to 31.7% in 2020 (Statistics Korea 2021). This demographic transformation has been particularly notable among young adults in their twenties and thirties, who now constitute 35.9% of all one-person households in the country. While this trend reflects broader global patterns of delayed marriage, increased geographic mobility, and evolving social norms, the pace of change in South Korea has been comparatively rapid—doubling in just 20 years compared to 30 years in Japan and nearly 50 years in the United States (Ortiz-Ospina 2019; Kim 2019).

The rise of one-person households represents more than just a demographic shift; it signifies a profound transformation in the social fabric of a society traditionally organized around family-based support systems. In South Korea, where familial ties have historically provided critical emotional, instrumental, and economic resources, the growing prevalence of solo living raises questions about health and well-being. These concerns are particularly salient for young adults, as early adulthood represents a formative period when health behaviors and social trajectories that influence long-term outcomes are established (Elder 1994; Shanahan 2000).

From a theoretical perspective, the health consequences of living alone can be understood through the lens of family and household-based support systems. Research on marriage and family relationships has consistently documented their protective effects on health, though these benefits vary significantly depending on relationship quality, individual characteristics, and contextual factors (Carr and Springer 2010). Households—whether

composed of families or other co-residential arrangements—function as crucial social environments that structure the distribution of emotional, material, and social support resources (Hughes and Waite 2002). In multi-person households, responsibilities such as emotional caregiving, health monitoring, and financial support can be shared among members, potentially mitigating the effects of health shocks and daily stressors (House, Landis, and Umberson 1988; Braveman and Gottlieb 2014). In contrast, individuals living alone must independently manage all aspects of daily living, from economic maintenance to emotional regulation, which may heighten their vulnerability to health risks (Thoits 2011; Umberson 1987).

Cumulative advantage/disadvantage theory provides a useful framework for understanding how initial inequalities may evolve over time. The framework highlights how structural and institutional arrangements stratify individuals and cohorts by allocating unequal opportunities for the accumulation of resources and rewards (O’Rand 1996), producing systematic divergence in outcomes such as health as time progresses (Dannefer 2003). Applied to household structure, this perspective suggests that early disparities in access to household-based resources associated with living arrangements may translate into diverging health trajectories over the life course. Small initial differences in everyday support, material stability, and caregiving capacity may compound over time, leading to widening health inequalities (DiPrete and Eirich 2006). Whether such cumulative processes operate within young adulthood, however, remains empirically unclear.

The health implications of living alone are likely to be gendered as well. South Korea exhibits some of the largest gender inequalities among Organisation for Economic Co-operation and Development (OECD) countries, with women facing substantially lower

employment rates and wider wage gaps relative to men than in most other OECD nations (OECD 2024; Lim 2025). In South Korea, women are more likely than men to be employed in irregular and precarious positions, limiting their access to employment-based social insurance and related health-protective resources. In addition, prior research suggests gendered differences in social network structures, with women more likely to rely on smaller, kin-centered networks compared to men's broader, work-based networks (Smith-Lovin and McPherson 1993; Cha and Kim 2023). Together, these patterns point to a form of double vulnerability for women living alone: the absence of co-residential household support combined with structurally constrained access to institutional protections. As a result, the health consequences of living alone may be more pronounced for women than for men.

This study addresses a gap in existing research by examining the relationship between living alone and health outcomes among young adults in South Korea, with particular attention to age patterns and gender differences. Using 15 years of nationally representative panel data from the Korea Welfare Panel Study (KoWePS, 2005–2019), I employed random-effect logistic regression models to assess associations between living arrangements and two key outcomes: self-rated physical health and depressive symptoms. Grounded in a life-course and cumulative disadvantage perspective, the study moves beyond documenting average differences to examine whether health disparities associated with living alone vary by gender and evolve across young adulthood.

Specifically, in this paper, my analysis is guided by three research questions. First, is living alone associated with poorer physical and mental health among young adults? Second, do health disparities between one-person and multi-person households widen with

age within young adulthood, consistent with cumulative disadvantage processes? Third, are the health consequences of living alone more pronounced for women than for men?

The findings reveal three key patterns. First, young adults living alone face elevated odds of poor physical health and depression compared to those in multi-person households. Employment-based social insurance contribution is partially associated with these disparities, suggesting that access to institutional protections matters for health outcomes among those living alone. Second, physical health disadvantages do not intensify with age during young adulthood, while depression shows a non-linear pattern that may vary across age groups—with risks potentially declining through the early thirties before modestly re-emerging in the late thirties—though individual interaction terms did not reach statistical significance. Third, health consequences appear to be gendered: women living alone show substantially higher physical health risks that persist even when accounting for relationship quality and social insurance contribution, while men living alone show no comparable disadvantage. For depression, however, gender operates independently of living arrangement, with women showing elevated risks regardless of household type.

By focusing on young adults living alone—a demographic group that has received relatively limited scholarly attention in the health literature—this study contributes to research on the social determinants of health by highlighting how living arrangements are associated with health risks during early adulthood. In the context of South Korea's rapid transition toward solo living, the findings suggest that health inequalities associated with living alone are closely intertwined with broader structural conditions, including employment stability and access to social insurance. Importantly, the results point to pronounced gender differences, indicating that the health consequences of living alone are

not evenly distributed and may reflect gendered inequalities embedded in labor markets and social protection systems. Taken together, these patterns underscore the need to examine living arrangements not merely as individual choices, but as socially structured contexts through which institutional and relational resources are differentially allocated across the life course.

II. Theoretical Background

A. Changes in Young Adults' Living Arrangements and the Rise of One-Person Households

From a life-course perspective, young adulthood has historically been considered a critical stage for marriage and family formation (Elder 1994; Shanahan 2000). Traditional markers of adulthood—such as leaving the parental home, marrying, and having children—tended to follow a standardized sequence in many societies. However, in contemporary industrialized contexts, these patterns have diversified significantly. Delayed marriage, the rise of cohabitation, and prolonged singlehood have emerged as alternative pathways to adulthood, reflecting broader processes of the deinstitutionalization of marriage and family life (Cherlin 2004). These transformations are partly rooted in ideational changes emphasizing personal choice, self-fulfillment, and developmental idealism—the belief that "modern" family systems characterized by individual autonomy and diverse household forms are indicators of societal progress (Thornton and Philipov 2007; Thornton and Philipov 2009).

The rise of one-person households represents a worldwide phenomenon that has emerged across diverse economic and cultural contexts (Ortiz-Ospina 2019). This trend appears most prominently in economically prosperous developed nations, with particularly notable increases in Europe, the United States, and Japan. Although the rates and patterns of growth vary by nation, the number of one-person households is growing globally.

South Korea presents a particularly compelling case for examining this phenomenon. Although societal attitudes toward non-traditional family forms have slowly evolved, cohabitation remains relatively rare and socially stigmatized compared to Western

societies (Byoun, Choi, and Kim 2021). Consequently, delays in marriage have not primarily resulted in a rise of cohabiting unions but rather an expansion of singlehood among young adults. This distinctive pattern makes South Korea a particularly suitable context for investigating the health consequences of one-person living, as it combines rapid modernization with persistent cultural norms emphasizing family-based social support. In South Korea's family-centered society, where extended kinship networks have traditionally served as primary sources of social support, healthcare assistance, and economic security (Lee 2018; Tilland 2017), the rise of one-person households represents a fundamental departure from established social safety nets rooted in Confucian familism.

In South Korea, the majority of one-person households are often described as structurally induced rather than purely self-selected, reflecting broader socioeconomic pressures (Statistics Korea 2024b). Young adults frequently migrate to urban areas for education and employment opportunities (Lee et al. 2011), leading to geographic separation from family networks that have traditionally provided emotional, instrumental, and economic support (Lee 2018; Tilland 2017). This involuntary nature of living alone may exacerbate health vulnerabilities, as individuals may lack the social and psychological preparation for independent living that can be fulfilling in voluntary single living contexts (Klinenberg 2013).

The pace of growth in one-person households in South Korea has been remarkably rapid. According to Statistics Korea (2021), people who live alone composed 31.7% of all general households in South Korea in 2020, and this trend has continued with the figure reaching 35.5% by 2023 (Statistics Korea 2024a). This transformation occurred much faster than in other developed countries: while Japan and the United States took 30-50 years to

achieve similar increases, South Korea doubled its one-person household rate in only 20 years, from 15.5% in 2000 to 31.7% in 2020 (Statistics Korea 2021; Ortiz-Ospina 2019).

Scholars have attributed this rapid rise to multiple interconnected factors, including economic changes, shifts in family culture and values, the movement of young adults to cities for education and employment, increasing rates of late marriage and divorce, and demographic changes such as population aging (Sung 2020; Kim 2019). These transformations signal significant shifts in life course patterns and family formation processes, with implications that extend beyond demographic trends to encompass health, wellbeing, and social integration.

Young adults represent a substantial share of South Korea's one-person households, with individuals in their 20s and 30s comprising 35.9% of all such households (Statistics Korea 2021). A focus on this demographic is particularly important in the Korean context, where the average age at first marriage has risen significantly—from 26.5 years for women and 29.3 years for men in 2000 to 31.6 years for women and 33.9 years for men in 2024 (Statistics Korea 2024c). This means that individuals in their 20s and 30s, who would traditionally be forming families, are increasingly living alone during what has historically been a crucial period for establishing household-based social support systems. From a life-course perspective, this timing is critical, as early adulthood sets behavioral and social trajectories that significantly influence later-life health and well-being (Elder 1994; Shanahan 2000). However, since young adults are generally considered healthier than older adults, most existing research on one-person households and health has focused on middle-aged and older populations, with relatively few studies examining young adults (Park et al. 2016; Choi 2008; Kim 2011; Lee 2010; Lee 2016).

Given the rapid growth and unique characteristics of young adult one-person households in South Korea, understanding the health implications of this living arrangement becomes critical for individual well-being. The involuntary nature of living alone, combined with the mismatch between traditional family-centered support systems and emerging individualized lifestyles, suggests that young adults living alone may face distinctive health challenges that warrant systematic investigation.

B. Living Alone and Health

Literature generally suggests the protective effects of marriage and family relationships. However, these benefits vary significantly depending on relationship quality, individual characteristics, and contextual factors, with family units serving as crucial sources of economic, social, and psychological support that can both positively and negatively affect members' health outcomes (Carr and Springer 2010). While researchers recognize that marriage involves the selection of socioeconomically advantaged individuals, empirical studies have also documented substantial health-protective effects of marital unions (Rendall et al. 2011).

Although marital status has been widely used in household research, it reflects legal and social ties and may not fully capture the proximate living arrangement that shapes day-to-day resource availability. Household composition—specifically, whether one lives alone or with others—more directly reflects who is present to provide emotional support, monitor health, and share economic burdens in everyday life. This distinction is especially relevant among young adults, for whom diverse arrangements are common regardless of marital

status, making household composition a particularly salient lens for understanding individual health.

Households—whether composed of families or other co-residential arrangements—constitute a crucial social environment that structures the distribution of emotional, material, and social support resources (Hughes and Waite 2002). In multi-person households, responsibilities such as emotional caregiving, health monitoring, and financial support can be shared among members, potentially mitigating the effects of health shocks and daily stressors. In contrast, individuals living alone must independently manage all aspects of daily living, from economic maintenance to emotional regulation, which may heighten their vulnerability to health risks.

This dynamic is particularly relevant in the South Korean context, where rapid social transformation has created tension between traditional collectivist values and emerging individualist lifestyles. Historically, Korean society's collectivist orientation emphasized family-based support systems and interdependent social relationships (Lee 2018). However, the rapid rise of one-person households represents a shift toward more individualized living arrangements that may not be fully supported by existing social institutions designed around family-centered care (Chang et al. 2015; Lee 2018). This cultural transition may exacerbate the resource constraints experienced by those living alone, as individuals navigate between traditional expectations of family support and the reality of independent living (Chang 2010; Kim 2016).

Several specific mechanisms may explain why living alone could have negative health implications. First, individuals living alone may experience reduced social network density and support. Research indicates that robust social networks are critical for emotional

well-being, health behavior regulation, and access to health information and care (House, Landis, and Umberson 1988; Smith-Lovin and McPherson 1993). Lacking close network ties can delay healthcare-seeking, reduce adherence to treatment, and exacerbate mental health issues.

Second, living alone often entails fewer material resources. One-person households typically rely on a single income and may have less access to pooled financial safety nets that multi-person households enjoy (Braveman and Gottlieb 2014; Link and Phelan 1995). Material insecurity can limit access to healthcare, healthy food choices, and other protective factors, ultimately influencing health outcomes.

Third, individuals living alone may experience higher levels of psychosocial stress. Without daily emotional support or shared responsibility, stressors such as illness, job loss, or emotional trauma may weigh more heavily, elevating the risk of chronic stress-related illnesses (Thoits 2011; Pearlin et al. 1981).

Fourth, reduced access to daily social support in the home environment can increase health risks. Regular informal caregiving—reminders to seek medical care, encouragement to exercise, and emotional reassurance—is often absent for those living alone, potentially worsening both physical and mental health over time (Umberson 1987; Berkman et al. 2000).

Based on these theoretical considerations, I propose the following hypotheses regarding the general effects of living alone on health:

Hypothesis 1: Individuals living alone will report poorer health outcomes—including lower self-rated health and higher depressive symptoms—than individuals living in multi-person households.

While some studies suggest that young adults in one-person households may experience health vulnerabilities (Kang and Lee 2016), systematic examination of how these disparities change over time and vary by gender remains limited. This research gap is particularly significant when viewed through the lens of cumulative disadvantage theory, which would predict increasing health divergence between those living alone and those with co-residents across early adulthood (DiPrete and Eirich 2006; Dannefer 2003). However, whether such cumulative processes operate meaningfully within the compressed time frame of early adulthood—here defined as ages 20 to 39—remains an open empirical question.

In the context of living arrangements, individuals living alone may initially experience subtle disadvantages—such as less consistent access to nutritious meals, reduced social interaction, and greater engagement in risky health behaviors. If cumulative disadvantage processes operate within this period, these early disparities might widen over time as health crises compound resource deficits. However, whether such processes are detectable within the compressed time frame of early adulthood remains an empirical question.

Hypothesis 2: If cumulative disadvantage processes operate during early adulthood, health disparities between individuals living alone and those living with others will widen with age.

C. Gender Differences in Social Networks, Employment Security, and Health Vulnerabilities

The relationship between living alone and health outcomes may vary by gender, reflecting well-documented differences in social networks, employment security, and labor market

participation between men and women. Understanding these gendered patterns is crucial for developing a comprehensive theoretical framework, particularly in the South Korean context, where gender inequalities remain pronounced.

South Korea exhibits gender disparities as compared to OECD countries. Women earn only 70.7% of what men earn (the largest gender pay gap in the OECD), and women's employment rate (54.1%) remains significantly lower than men's (71.3%) (OECD 2024; Lim 2025). Women are disproportionately represented in irregular employment, with limited access to comprehensive social insurance benefits that provide health-protective resources.

Research on gendered network theory suggests that network structures vary systematically between men and women, not only in their size and composition but also in the kinds of resources they provide. Men tend to maintain larger and more heterogeneous networks through workplaces and public organizations, whereas women's networks are more likely to be smaller, denser, and centered on kin and local ties (Smith-Lovin and McPherson 1993; Ridgeway and Smith-Lovin 1999b). Importantly, these structural differences are not merely descriptive: they shape unequal access to information and opportunities (Ibarra 1997; Ridgeway 1997). Because high-status positions and resource-rich networks are disproportionately male-dominated, women—especially those already in disadvantaged positions—are more likely to be excluded from networks that provide instrumental resources and institutional leverage (Ibarra 1997; Ridgeway and Smith-Lovin 1999a).

Research consistently shows that social support serves as a buffer against stress and health risks (Thoits 2011). However, the health-protective effects of social support are not uniform across gender. Women tend to report higher levels of social support yet

simultaneously higher levels of psychological distress—a paradox that challenges the assumption that more support straightforwardly translates into better health outcomes (Turner and Marino 1994). This may reflect what Perry (2016) terms the "dualism" inherent in social integration for women, whereby social ties simultaneously provide support and impose costs through caregiving obligations and emotional labor. As a result, women's social ties, while emotionally close, can themselves become sources of stress rather than protection (Thoits 2011; Perry 2016). This gendered asymmetry in how social support operates can be compounded by broader structural inequities in access to multiple protective mechanisms simultaneously—meaning that those who lack both household-based support and employment-based resources face compounding disadvantages across a wide range of health outcomes (Link and Phelan 1995).

These gendered differences in network structure mean that gendered inequalities in access to resources go beyond differences in emotional support. When living alone, these structural inequalities may become particularly consequential: women's more kin-centered and localized networks may offer emotional closeness but are often less effective as channels for material resources, information, and opportunities, especially in the absence of strong institutional protection. In contrast, men's broader, more workplace-centered networks are more likely to serve as conduits for instrumental resources and informal social protection.

Gender differences in time use may further compound vulnerability to social isolation and resource deprivation among those living alone. Women typically work fewer hours in paid employment than men, potentially resulting in fewer opportunities to build and maintain workplace-based networks that are critical sources of instrumental resources (Cha

2013; Nemoto 2013; Cha and Kim 2023). In South Korea, women account for 70.9% of part-time workers and 57.3% of irregular workers, and irregular workers often lack access to the "four major insurances" that corporations are legally obligated to provide—health insurance, occupational hazard insurance, unemployment insurance, and the national pension—which constitute the core of the country's social protection system (Lim 2025). Previous research shows that employment protection has a direct impact on health outcomes, with stronger statutory employment protection improving both subjective health and job security (Park and Baek 2019).

For women living alone, these structural disadvantages create a particular vulnerability that goes beyond the absence of household-based support. While both men and women who live alone lack such support, men are more likely to compensate through workplace-centered networks and employment-based social protection. Women, by contrast, face compounding disadvantages—their weaker attachment to formal employment limits access to both instrumental network resources and social insurance, leaving them with fewer alternative sources of support. Social insurance contributions thus serve as indicators of employment stability and access to health-protective resources, suggesting that the health effects of living alone may be more pronounced for women, particularly when controlling for social insurance access.

Based on these theoretical considerations regarding gendered vulnerabilities, I propose the following hypothesis:

Hypothesis 3: The negative health consequences of living alone will be stronger for women than for men.

III. Data and Descriptive Statistics

A. Data

Based on the theoretical framework outlined above, this study empirically examines the relationship between living arrangements and health among young adults in South Korea. Specifically, it assesses whether living alone is associated with poorer health outcomes, whether health disparities widen over time, and whether these effects differ by gender. The analysis draws on nationally representative panel data from the Korea Welfare Panel Study (KoWePS), which provides annual longitudinal data on individuals and households across a wide range of economic, demographic, and health-related measures.

KoWePS was first launched in 2006 using a stratified sampling design that oversampled low-income households to ensure sufficient representation of economically disadvantaged groups. The initial sample was drawn based on income data from the 2005 Population and Housing Census and the 2006 National Survey of Household Income and Expenditure. Households were classified into two strata—general and low-income—and 3,500 households were selected from each stratum, resulting in a target sample of 7,000 households. The final panel consisted of 7,072 households. In 2012 (Wave 7), a refresher sample of approximately 1,800 households was added to address declining retention rates, attrition-related imbalances, and geographic shifts. The refresher sample followed the same stratified sampling procedures as the original cohort.

Two variables derived from this sampling structure were constructed for the analysis. First, a binary indicator identifies whether a household was originally sampled from the low-income stratum. Second, a panel membership indicator distinguishes

respondents from the original (Wave 1) and refresher (Wave 7 onward) cohorts. These variables are included in the regression models to account for potential biases related to differential sampling and attrition.

The analytic sample includes data from the 2005 to 2019 reference years, collected annually between 2006 and 2020 (Waves 1–15). Based on the age criterion of 20 to 39 years, the dataset comprises 51,634 person-year observations from 9,344 unique individuals. Only observations with non-missing responses on both of the two primary dependent variables—self-rated health status and depressive symptoms—were retained.

To minimize data loss due to item-level nonresponse, mean imputation was applied for variables with less than 1% missingness, following standard practices in applied regression analysis. Four control variables—satisfaction with family relationships and social relationships, and satisfaction with household income and housing environment—had small proportions of missing values (less than 0.04% respectively). Missing values were replaced with the sample mean and rounded for categorical variables. To address potential bias introduced by imputation, flag variables were created for each imputed variable and included in all regression models.

Observations with missing values in marital status (0.02%), employment status (0.00%), and social insurance contributions (0.00%) were excluded from the analysis due to their minimal counts (fewer than 10) and proportions, which were unlikely to affect overall results. This resulted in a final sample of 48,058 person-years of observation from 9,021 unique individuals. Of these, 2,946 observations were from individuals living alone, while 45,112 came from those in multi-person households.

B. Measures

Dependent Variables

The dependent variables include two proxies for health outcomes: self-rated health status and mental health status measured by the CES-D depression scale. The KoWePS study asked participants to report their "Health status as of December 31, 20NN (the last day of the previous year)." Participants selected from five options: Very Good, Good, Fair, Poor, and Very Poor. For this study, these responses were dichotomized, with "Very Good" and "Good" classified as better health status (coded as "0"), while "Fair," "Bad," and "Very Bad" were classified as poorer health status (coded as "1").

Depressive symptoms were evaluated using the 11-item version of the Center for Epidemiological Studies Depression Scale (CES-D). This scale, developed by the U.S. National Institute of Mental Health, measures psychological state and behavior over the previous week. The original English questions were translated into Korean for the KoWePS study. Participants rated each of the eleven items on a scale from 0 to 3, indicating frequency of depressive symptoms: "0" (rarely/none, <1 day), "1" (some/little, 1-2 days), "2" (occasionally/moderate, 3-4 days), and "3" (most/all, 5-7 days). Following the standard CES-D 11 scoring protocol, total scores were multiplied by 20/11, with scores of 16 or higher indicating suspected depression (Shin 2010).

Independent Variables

"Household type" serves as the key independent variable of interest in this study, categorized as either "one-person household" or "multi-person household." Respondents who selected "one-person" for the "household type" question were classified as one-person

households, while all other responses were classified as multi-person households. A dummy variable was created to compare these two groups: multi-person households were coded as "0" and one-person households as "1."

Age was categorized rather than treated as a continuous variable, as health trajectories are unlikely to follow a strictly linear pattern across early adulthood. Age was grouped into four categories from 20 to 39 years (1 = 20–26, 2 = 27–30, 3 = 31–34, 4 = 35–39). According to Statistics Korea's Economically Active Population Survey, the average time to graduation from four-year universities was approximately 73 months (6.1 years) for men and 55 months (4.6 years) for women as of 2025 (Statistics Korea 2025). To capture the period of labor market entry following graduation, the first age category was set at 20–26. The third category was defined as 31–34, reflecting the average age at first marriage reported by Statistics Korea—33.9 years for men and 31.6 years for women (Statistics Korea 2024c).

Gender was coded as a dummy variable (1 = woman, 0 = man). Four satisfaction variables—family life, social relationships, household income, and housing environment—originally measured on a 5-point Likert scale—were recoded as binary variables (1 = satisfied, 0 = neutral or not satisfied) to facilitate interpretation and maintain consistency across measures. Social Insurance Contribution consists of three main components: national pension contributions, national health insurance premiums, and employment insurance payments. It is measured in units of 10,000 Korean won, and ranges from 0 to 1,147; a higher contribution indicates more security.

Marital Status, Employment, Education level, Student Status, Low-Income household, and Panel Cohort were included as control variables. Marital status was

collapsed into two categories: never married (0) and ever married (1). Employment status was categorized into three groups: not in the labor force (0), employed (1), and unemployed (2). Education level was measured as a four-level ordinal variable based on educational attainment, ranging from high school or less (1) to graduate education or higher (4). Student status was represented as a binary variable (0 = not a student, 1 = a student).

Table 1 presents information on the variables, and Table 2 provides descriptive statistics for the variables used in this study.

Table 1. Information on Variables

Variables		Definition
Dependent Variables	Health Status (Self-rated)	0 = Better Health 1 = Poorer Health
	Depression (CES-D 11)	0 = Healthy (No Depression) 1 = Unhealthy (Depression)
Focal Independent Variables	Household Type	0 = Multi-person household 1 = One-person household
Analytic Variables	Age	1 = 20~26 years old 2 = 27~30 years old 3 = 31~34 years old 4 = 35~39 years old
	Woman	0 = Man 1 = Woman
	Social Insurance Contribution	Annual contribution to social insurance (unit: 10,000 KRW)
	Satisfaction with family life	0 = Not Satisfied or Neutral 1 = Satisfied
	Satisfaction with social relationships/connections	0 = Not Satisfied or Neutral 1 = Satisfied
	Satisfaction with household income	0 = Not Satisfied or Neutral 1 = Satisfied
	Satisfaction with housing environment	0 = Not Satisfied or Neutral 1 = Satisfied
Control Variables	Marital Status	0 = Never Married 1 = Ever Married
	Employment	0 = Not in Labor Force 1 = Employed 2 = Unemployed
	Education	1 = ~High school dropout/graduate 2 = Junior college enrolled/dropout/graduate 3 = University enrolled/dropout/graduate 4 = Graduate school or higher (Masters/PhD)

	Student	0 = Not Student 1 = Student
	Low-Income Households	0 = General Households 1 = Low-Income Households
	Panel Cohort	0 = Refresher Sample (Wave 7+) 1 = Original Sample (Wave 1)

Table 2. Descriptive Information on Variables (N = 48,058)

Variable	Mean / %	SD
Dependent Variables		
Poor Self-Rated Health (1 = Yes)	11.75%	0.32
Depression Symptom (1 = Yes)	9.71%	0.30
Key Independent Variables		
One-Person Household (1 = Yes)	6.13%	0.24
Analytic Variables		
Woman (1 = Yes)	54.12%	
Age		
20–26	27.08%	
27–30	18.12%	
31–34	21.96%	
35–39	32.84%	
Satisfaction with Family Relationships	85.35%	0.35
Satisfaction with Social Relationships	76.43%	0.42
Satisfaction with Household Income	32.40%	0.32
Satisfaction with Housing Environment	59.41%	0.49
Social Insurance Contribution (10,000 won)	24.13	20.45
Socioeconomic Characteristics		
Education		
≤ High School	32.16%	
Junior/Vocational College	24.73%	
University	39.31%	
More than Graduate School	3.80%	
Ever Married (1 = Yes)	53.55%	
Employment		
Not in Labor Force	30.89%	
Employed	65.49%	
Unemployed	3.63%	
Student (1 = Yes)	10.28%	
Low-Income Households (1 = Yes)	11.04%	
Panel Cohort (1 = Original Sample (Wave 1))	91.38%	

Note: Percentages are reported for categorical variables and means (with standard deviations) for continuous variables. N = 48,058 person-year observations from the Korea Welfare Panel Study (KoWePS), 2005–2019.

C. Analytic Plan

Drawing on nationally representative panel data from the Korea Welfare Panel Study (KoWePS), I employ random-effects logistic regression approaches to test the following three hypotheses.

Hypothesis 1: Health Disparities by Living Arrangement

Hypothesis 1 posits that individuals living alone will experience poorer health outcomes—specifically, higher probabilities of reporting poor self-rated health and depressive symptoms—than those living with others. To test this hypothesis, I estimate a series of random-effect logistic regression models using the full sample of young adults (ages 20–39) across all waves from 2005 to 2019. The general model specification is:

$$Y_{it} = \beta_0 + \beta_1 \text{OnePersonHH}_{it} + \beta_4 X_{it} + \alpha_i + \tau_t + \varepsilon_{it}$$

Where:

- Y_{it} is a binary indicator of health outcome (poor self-rated health or depression) for individual i at time t ;
- OnePersonHH_{it} is a binary variable indicating whether the respondent lives alone;
- X_i is a vector of time-varying covariates (age, education, employment status, marital status, student status, etc.);
- α_i is the random intercept for individuals;
- τ_t is the year fixed effect;
- ε_{it} is the error term.

Hypothesis 2: Long-Term Cumulation of Health Disadvantage

Hypothesis 2 assesses whether the health disadvantages associated with living alone intensify over time, consistent with the cumulative disadvantage framework. To test this, I apply a random-effects logistic regression model with interaction terms between age categories and household type.

The core model is specified as:

$$Y_{it} = \beta_0 + \beta_1 \text{OnePersonHH}_{it} + \beta_2 \text{AgeCategory}_t \\ + \beta_3 (\text{OnePersonHH}_{it} \times \text{AgeCategory}_t) + \beta_4 X_{it} + \alpha_i + \tau_t + \varepsilon_{it}$$

Age is operationalized as categorical variables (27-30, 31-34, 35-39, with 20-26 as reference) to capture potential non-linear age effects. A significant positive β_3 would indicate that the health impact of living alone worsens with age, supporting the cumulative disadvantage hypothesis. Joint significance tests across all age interactions provide an overall assessment of whether age moderates the living alone effect.

Hypothesis 3: Gender Differences in the Impact of Living Alone

Hypothesis 3 suggests that the adverse health effects of living alone vary by gender. To examine this, I estimate random-effects logistic regression models that include an interaction term between gender and household type.

The model for Hypothesis 3 is:

$$Y_{it} = \beta_0 + \beta_1 \text{OnePersonHH}_{it} + \beta_2 \text{Woman}_i + \beta_3 (\text{OnePersonHH}_{it} \times \text{Woman}_i) \\ + \beta_4 X_{it} + \alpha_i + \tau_t + \varepsilon_{it}$$

A statistically significant β_3 indicates that the relationship between living alone and health differs by gender. Predicted probabilities are calculated and visualized for all four groups (men/women $\times$ one-person/multi-person households) to illustrate the gendered patterns across model specifications.

IV. Results

A. Health Disparities by Living Arrangement

This section begins by evaluating Hypothesis 1, which posits that individuals living alone are more likely to experience poorer health outcomes than those residing in multi-person households. I conducted random-effects logistic regression analyses using the dataset of young adults aged 20 to 39 from the Korea Welfare Panel Study (KoWePS), covering the years 2005 to 2019. Two binary indicators of health outcomes—self-rated health and depressive symptoms—serve as the dependent variables in this analysis.

Table 3 presents random-effects logistic regression results predicting poor self-rated health among young adults ages 20–39 in South Korea across five models.

Living alone consistently predicted worse health across all models. In Model 1, individuals living alone had significantly higher odds of reporting poor health ($\beta=0.376$, $p<.001$), translating to 46% higher odds compared to those in multi-person households. When I introduced demographic and socioeconomic control variables in Model 2, this association persisted with modest attenuation ($\beta=0.360$, $p<.001$). In Model 3, I added relationship satisfaction variables, which did not explain away the living alone effect ($\beta=0.375$, $p<.001$), suggesting that satisfaction with relationships and material conditions does not account for the health disadvantage associated with solo living.

Table 3. Random Effect (RE) Logistic Regression Results Predicting Poor Self-Rated Health among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Baseline	(2) Baseline w/ Control Variables	(3) Satisfaction Variables	(4) Social Insurance Contribution	(5) All Variables
Living Alone (= 1)	0.376*** (0.088)	0.360*** (0.091)	0.375*** (0.090)	0.212* (0.091)	0.285** (0.091)
Woman (= 1)		0.137** (0.046)	0.154*** (0.046)	0.161*** (0.046)	0.167*** (0.046)
Ever Married (= 1)		-0.273*** (0.066)	-0.168* (0.065)	-0.280*** (0.065)	-0.175** (0.065)
Employment (ref. Not in labor force)					
Employed		-0.315*** (0.045)	-0.282*** (0.045)	-0.275*** (0.045)	-0.258*** (0.045)
Unemployed		0.064 (0.089)	0.006 (0.089)	0.053 (0.089)	0.005 (0.089)
Student (= 1)		-0.431*** (0.083)	-0.372*** (0.083)	-0.464*** (0.083)	-0.394*** (0.083)
Age (ref. 20~26 years old)					
27~30 years old		0.242*** (0.066)	0.224*** (0.065)	0.240*** (0.066)	0.224*** (0.065)
31~34 years old		0.448*** (0.073)	0.420*** (0.072)	0.458*** (0.072)	0.427*** (0.072)
35~39 years old		0.712*** (0.076)	0.704*** (0.075)	0.757*** (0.075)	0.730*** (0.074)
Education (ref. ~HS graduation)					
Junior/Vocational College		-0.378*** (0.065)	-0.250*** (0.064)	-0.292*** (0.065)	-0.205** (0.064)
University		-0.628*** (0.062)	-0.414*** (0.061)	-0.465*** (0.063)	-0.330*** (0.062)
More than Graduate School		-0.542*** (0.144)	-0.297* (0.143)	-0.341* (0.145)	-0.191 (0.144)
Satisfaction with Household Income			-0.485*** (0.049)		-0.432*** (0.050)
Satisfaction with Housing Environment			-0.240*** (0.042)		-0.223*** (0.042)

Satisfaction with Family Relationship			-0.342***		-0.339***
			(0.050)		(0.050)
Satisfaction with Social Relationship			-0.391***		-0.385***
			(0.041)		(0.041)
Social Insurance Contribution				-0.014***	-0.008***
				(0.002)	(0.002)
Low-Income Households	0.900***	0.757***	0.599***	0.598***	0.511***
	(0.059)	(0.058)	(0.058)	(0.060)	(0.060)
Original panel (Wave 1)	-0.021	-0.022	-0.029	-0.052	-0.045
	(0.090)	(0.088)	(0.085)	(0.088)	(0.085)
Constant	-2.731***	-2.414***	-1.730***	-2.186***	-1.619***
	(0.090)	(0.112)	(0.116)	(0.114)	(0.118)
Insig2u	0.661***	0.530***	0.432***	0.504***	0.427***
	(0.055)	(0.057)	(0.059)	(0.057)	(0.059)
Observations	48058	48058	48058	48058	48058

Note: Coefficients from random-effects logistic regression models are reported. Standard errors in parentheses. All models include year fixed effects. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–26 (Age). Flag variables indicating imputed values were included in all models to account for potential bias introduced by mean imputation but are omitted from the table for brevity. Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

When I introduced social insurance contribution in Model 4, the living alone coefficient attenuated substantially ($\beta=0.212$, $p<.05$), suggesting that access to employment-based social protection partially accounts for the relationship between living arrangements and health. In Model 5, I included all variables simultaneously, and the living alone effect remained statistically significant ($\beta=0.285$, $p<.01$), corresponding to 33% higher odds of poor health, indicating that while social insurance attenuates the living alone effect, relationship satisfaction variables also play independent roles.

I find consistent protective effects of social insurance contribution across Models 4 and 5 ($\beta=-0.014$, $p<.001$; $\beta=-0.008$, $p<.001$), suggesting that actual enrollment in social insurance programs—not merely being employed—matters for health outcomes. In Models

3 and 5, I find strong protective effects of relationship satisfaction variables. Higher satisfaction with household income ($\beta=-0.432$, $p<.001$), housing environment ($\beta=-0.223$, $p<.001$), family relationships ($\beta=-0.339$, $p<.001$), and social relationships ($\beta=-0.385$, $p<.001$) were all significantly associated with better health in the full model, with effects remaining robust across specifications.

Among the control variables, I observe several consistent patterns. Women reported significantly worse health than men across all specifications. Age showed a clear gradient—compared to those aged 20–26, health deteriorated progressively in older age groups. Being ever married was consistently protective. Employment and student status both showed strong protective effects relative to not being in the labor force, while unemployment showed no significant difference from that reference category. Higher educational attainment was generally protective, with university education showing particularly strong effects. Living in a low-income household was strongly and consistently associated with poor health across all models.

B. Depression Symptoms by Living Arrangement

Table 4 presents random-effects logistic regression results predicting depression symptoms among young adults ages 20–39 in South Korea across five models.

Living alone consistently predicted higher odds of depression across most models, though with some notable differences from self-rated health results. In Model 1, individuals living alone had significantly higher odds of experiencing depression symptoms ($\beta=0.300$, $p<.001$), translating to 35% higher odds compared to those in multi-person households.

When I introduced demographic and socioeconomic control variables in Model 2, this association persisted with modest attenuation ($\beta=0.291$, $p<.01$). In Model 3, I added relationship satisfaction variables, which did not attenuate the living alone effect ($\beta=0.317$, $p<.001$), suggesting that satisfaction with relationships and material conditions does not account for the depression gap associated with solo living.

When I introduced social insurance contribution in Model 4, the living alone coefficient attenuated substantially and lost statistical significance ($\beta=0.090$, $p>.05$). In Model 5, I included all variables simultaneously, and the living alone effect regained marginal significance ($\beta=0.205$, $p<.05$), corresponding to 23% higher odds of depression. The attenuation from social insurance was more pronounced for depression than for self-rated health, suggesting that employment-based social protection may play a particularly central role in explaining the mental health gap between living arrangements.

I find consistent protective effects of social insurance contribution across Models 4 and 5 ($\beta=-0.018$, $p<.001$; $\beta=-0.010$, $p<.001$), suggesting that actual enrollment in social insurance programs matters for mental health outcomes independently of employment status.

In Models 3 and 5, I find particularly strong protective effects of relationship satisfaction variables against depression. These satisfaction variables showed stronger protective effects against depression than against poor self-rated health, underscoring that social and relational factors are particularly salient for mental health outcomes.

Table 4. Random Effect (RE) Logistic Regression Results Predicting Depression Symptom among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Baseline	(2) Baseline w/ Control Variables	(3) Satisfaction Variables	(4) Social Insurance Contribution	(5) All Variables
Living Alone (= 1)	0.300*** (0.086)	0.291** (0.090)	0.317*** (0.087)	0.090 (0.089)	0.205* (0.087)
Woman (= 1)		0.408*** (0.051)	0.423*** (0.049)	0.435*** (0.051)	0.438*** (0.049)
Ever Married (= 1)		-0.196** (0.070)	0.040 (0.067)	-0.215** (0.069)	0.026 (0.066)
Employment (ref. Not in labor force)					
Employed		-0.275*** (0.050)	-0.213*** (0.048)	-0.226*** (0.049)	-0.184*** (0.048)
Unemployed		0.447*** (0.087)	0.385*** (0.088)	0.429*** (0.086)	0.382*** (0.087)
Student (= 1)		-0.474*** (0.087)	-0.351*** (0.085)	-0.520*** (0.086)	-0.379*** (0.086)
Age (ref. 20~26 years old)					
27~30 years old		0.044 (0.064)	0.021 (0.064)	0.053 (0.064)	0.024 (0.064)
31~34 years old		-0.140 (0.076)	-0.191* (0.075)	-0.115 (0.075)	-0.180* (0.074)
35~39 years old		-0.302*** (0.080)	-0.312*** (0.077)	-0.236** (0.078)	-0.282*** (0.076)
Education (ref. ~HS graduation)					
Junior/Vocational College		-0.622*** (0.070)	-0.379*** (0.066)	-0.515*** (0.070)	-0.330*** (0.066)
University		-0.939*** (0.067)	-0.564*** (0.063)	-0.731*** (0.068)	-0.469*** (0.064)
More than Graduate School		-0.991*** (0.150)	-0.572*** (0.143)	-0.728*** (0.150)	-0.448** (0.144)
Satisfaction with Household Income			-0.356*** (0.055)		-0.287*** (0.056)
Satisfaction with Housing Environment			-0.510*** (0.044)		-0.487*** (0.044)

Satisfaction with Family Relationship				-0.786*** (0.049)	-0.784*** (0.049)
Satisfaction with Social Relationship				-0.864*** (0.043)	-0.858*** (0.043)
Social Insurance Contribution				-0.018*** (0.002)	-0.010*** (0.002)
Low-Income Households	0.975*** (0.060)	0.767*** (0.060)	0.523*** (0.058)	0.563*** (0.062)	0.415*** (0.061)
Original panel (Wave 1)	0.293** (0.096)	0.243* (0.095)	0.242** (0.088)	0.202* (0.094)	0.224* (0.088)
Constant	-3.302*** (0.097)	-2.489*** (0.118)	-1.163*** (0.113)	-2.176*** (0.122)	-1.023*** (0.117)
Insig2u	0.668*** (0.052)	0.576*** (0.054)	0.237*** (0.061)	0.524*** (0.053)	0.233*** (0.060)
Observations	48058	48058	48058	48058	48058

Note: Coefficients from random-effects logistic regression models are reported. Standard errors in parentheses. All models include year fixed effects. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–26 (Age). Flag variables indicating imputed values were included in all models to account for potential bias introduced by mean imputation but are omitted from the table for brevity. Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

An interesting pattern emerged with marital status. Being ever married showed a protective effect in Model 2 ($\beta = -0.196$, $p < .01$), but this effect disappeared entirely when I added relationship satisfaction variables in Model 3 ($\beta = 0.040$, $p > .05$). The protective effect reappeared in Model 4 with social insurance but without satisfaction variables ($\beta = -0.215$, $p < .01$), and again became non-significant in the full model ($\beta = 0.026$, $p > .05$). This suggests that the mental health benefits of marriage may operate largely through relationship satisfaction rather than through material or insurance-based mechanisms

Among control variables, several patterns diverged from self-rated health results. Women showed significantly higher odds of depression across all specifications, with approximately 50–55% higher odds—substantially stronger than the gender gap observed

for self-rated health. Unlike self-rated health, age showed no consistent positive gradient with depression; if anything, older age groups showed lower odds of depression relative to the 20–26 reference group. Employment remained protective, while unemployment showed a strong positive association with depression—a pattern that did not emerge for self-rated health. Student status was protective, and higher educational attainment showed strong protective effects across all specifications. Living in a low-income household was strongly and consistently associated with depression across all models.

C. Age Differences and Cumulative Disadvantage

To examine Hypothesis 2, which posits that health disparities between individuals living alone and those living with others will widen over time, I estimated random effects logistic regression models. Table 5 presents results for both self-rated health (Models 1-2) and depression (Models 3-4). Model 1 and Model 3 include all controls except social insurance contribution, and Model 2 and Model 4 include social insurance contribution as an additional control variable.

In Table 5, age showed distinctly different patterns for self-rated health versus depression in multi-person households. For self-rated health, a clear age gradient emerged. Compared to those aged 20-26, each successive age group reported progressively worse health: ages 27-30 showed 28% higher odds ($\beta=0.250$, $p<0.001$), ages 31-34 showed 60% higher odds ($\beta=0.471$, $p<0.001$), and ages 35-39 showed 119% higher odds ($\beta=0.783$, $p<0.001$). This cumulative pattern is consistent with age-related deterioration in health over the life course.

Table 5. Random Effect (RE) Logistic Regression of Poor Self-Rated Health Status and Depression among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Poor Self-rated Health Status	(2) Poor Self-rated Health Status w/ Social Ins. Cont.	(3) Depression	(4) Depression w/ Social Ins. Cont.
Living Alone (= 1)	0.517** (0.160)	0.337* (0.159)	0.337* (0.158)	0.105 (0.158)
Age (ref. 20~26 years old)				
27~30 years old (C2)	0.254*** (0.069)	0.250*** (0.069)	0.057 (0.068)	0.063 (0.068)
31~34 years old (C3)	0.467*** (0.077)	0.471*** (0.076)	-0.110 (0.080)	-0.090 (0.079)
35~39 years old (C4)	0.744*** (0.079)	0.783*** (0.078)	-0.309*** (0.084)	-0.250** (0.082)
Living Alone * C2	-0.122 (0.205)	-0.103 (0.204)	-0.116 (0.208)	-0.094 (0.206)
Living Alone * C3	-0.154 (0.213)	-0.105 (0.211)	-0.387 (0.253)	-0.331 (0.249)
Living Alone * C4	-0.359 (0.214)	-0.296 (0.212)	0.228 (0.229)	0.295 (0.225)
Woman (= 1)	0.134** (0.046)	0.159*** (0.046)	0.409*** (0.051)	0.437*** (0.051)
Education (ref. ~HS graduation)				
Junior/Vocational College	-0.378*** (0.065)	-0.292*** (0.065)	-0.622*** (0.070)	-0.515*** (0.070)
University	-0.629*** (0.062)	-0.467*** (0.063)	-0.938*** (0.067)	-0.729*** (0.068)
More than Graduate School	-0.542*** (0.144)	-0.342* (0.145)	-0.989*** (0.150)	-0.725*** (0.150)
Ever Married (= 1)	-0.282*** (0.066)	-0.287*** (0.066)	-0.199** (0.071)	-0.216** (0.069)
Employment (ref. Not in labor force)				
Employed	-0.320*** (0.045)	-0.279*** (0.045)	-0.274*** (0.050)	-0.223*** (0.050)
Unemployed	0.062 (0.089)	0.051 (0.089)	0.448*** (0.087)	0.430*** (0.086)
Student (= 1)	-0.422*** (0.083)	-0.457*** (0.083)	-0.468*** (0.087)	-0.517*** (0.087)

Social Insurance Contribution		-0.013*** (0.002)		-0.018*** (0.002)
Low Income Households	0.756*** (0.058)	0.598*** (0.060)	0.769*** (0.060)	0.564*** (0.062)
Original panel (Wave 1)	-0.022 (0.088)	-0.052 (0.088)	0.244* (0.095)	0.203* (0.095)
Constant	-2.422*** (0.113)	-2.193*** (0.115)	-2.497*** (0.118)	-2.181*** (0.123)
Insig2u	0.531*** (0.057)	0.505*** (0.057)	0.576*** (0.054)	0.524*** (0.053)
Observations	48058	48058	48058	48058

Note: Coefficients from random-effects logistic regression models are reported. Standard errors in parentheses. All models include year fixed effects. Models 1 and 3 include control variables but exclude social insurance contribution. Models 2 and 4 additionally control for social insurance contribution. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–26 (Age). Interaction terms between living alone and age categories (C2–C4) are included to test whether the association between living alone and health outcomes varies by age group. Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

Depression revealed a contrasting pattern in multi-person households. Unlike self-rated health, age showed a negative relationship with depression. While ages 27–30 showed no significant difference from the youngest group, those aged 35–39 had 22% lower odds of depression ($\beta = -0.250$, $p < 0.01$). This suggests that the youngest age group (20–26) may face particular mental health vulnerabilities during early adulthood transitions.

The interaction terms between living alone and age categories were not individually significant for either outcome. Joint significance tests revealed that the relationship between living alone and self-rated health does not vary significantly by age ($\chi^2 = 2.15$, $p = .542$). For depression, the joint test reached marginal significance ($\chi^2 = 7.92$, $p = .048$), though individual interaction terms lacked sufficient statistical power, suggesting limited evidence for age moderation of the mental health consequences of living alone.

These findings provide limited support for Hypothesis 2. For self-rated health, Hypothesis 2 was not supported. The non-significant joint test and consistently negative (though non-significant) interaction terms indicate no evidence that the health gap between living arrangements widens with age. For depression, the evidence is more nuanced. The marginally significant joint test indicates that age does moderate the mental health consequences of living alone, though not in the linear cumulative disadvantage pattern hypothesized. The shift from negative to positive interaction coefficients across age groups suggests a non-linear relationship. The large negative coefficient at ages 31-34 ($\beta = -0.331$) indicates that living alone may actually be protective against depression during this period, while the positive coefficient at ages 35-39 ($\beta = 0.295$) suggests that the mental health advantage diminishes or reverses in late young adulthood.

Figure 1 illustrates the predicted probabilities of poor self-rated health by age group and living arrangement, comparing baseline models (Model 1) with models including social insurance contribution (Model 2). The pattern reveals that while both living arrangements experience age-related health deterioration, social insurance contribution plays different protective roles.

For multi-person households, social insurance contribution shows minimal impact on health trajectories. In both Model 1 and Model 2, predicted probabilities increase steadily and nearly identically across age groups. This suggests that the health-protective resources available through multi-person households—such as household-level economic resource sharing, caregiving support, and social integration—may largely substitute for or operate independently of the protections offered by formal social insurance enrollment.

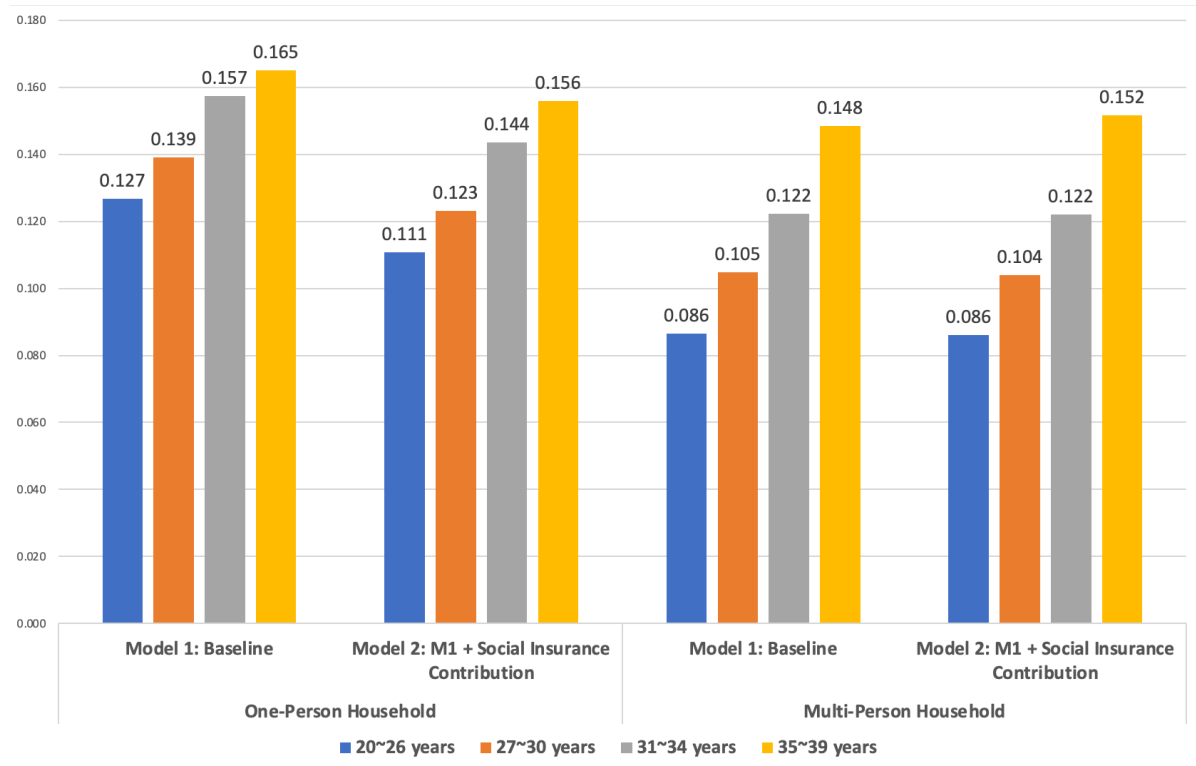


Figure 1. Random-Effects (RE) Logistic Regression Results Predicting Poor Self-Rated Health Status among Young Households in South Korea by Household Types, 2005 – 2019 (Age 20 – 39)

Note: Values represent predicted probabilities of poor self-rated health derived from random-effects logistic regression models with an interaction term between living arrangement and age categories. Model 1 includes gender, education, employment status, marital and student status as covariates. Model 2 additionally controls for social insurance contributions. Data are from the Korea Welfare Panel Study (KoWePS), 2005–2019.

However, for one-person households, social insurance contribution demonstrates a consistent protective effect across all age groups. In Model 1 (baseline), predicted probabilities increase steadily from 0.127 at ages 20-26 to 0.165 at ages 35-39, following a cumulative health deterioration pattern. When social insurance is added in Model 2, the entire trajectory shifts downward—from 0.111 at ages 20-26 to 0.156 at ages 35-39. While the age-related increase persists, social insurance reduces the overall level of health risk by approximately 1-2 percentage points across all age groups. This consistent protective effect suggests that for individuals living alone, access to employment-based social insurance

provides crucial health-protective resources that partially compensate for the absence of household-level support systems.

Figure 2 illustrates the predicted probabilities of depression by age group and living arrangement, comparing baseline models (Model 1) with models including social insurance contribution (Model 2). Unlike self-rated health, depression shows markedly different age patterns, with social insurance again playing divergent roles across living arrangements.

For multi-person households, predicted probabilities of depression remain remarkably stable across all age groups in both models. Social insurance contribution shows virtually no impact on depression trajectories, with Model 1 and Model 2 producing nearly identical predicted probabilities at every age group. However, for one-person households, the pattern reveals a distinct U-shaped trajectory that is partially attenuated by social insurance contribution. While social insurance reduces depression risk by approximately 1-1.5 percentage points in younger age groups, the U-shaped pattern persists, with mental health risks remaining elevated at both ends of the age spectrum.

The gap in depression between living arrangements narrows substantially with age. At ages 20-26, one-person households show 1.7 percentage points higher depression risk compared to multi-person households in Model 1 (0.120 vs. 0.103), but this gap diminishes to only 0.2 percentage points at ages 31-34 (0.104 vs. 0.102). However, the gap widens again slightly at ages 35-39 (0.107 vs. 0.104), consistent with the positive interaction coefficient observed in Table 5. This pattern suggests that living alone may carry particular mental health risks during the transition to adulthood (ages 20-26), but this disadvantage largely dissipates through the late 20s and early 30s, only to reemerge modestly in the late 30s for those who continue living alone.

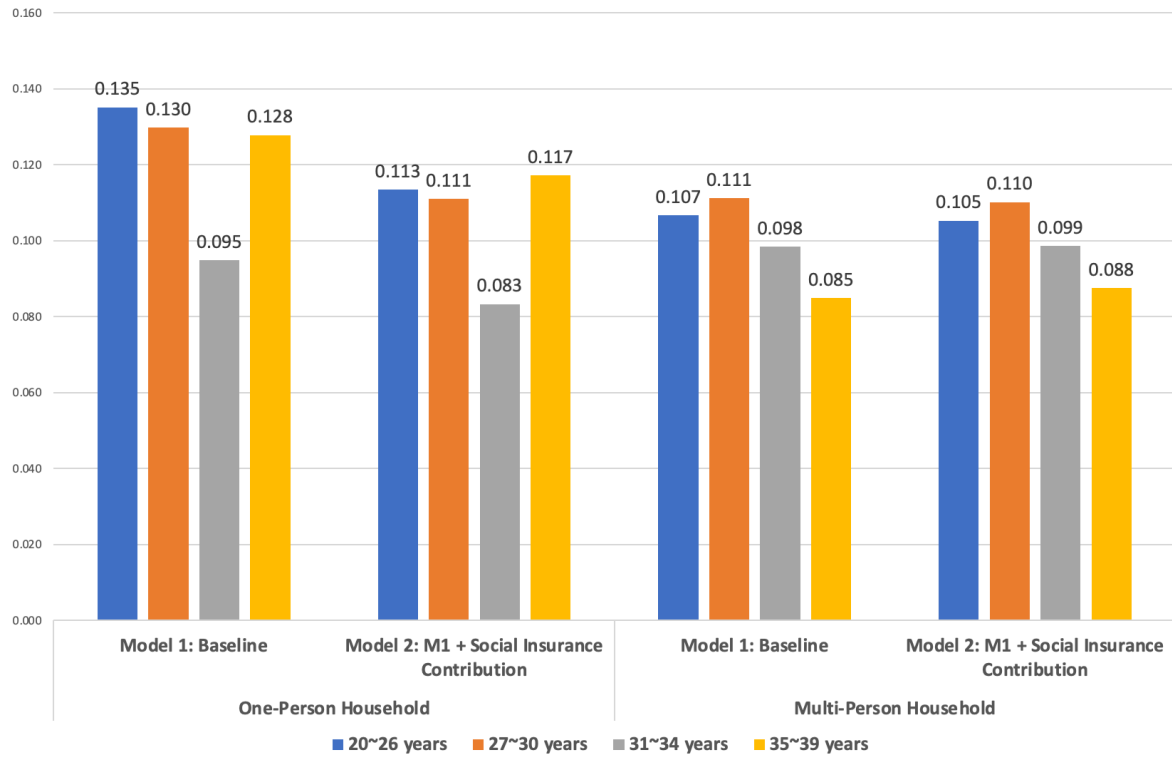


Figure 2. Random-Effects (RE) Logistic Regression Results Predicting Depression Symptoms among Young Households in South Korea by Household Types, 2005 – 2019 (Age 20 – 39)

Note: Values represent predicted probabilities of depression symptom derived from random-effects logistic regression models with an interaction term between living arrangement and age categories. Model 1 includes gender, education, employment status, marital and student status as covariates. Model 2 additionally controls for social insurance contributions. Data are from the Korea Welfare Panel Study (KoWePS), 2005–2019.

D. Gender Differences in Living Alone and Health

To examine Hypothesis 3, which posits that the negative health consequences of living alone will be stronger for women than for men, I added interaction terms between living alone and gender to the models. Table 6 presents results on gendered patterns in the association between living arrangements and health.

Living alone showed different associations with health by gender. For men living alone, captured by the main effect of Living Alone, the baseline model (Model 1) showed a marginally significant positive association ($\beta=0.263$, $p<.05$), but this attenuated and lost significance once control variables were introduced. Across Models 2 through 5, coefficients ranged from 0.044 to 0.173, none reaching statistical significance. This suggests that once demographic and socioeconomic factors are accounted for, men living alone show no significant health disadvantage compared to men in multi-person households.

In contrast, women living alone showed substantially elevated odds of poor health. The interaction term between living alone and woman was positive in all five models, reaching statistical significance in Models 2 through 5 (Model 2: $\beta=0.392$, $p<.05$; Model 3: $\beta=0.408$, $p<.05$; Model 4: $\beta=0.339$, $p<.05$; Model 5: $\beta=0.374$, $p<.05$), while falling short of significance in the baseline model (Model 1: $\beta=0.241$, $p>.05$). Calculating the total association for women living alone by combining the main effect and interaction term reveals coefficients ranging from 0.383 to 0.581 across Models 2 through 5—translating to approximately 47–79% higher odds of poor health compared to women in multi-person households.

Table 6. Random Effect (RE) Logistic Regression Results Predicting Poor Self-Rated Health Status with Gender Interaction among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Baseline	(2) Baseline w/ Control Variables	(3) Satisfaction Variables	(4) Social Insurance Contribution	(5) All Variables
Living Alone (= 1)	0.263* (0.123)	0.166 (0.126)	0.173 (0.123)	0.044 (0.125)	0.100 (0.124)
Woman (= 1)	0.154*** (0.046)	0.110* (0.048)	0.125** (0.047)	0.137** (0.048)	0.140** (0.047)
Living Alone*Woman	0.241 (0.167)	0.392* (0.169)	0.408* (0.167)	0.339* (0.167)	0.374* (0.166)
Ever Married (= 1)		-0.275*** (0.066)	-0.170** (0.065)	-0.281*** (0.065)	-0.177** (0.065)
Employment (ref. Not in labor force)					
Employed		-0.322*** (0.045)	-0.289*** (0.045)	-0.281*** (0.045)	-0.265*** (0.045)
Unemployed		0.059 (0.089)	0.000 (0.089)	0.048 (0.089)	-0.001 (0.089)
Student (= 1)		-0.428*** (0.083)	-0.368*** (0.083)	-0.461*** (0.083)	-0.390*** (0.083)
Age (ref. 20~26 years old)					
27~30 years old		0.248*** (0.066)	0.232*** (0.066)	0.246*** (0.066)	0.231*** (0.066)
31~34 years old		0.456*** (0.073)	0.428*** (0.072)	0.464*** (0.072)	0.434*** (0.072)
35~39 years old		0.720*** (0.076)	0.712*** (0.075)	0.763*** (0.075)	0.737*** (0.074)
Education (ref. ~HS graduation)					
Junior/Vocational College		-0.379*** (0.065)	-0.251*** (0.064)	-0.293*** (0.065)	-0.207** (0.064)
University		-0.631*** (0.062)	-0.417*** (0.061)	-0.469*** (0.063)	-0.334*** (0.062)
More than Graduate School		-0.544*** (0.144)	-0.300* (0.142)	-0.345* (0.145)	-0.195 (0.144)
Satisfaction with Family Relationship			-0.344*** (0.050)		-0.340*** (0.050)
Satisfaction with Social Relationship			-0.390***		-0.383***

			(0.041)	(0.041)	
Satisfaction with Household Income			-0.484***	-0.432***	
			(0.049)	(0.050)	
Satisfaction with Housing Environment			-0.242***	-0.224***	
			(0.042)	(0.042)	
Social Insurance Contribution			-0.013***	-0.008***	
			(0.002)	(0.002)	
Low-Income Households	0.899***	0.755***	0.596***	0.597***	0.509***
	(0.059)	(0.058)	(0.058)	(0.060)	(0.060)
Original panel (Wave 1)	-0.024	-0.022	-0.028	-0.051	-0.045
	(0.090)	(0.088)	(0.085)	(0.088)	(0.085)
Constant	-2.811***	-2.396***	-1.711***	-2.172***	-1.603***
	(0.093)	(0.112)	(0.116)	(0.114)	(0.118)
Insig2u	0.659***	0.526***	0.428***	0.502***	0.424***
	(0.055)	(0.057)	(0.059)	(0.057)	(0.059)
Observations	48058	48058	48058	48058	48058

Note: Coefficients from random-effects logistic regression models are reported. Standard errors in parentheses. All models include year fixed effects. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–26 (Age). Flag variables indicating imputed values were included in all models to account for potential bias introduced by mean imputation, but are omitted from the table for brevity. Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

Relationship satisfaction and social insurance variables were associated with the gendered pattern in different ways. When I added relationship satisfaction variables in Model 3, the interaction coefficient increased slightly relative to Model 2 ($0.392 \rightarrow 0.408$), suggesting that relationship satisfaction does not account for the elevated odds of poor health among women living alone. When I introduced social insurance contribution in Model 4, the interaction coefficient attenuated more substantially ($0.392 \rightarrow 0.339$, approximately 14% reduction), suggesting that differential access to social insurance is partially associated with the gendered health pattern, though the association persisted. In the full model (Model 5), the interaction term remained at $\beta=0.374$ ($p<.05$), indicating that even

when accounting for both relationship satisfaction and social insurance, women living alone continued to show elevated odds of poor health.

These findings provide support for Hypothesis 3 and point to the gendered nature of the association between living arrangements and health. Men living alone show no persistent health disadvantage compared to men in multi-person households, while women living alone show substantially higher odds of poor health that are not fully accounted for by differences in relationship satisfaction or social insurance access. The persistence of the gender gap even after accounting for measured relational and institutional factors suggests that broader structural conditions—such as differential labor market positions and social isolation—may be associated with gendered health patterns among one-person households.

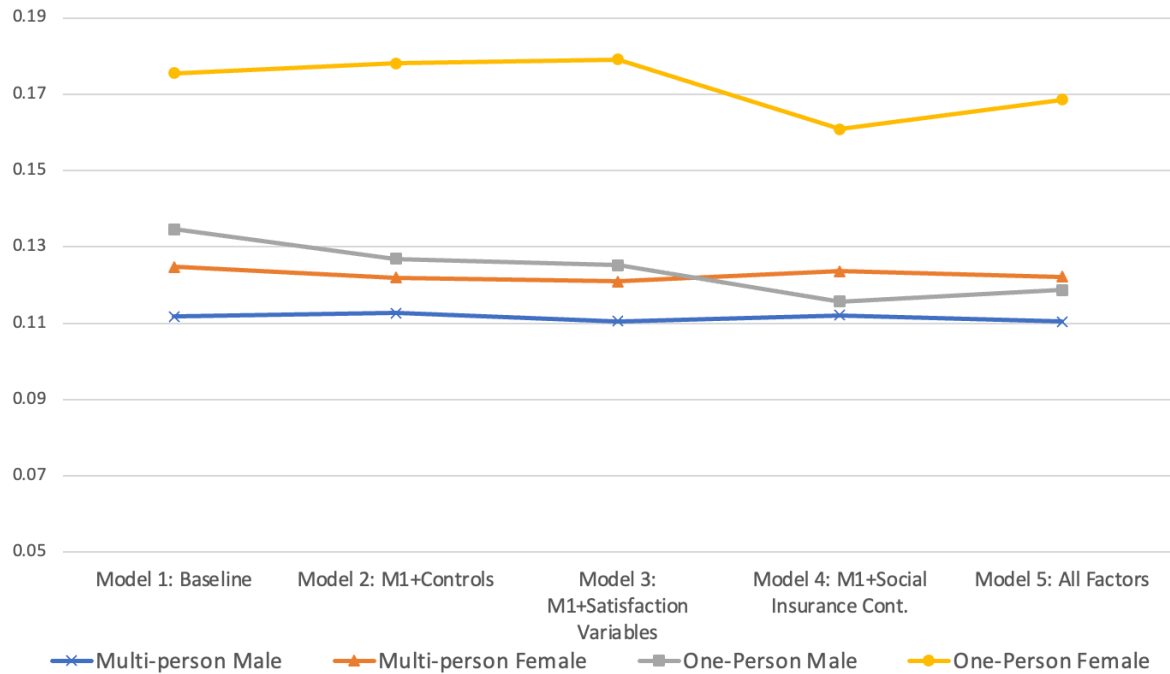


Figure 3. Random-Effects (RE) Logistic Regression Results Predicting Poor Self-Rated Health Status among Young Households in South Korea by Gender and Household Types, 2005 – 2019 (Age 20 – 39)

Note: Values represent predicted probabilities of poor self-rated health derived from random-effects logistic regression models with gender interaction terms. Model 1 includes living alone, woman, and their interaction term only. Model 2 additionally includes demographic and socioeconomic control variables. Model 3 adds satisfaction variables (household income, housing environment, family relationship, and social relationship). Model 4 adds social insurance contribution to Model 2. Model 5 includes all variables simultaneously. Data source: Korea Welfare Panel Study (KoWePS), 2005–2019.

Figure 3 illustrates the predicted probabilities of poor self-rated health across all five models, disaggregated by gender and living arrangement. Women living alone (yellow line) show consistently higher predicted probabilities compared to all other groups across all model specifications, while men living alone (gray line), multi-person household men (blue line), and multi-person household women (orange line) show comparatively lower and more stable predicted probabilities. The predicted probabilities for these three groups range from approximately 0.111 to 0.135 across model specifications, with modest differences between them. In contrast, women living alone show predicted probabilities ranging from 0.161 to

0.179—approximately 50–60% higher than all other groups—suggesting that the association between living alone and poor health is concentrated among women.

Multi-person households show greater stability in predicted probabilities across models. Both men and women in multi-person households maintain predicted probabilities between 0.111 and 0.125 regardless of model specification, suggesting that their health outcomes are less sensitive to the variables introduced across models. In contrast, one-person households show greater variation across specifications, though the magnitude differs by gender. When I introduced social insurance contribution in Model 4, predicted probabilities decreased for both one-person household groups—from 0.135 to 0.116 for men and from 0.179 to 0.161 for women. In the full model (Model 5), predicted probabilities for both groups increased slightly again (men: 0.119; women: 0.169). This parallel pattern suggests that health outcomes among those living alone are more sensitive to access to external resources such as social insurance, whereas those in multi-person households show relatively stable predicted probabilities across specifications. The critical difference is that while this variation affects men living alone only modestly, it operates on an already elevated baseline for women, resulting in larger absolute fluctuations in their predicted probabilities across models.

Table 7. Random Effect (RE) Logistic Regression Results Predicting Depression Symptom with Gender Interaction among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Baseline	(2) Baseline w/ Control Variables	(3) Satisfaction Variables	(4) Social Insurance Contribution	(5) All Variables
Living Alone (= 1)	0.336** (0.124)	0.266* (0.126)	0.291* (0.123)	0.102 (0.124)	0.200 (0.122)
Woman (= 1)	0.482*** (0.050)	0.405*** (0.052)	0.420*** (0.050)	0.437*** (0.052)	0.438*** (0.050)
Living Alone*Woman	-0.017 (0.171)	0.047 (0.171)	0.050 (0.168)	-0.022 (0.169)	0.009 (0.167)
Ever Married (= 1)		-0.196** (0.070)	0.040 (0.067)	-0.214** (0.069)	0.026 (0.066)
Employment (ref. Not in labor force)					
Employed		-0.276*** (0.050)	-0.213*** (0.049)	-0.225*** (0.049)	-0.184*** (0.049)
Unemployed		0.447*** (0.087)	0.384*** (0.088)	0.429*** (0.086)	0.382*** (0.087)
Student (= 1)		-0.474*** (0.087)	-0.350*** (0.085)	-0.521*** (0.086)	-0.379*** (0.086)
Age (ref. 20~26 years old)					
27~30 years old		0.045 (0.064)	0.022 (0.064)	0.052 (0.064)	0.024 (0.064)
31~34 years old		-0.139 (0.077)	-0.190* (0.075)	-0.115 (0.075)	-0.180* (0.074)
35~39 years old		-0.301*** (0.080)	-0.311*** (0.077)	-0.237** (0.078)	-0.282*** (0.076)
Education (ref. ~HS graduation)					
Junior/Vocational College		-0.622*** (0.070)	-0.379*** (0.066)	-0.514*** (0.070)	-0.330*** (0.066)
University		-0.940*** (0.067)	-0.564*** (0.063)	-0.731*** (0.068)	-0.469*** (0.064)
More than Graduate School		-0.991*** (0.150)	-0.572*** (0.142)	-0.728*** (0.150)	-0.448** (0.144)
Satisfaction with Family Relationship			-0.787*** (0.049)		-0.784*** (0.049)
Satisfaction with Social Relationship			-0.864***		-0.858***

			(0.043)	(0.043)	
Satisfaction with Household Income			-0.356***	-0.287***	
			(0.055)	(0.056)	
Satisfaction with Housing Environment			-0.510***	-0.487***	
			(0.044)	(0.044)	
Social Insurance Contribution				-0.018***	-0.010***
				(0.002)	(0.002)
Low-Income Households	0.979***	0.766***	0.523***	0.563***	0.415***
	(0.060)	(0.060)	(0.058)	(0.062)	(0.061)
Original panel (Wave 1)	0.289**	0.243*	0.242**	0.202*	0.224*
	(0.096)	(0.095)	(0.088)	(0.094)	(0.088)
Constant	-3.558***	-2.487***	-1.161***	-2.177***	-1.022***
	(0.101)	(0.118)	(0.114)	(0.122)	(0.117)
Insig2u	0.641***	0.576***	0.237***	0.524***	0.233***
	(0.052)	(0.054)	(0.061)	(0.053)	(0.060)
Observations	48058	48058	48058	48058	48058

Note: Coefficients from random-effects logistic regression models are reported. Standard errors in parentheses. All models include year fixed effects. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–26 (Age). Flag variables indicating imputed values were included in all models to account for potential bias introduced by mean imputation, but are omitted from the table for brevity. Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 7 presents results for depression with gender interaction terms, revealing a different pattern from self-rated health. Unlike the gendered pattern observed for physical health, depression showed no significant gender differentiation in the association between living alone and health outcomes.

Living alone showed a modest and inconsistent association with depression, with no additional association for women. For men living alone, captured by the main effect of Living Alone, the coefficients were positive and statistically significant in Models 1 through 3 (Model 1: $\beta=0.336$, $p<.01$; Model 2: $\beta=0.266$, $p<.05$; Model 3: $\beta=0.291$, $p<.05$), but attenuated and lost significance when social insurance contribution was introduced in Model

4 ($\beta=0.102$, $p>.05$) and in the full model (Model 5: $\beta=0.200$, $p>.05$). The interaction term between living alone and woman was non-significant across all five models. Joint significance tests confirmed that the gender difference in the association between living alone and depression was not statistically significant in any model (χ^2 ranging from 0.00 to 0.09, all $p>.76$).

Relational and material satisfaction and social insurance variables showed different patterns, though neither revealed gendered associations. When I added satisfaction variables in Model 3, the main effect of living alone increased slightly and remained significant, while the interaction term also increased but remained non-significant. This suggests that satisfaction does not account for the association between living alone and depression for either gender. When I introduced social insurance contribution in Model 4, both the main effect and interaction term attenuated substantially, with both becoming non-significant. This suggests that social insurance access is partially associated with depression risks among those living alone, but similarly for both men and women.

The predominant pattern in depression is the strong main association of gender, which operates independently of living arrangement. Women showed significantly higher odds of depression across all models (β ranging from 0.405 to 0.482, all $p<.001$), translating to approximately 50–62% higher odds of depression compared to men. This gender gap persisted across all model specifications and was not attenuated by satisfaction variables or social insurance, suggesting that women's elevated depression risk is associated with structural factors beyond the variables measured in this study. Unlike self-rated health, where the gender gap was concentrated among those living alone, the depression gender gap was present among women regardless of living arrangement.

These findings do not support Hypothesis 3 for depression outcomes and reveal an important contrast with self-rated health results. While Hypothesis 3 received support for self-rated health—where women living alone showed substantially higher odds of poor health—it was not supported for depression. This divergence suggests that physical health and mental health show different patterns in their associations with living arrangements and gender. The elevated odds of poor physical health among women living alone may reflect cumulative structural disadvantages—such as economic precarity, labor market disadvantages, and inadequate social protection—that compound over time and manifest in embodied health outcomes. Depression, in contrast, appears to be more universally elevated among women regardless of living arrangement, suggesting that gender-based vulnerabilities to mental health are associated with broader societal factors—such as gender discrimination, caregiving burdens, or restrictive gender norms—that affect women across all household types.

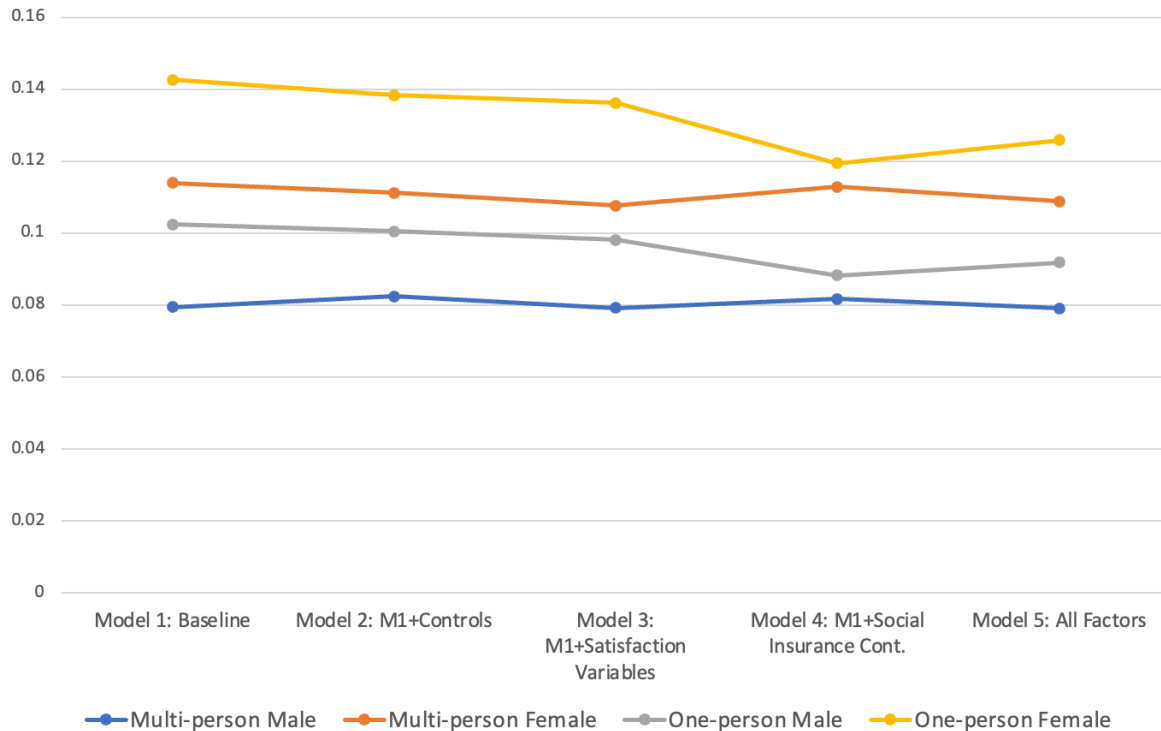


Figure 4. Random-Effects (RE) Logistic Regression Results Predicting Depression Symptoms among Young Households in South Korea by Gender and Household Types, 2005 – 2019 (Age 20 – 39)

Note: Values represent predicted probabilities of depression derived from random-effects logistic regression models with gender interaction terms. Model 1 includes living alone, woman, and their interaction term only. Model 2 additionally includes demographic and socioeconomic control variables. Model 3 adds satisfaction variables (household income, housing environment, family relationship, and social relationship). Model 4 adds social insurance contribution to Model 2. Model 5 includes all variables simultaneously. Data source: Korea Welfare Panel Study (KoWePS), 2005–2019.

Figure 4 illustrates the predicted probabilities of depression across all five models, disaggregated by gender and living arrangement. Unlike the self-rated health results where women living alone uniquely showed elevated predicted probabilities, the depression pattern reveals a different picture: women in both living arrangements show substantially higher predicted probabilities compared to men, though women living alone (yellow line) consistently show the highest levels across all specifications. Women living alone show predicted probabilities ranging from 0.119 to 0.143, while women in multi-person

households (orange line) range from 0.108 to 0.114—both substantially higher than their male counterparts. Men living alone (gray line) range from 0.088 to 0.102, while men in multi-person households (blue line) show the lowest predicted probabilities at 0.079 to 0.082. This pattern suggests that depression shows a stronger association with gender than with living arrangement, with gender being the more dominant correlate of mental health outcomes across model specifications.

Multi-person households show relatively stable predicted probabilities across all five models, with both men and women maintaining similar levels regardless of which variables are introduced. In contrast, one-person households show greater variation across specifications. When I introduced social insurance contribution in Model 4, predicted probabilities decreased for both one-person household groups—women from 0.136 to 0.119 and men from 0.098 to 0.088. In the full model (Model 5), predicted probabilities for both groups increased slightly again (women: 0.126; men: 0.092). This parallel pattern is consistent with what I observed for self-rated health: predicted probabilities among those living alone show greater sensitivity to the introduction of social insurance variables, whereas those in multi-person households show relatively stable predicted probabilities across specifications. The key distinction from self-rated health is that for depression, this pattern operates within the context of a strong baseline gender difference that is present among all women regardless of living arrangement.

V. Robustness Checks

A. Robustness Checks Using Alternative Outcome Measures and Model Specifications

Tables A1 and A2 show the results of robustness checks using alternative outcome measures and model specifications. The main analysis of self-rated health status using binary classification (good/very good health vs. fair/poor/very poor health) revealed that living alone significantly increased the odds of reporting suboptimal health ($\beta=0.285$, $p=0.002$). To assess the robustness of this finding, two additional analyses were conducted using alternative operationalizations of health status. First, a 5-point ordered logistic regression using the original Likert scale yielded a non-significant effect ($\beta=-0.033$, $p=0.586$). Second, the health variable was collapsed into three categories (good/very good, fair, poor/very poor), revealing a significant positive association ($\beta=0.211$, $p=0.010$), with results nearly identical to the binary specification in both magnitude and significance. This pattern of results suggests that the effect of living alone on health operates through a threshold mechanism rather than a continuous gradient.

To further investigate this possibility, transition-specific analyses were conducted by estimating separate binary logistic regressions for each categorical boundary. Results confirmed that living alone significantly increased the risk of transitioning from good/very good health to fair or worse health ($\beta=0.227$, $p=0.005$), but had no effect on further deterioration from fair to poor/very poor health ($\beta=-0.058$, $p=0.675$). The lack of significance in the 5-point ordered logistic model likely reflects averaging across heterogeneous transition effects, which may violate the proportional odds assumption. Taken together, these robustness checks validate the main findings while revealing that the

health impact of living alone is concentrated at the upper end of the health distribution—specifically, it undermines the maintenance of optimal health rather than precipitating severe health decline.

In the case of depression, the main binary analysis (non-depressed vs. depressed) demonstrated that living alone significantly increased depression risk ($\beta=0.205$, $p=0.019$). Robustness checks using the full perceived depression score (0–60) in an ordered logistic regression confirmed this finding with even stronger statistical significance ($\beta=0.160$, $p=0.001$), indicating that the effect is robust across different operationalizations of the outcome. Unlike self-rated health, the consistency across binary and ordered specifications suggests that living alone exerts a more uniform effect across the depression spectrum.

B. Robustness Checks for Age-Moderated Effects

Tables A3–A5 examine whether the association between living alone and health outcomes varies by age within young adulthood, as well as the sensitivity of the results to alternative age operationalizations (continuous versus categorical) and model specifications (random-effects versus fixed-effects). In the main RE models using age categories (Table 5), joint significance tests indicated differential patterns across outcomes: the interaction set was not jointly significant for poor self-rated health (Model 2: $\chi^2 = 2.15$, $p = 0.542$), but reached marginal significance for depression (Model 2: $\chi^2 = 7.92$, $p = 0.048$). This suggests that age does not meaningfully condition the physical health consequences of living alone, whereas there may be modest age heterogeneity in the association between living alone and depression.

To assess robustness, FE logistic models were first estimated (Table A3) to account for time-invariant unobserved heterogeneity. The FE results largely reinforce the main conclusion that age does not robustly moderate the living-alone effect: most interaction terms remained statistically non-significant, and the overall pattern did not yield consistent evidence of age-contingent effects across outcomes.

Second, I re-estimated RE models using an alternative age operationalization. When age was modeled as a continuous variable and interacted with living alone (Table A5), the interaction term was not statistically significant for either outcome (poor health: $\chi^2 = 2.16$, $p = 0.142$ in Model 1; $\chi^2 = 1.39$, $p = 0.239$ in Model 2; depression: $\chi^2 = 0.19$, $p = 0.666$ in Model 1; $\chi^2 = 0.01$, $p = 0.908$ in Model 2). This indicates that the effect of living alone does not change in a simple linear fashion with age within ages 20–39.

However, when age was modeled categorically using five-year intervals (Table A4), the results echoed the main analysis in a more nuanced way. For poor self-rated health, the joint test of the interaction set remained non-significant (Model 1: $\chi^2 = 2.98$, $p = 0.395$; Model 2: $\chi^2 = 2.22$, $p = 0.529$), consistent with the conclusion that age does not significantly moderate the living-alone effect on physical health. In contrast, for depression, the interaction set was jointly significant in both specifications (Model 1: $\chi^2 = 10.85$, $p = 0.013$; Model 2: $\chi^2 = 11.20$, $p = 0.011$). Notably, the interaction for the 30–34 age group was statistically significant (Model 1: $\beta = -0.618$, $p = 0.017$; Model 2: $\beta = -0.559$, $p = 0.028$), indicating that age-related heterogeneity in the depression association emerges when age is allowed to vary non-linearly across discrete intervals.

Taken together, these checks indicate no robust evidence of age moderation for self-rated health, whereas depression shows age-related heterogeneity only when age is modeled

categorically. This divergence suggests that age-related variation in depression is non-linear and concentrated at specific stages of young adulthood rather than reflecting a smooth, cumulative process across ages 20–39.

VI. Discussion

A. Summary of Main Findings

This study examined health disparities between young adults living alone and those in multi-person households in South Korea, drawing on 15 years of nationally representative panel data (2005-2019) among individuals aged 20-39. I tested three hypotheses regarding the association between living arrangements and health outcomes.

My analysis showed support for Hypothesis 1 with important qualifications. Hypothesis 1 is that individuals living alone will report poorer health outcomes—including lower self-rated health and higher depressive symptoms—than individuals living in multi-person households. Living alone was associated with significantly higher odds of poor self-rated health and depression. Social insurance contribution produced notable attenuation, suggesting that differential access to employment-based social protection partially—but not fully—explains health disadvantages. Robustness checks revealed that the health effect operates through a threshold mechanism: living alone is associated with suboptimal health rather than severe health decline. Hypothesis 2, if cumulative disadvantage processes operate during early adulthood, health disparities between individuals living alone and those living with others will widen with age, was not supported for self-rated health and depression. Age did not moderate the effects of living alone on physical health. For depression, a non-linear pattern that may vary across age groups—with potentially lower risks in the early thirties and modest re-elevation at ages 35-39—suggesting stage-specific rather than cumulative associations. Hypothesis 3 received strong support for self-rated health but not for depression. Women living alone faced substantially elevated health risks

that persisted even when accounting for relational and material satisfaction variables and social insurance, while men living alone showed no health disadvantage. For depression, gender operated as a strong main effect independent of living arrangement, with no significant interaction between gender and living arrangement. In sum, my findings suggest that the health consequences of living alone are neither uniform nor gender-neutral, warranting closer examination of the mechanisms underlying these complex patterns.

B. Living Alone and Health: Threshold Effects and Mechanisms

The robustness checks suggest an important pattern in how living alone is associated with health: the association may reflect a threshold pattern rather than a uniform one across the health distribution. This suggests that living alone is associated with suboptimal health maintenance rather than severe decline. Young individuals living alone may be less likely to engage in preventive health behaviors, routine healthcare access, or early symptom management that keep individuals in optimal health, even as they may not necessarily face greater odds of severe health events once health has already declined.

The partial explanatory role of social insurance further illuminates possible pathways associated with these disparities. When social insurance contribution was introduced, the living alone coefficient for self-rated health dropped substantially and lost significance when introduced alone. This pattern—combined with Figures 3 and 4 showing that one-person households show greater sensitivity in predicted probabilities to the introduction of external institutional variables while multi-person households show relatively stable predicted probabilities across model specifications—suggests that health outcomes among those living

alone may be more closely associated with access to external institutional resources, whereas those in multi-person households show stable predicted probabilities regardless of which variables are introduced. However, social insurance access alone may not fully account for the multifaceted support associated with co-residential arrangements. For depression, the pattern was similar but more uniform: social insurance was partially associated with attenuation equally for both genders. The divergence between physical and mental health outcomes suggests that while depression may show greater sensitivity to institutional protections when accessible, physical health disparities may be associated with structural inequalities that extend beyond formal social insurance coverage.

C. Age Patterns: Limited Support for Cumulative Disadvantage

The findings provide limited support for cumulative disadvantage theory. For self-rated health, the absence of age moderation—confirmed across multiple model specifications—suggests that the health disadvantage associated with living alone does not intensify with age within young adulthood. This may reflect that the 15-year observation period is insufficient to detect long-term cumulative physical health effects, which may require decades to manifest. Alternatively, it suggests that living alone during young adulthood is not associated with trajectories of compounding health deficits.

For depression, the pattern is more complex and may suggest non-linear variation across age groups within young adulthood. The predicted probabilities among those living alone show potentially higher levels at ages 20-26 and modest re-elevation at 35-39 relative to the early thirties, though individual interaction terms did not reach statistical significance

and the joint test reached only marginal significance ($\chi^2 = 7.92$, $p = .048$). This pattern may suggest that living alone is associated with particular mental health risks during the transition to adulthood, when individuals may be more likely to experience social isolation, identity formation challenges, and the process of establishing independence. Depression levels among those continuing to live alone into their 30s appear to approach those of multi-person household peers, with a slight re-elevation visible at ages 35-39 in Figure 4 that may reflect a distinct subgroup associated with unmet expectations regarding family formation or accumulated relational deficits. Rather than steadily widening gaps, the mental health pattern associated with living alone may differ across age groups within young adulthood, with variation potentially concentrated at life course transitions rather than accumulating linearly over time.

D. Gendered Health Inequalities: Structural Disadvantage

The stark gender differentiation in self-rated health outcomes is consistent with the vulnerability framework discussed in the literature review. Women living alone showed substantially elevated odds of poor health that persisted across all model specifications, while men living alone showed no statistically significant health disadvantage. This pattern is consistent with theoretical expectations that women living alone face structural disadvantages across multiple domains: they lack household-based support while simultaneously facing structural barriers in labor market participation and social insurance access. The gendered health gap was not accounted for by relationship satisfaction—which had virtually no attenuating association—and persisted across all model specifications

including those controlling for social insurance contribution. This suggests that a substantial portion of the gender gap may be associated with unmeasured structural factors such as labor market positions, economic precarity, housing cost burdens, and forms of social isolation that extend beyond the variables captured in this study.

The contrast between self-rated health and depression further highlights gendered patterns. Unlike physical health, where the gender gap was concentrated among those living alone, depression showed a strong main association of gender that operated independently of living arrangement. This divergence suggests that physical and mental health vulnerabilities show different gendered patterns. Physical health disparities among women living alone may be associated with structural disadvantages—such as lower employment rates, higher non-regular employment, lower wages, and limited social insurance enrollment documented in South Korea (OECD 2024; Lim 2025)—that are associated with embodied health outcomes. These structural inequalities may become particularly visible through the experiences of women living alone, who lack the compensatory household resources that may otherwise offset labor market and institutional disadvantages. Depression, in contrast, appears to be more universally elevated among women regardless of living arrangement, suggesting that gender-based vulnerabilities to mental health problems may be associated with broader societal factors—such as gender discrimination, restrictive norms, or unequal caregiving expectations—that affect women across all household types. The fact that social insurance was partially associated with lower depression odds equally for both genders further indicates that when institutional protections are accessible, they may function similarly across genders, but access itself appears to be structurally gendered.

E. Household-Dependent Health Outcomes

Figures 3 and 4 reveal a consistent pattern across both health outcomes: multi-person households maintain relatively stable predicted probabilities across model specifications, whereas one-person households show greater variation in predicted probabilities with the introduction of external institutional variables. For self-rated health, predicted probabilities among multi-person households remain nearly unchanged regardless of whether social insurance is included, while those for one-person households vary more noticeably when institutional variables are introduced. A similar pattern emerges for depression.

This pattern suggests that health outcomes among individuals living alone may be more closely associated with external institutional conditions, whereas those in multi-person households show relatively stable predicted probabilities regardless of which institutional variables are introduced. The relative stability observed among multi-person households is consistent with the idea that co-residential living may be associated with access to a broader set of informal supports, while individuals living alone may be more sensitive to variation in institutional coverage.

At the same time, the persistence of elevated odds of poor health among one-person households—even after accounting for social insurance—suggests that institutional protections may only partially account for the vulnerabilities associated with living alone. These findings suggest that health inequalities across living arrangements may vary not solely at the individual level, but with household composition and the broader institutional context. From a policy perspective, these findings suggest that while strengthening social insurance remains important, it may not be sufficient on its own to address the health risks

associated with living alone, highlighting the potential importance of complementary supports beyond formal welfare provisions.

F. Limitations

There are several limitations to this project. First, the depression measure exhibits substantial non-random missingness, affecting 24.9% of observations. Attrition analyses (Table A6) indicate that missingness is systematically patterned: men, younger individuals, higher-income respondents, and those reporting poor self-rated health were significantly more likely to have missing depression data. Given the well-established association between physical and mental health (Chapman et al. 2004; Moussavi et al. 2007; Scott et al. 2016), the disproportionate exclusion of individuals with poorer health suggests that depression prevalence and its associations may be underestimated in this study.

Second, although the 15-year observation window is substantial, it may be insufficient to capture long-term cumulative physical health processes that unfold over longer life courses. The absence of significant age moderation for self-rated health may therefore reflect temporal limitations rather than the absence of cumulative disadvantage.

Third, causal inference remains limited despite the panel design. Selection into living arrangements is likely non-random, and unobserved confounding cannot be ruled out.

Finally, several theoretically relevant mechanisms are not directly measured. The data lack detailed information on social networks, frequency of contact, caregiving arrangements, loneliness, housing quality, and neighborhood conditions, all of which may mediate the relationship between living arrangements and health. In addition, the binary

measure of living alone obscures heterogeneity within one-person households, which may encompass diverse circumstances and support structures. Future research incorporating richer measures of social context and housing conditions would provide a more nuanced understanding of how living arrangements shape health outcomes in South Korea.

G. Policy Implications

The findings suggest several implications for social policy in South Korea and other societies experiencing growth in one-person households. First, the role of employment-based social insurance in partially explaining health disparities points to the potential value of expanding social protection that operates more independently of labor market position. The current employment-centered welfare architecture may systematically exclude those in precarious employment, disproportionately affecting women. Policies should strengthen enrollment and benefits for non-regular workers, extending coverage to the self-employed and economically inactive, and reducing gaps between workplace-based and regional insurance programs.

Second, the gender differences in physical health outcomes—with women living alone showing substantially elevated risks that men do not—suggest the potential importance of gender-attentive interventions. These might address not only employment rates but also employment quality, wage equity, and structural factors that may channel women into precarious positions with limited social protection. Housing policies may be particularly relevant, as housing cost burdens could affect living conditions in ways that relate to health outcomes.

Third, the threshold mechanism revealed in robustness checks suggests that preventive health interventions may be especially relevant for one-person households. Rather than focusing solely on treating severe health decline, policies might emphasize maintaining optimal health through accessible primary care, regular health screenings, and support for health-promoting behaviors. The non-linear age pattern for depression further suggests that mental health support could be tailored to different life stages, with particular attention to early adulthood transitions when vulnerability appears elevated.

Finally, an integrated approach may be necessary. Expanding social insurance alone may be insufficient if labor market stratification persists, while improving employment conditions without strengthening social protection may also fall short. A comprehensive policy should address labor market conditions, welfare coverage, housing affordability, and social connection infrastructure simultaneously.

VII. Conclusion

This study examined health disparities between young adults living alone and those in multi-person households in South Korea, using 15 years of nationally representative panel data from the Korea Welfare Panel Study (2005–2019). As one-person households have become a defining feature of contemporary Korean society, understanding their health implications is increasingly important.

The findings suggest that living alone is associated with elevated odds of poor self-rated health and depression, but that these associations are neither uniform nor gender-neutral. Living alone is associated with suboptimal physical health maintenance, consistent with a threshold pattern, while its association with depression operates more continuously across the severity spectrum. Moreover, age does not intensify physical health disadvantages within young adulthood, challenging simple cumulative disadvantage narratives, while mental health patterns may vary across age groups within young adulthood rather than accumulating linearly over time.

A central contribution of this study lies in revealing how gendered health inequalities are associated with living arrangements. Women living alone show substantially higher odds of poor physical health than all other groups, even after accounting for relationship satisfaction and social insurance access, whereas men living alone show no comparable disadvantage. These patterns suggest that one-person households may function as a critical site where gendered labor market inequalities and unequal access to social protection are associated with embodied health outcomes. In contrast, depression shows a strong gender main association that cuts across household types, highlighting distinct gendered patterns for physical and mental health.

By situating household composition within South Korea's employment-based welfare regime, this study contributes to broader debates on family, health, and inequality. Theoretically, the findings suggest a reframing of "living alone" not as a uniform condition defined by the absence of marriage, but as a heterogeneous category whose health consequences are shaped by the intersection of gender and institutional contexts. This reframing shifts scholarly attention from marital status as the primary lens toward household composition and its interaction with welfare regime characteristics—a distinction that may carry different implications across social groups and national contexts. The findings also suggest that health inequalities across living arrangements may not be fully accounted for by institutional protections alone, particularly for women living alone, highlighting household composition as a fundamental axis of social stratification in contemporary societies.

As one-person households continue to expand in South Korea and other advanced economies, future research should further investigate how the meanings and consequences of living alone vary across social groups, welfare regimes, and life-course stages. Addressing the health vulnerabilities of those living alone will require not only expanding formal social protection, but also recognizing the ways in which household composition intersects with gender and institutional context to produce unequal health outcomes.

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Appendix

Table A1. OLS Regression Results Predicting Self-Rated Health Status among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Self-Rated Health Status (5 Likert Scale)	(2) Self-Rated Health Status (5 Likert Scale) With Satisfaction & Social Insurance	(3) Perceived Depression Score (0–60)	(4) Perceived Depression Score (0–60) With Satisfaction & Social Insurance
Living Alone (= 1)	-0.066 (0.060)	-0.033 (0.061)	0.205*** (0.051)	0.160** (0.050)
Woman (= 1)	0.204*** (0.024)	0.210*** (0.024)	0.259*** (0.023)	0.300*** (0.023)
Ever Married (= 1)	-0.296*** (0.041)	-0.219*** (0.041)	-0.039 (0.037)	0.123*** (0.034)
Employment (ref. Not in labor force)				
Employed	-0.199*** (0.028)	-0.180*** (0.028)	-0.090*** (0.026)	-0.030 (0.025)
Unemployed	0.016 (0.065)	-0.053 (0.065)	0.638*** (0.055)	0.542*** (0.054)
Student (= 1)	-0.175*** (0.041)	-0.126** (0.041)	-0.237*** (0.039)	-0.156*** (0.039)
Age (ref. 20~26 years old)				
27~30 years old	0.094* (0.037)	0.082* (0.037)	0.078* (0.034)	0.050 (0.034)
31~34 years old	0.283*** (0.043)	0.256*** (0.043)	0.017 (0.040)	-0.044 (0.038)
35~39 years old	0.545*** (0.046)	0.522*** (0.046)	-0.056 (0.043)	-0.104* (0.041)
Education (ref. ~HS graduation)				
Junior/Vocation al College	-0.130*** (0.038)	-0.060 (0.038)	-0.383*** (0.037)	-0.218*** (0.035)
University	-0.279*** (0.036)	-0.166*** (0.037)	-0.492*** (0.034)	-0.211*** (0.033)
More than Graduate School	-0.211** (0.076)	-0.088 (0.076)	-0.409*** (0.059)	-0.084 (0.057)

Satisfaction with Household Income		-0.248*** (0.026)		-0.274*** (0.023)
Satisfaction with Housing Environment		-0.129*** (0.027)		-0.327*** (0.022)
Satisfaction with Family Relationship		-0.280*** (0.038)		-0.717*** (0.033)
Satisfaction with Social Relationship		-0.355*** (0.029)		-0.698*** (0.025)
Low-Income Household (= 1)	0.680*** (0.055)	0.533*** (0.055)	0.707*** (0.042)	0.351*** (0.040)
Panel Cohort (Original = 1)	-0.072 (0.050)	-0.076 (0.049)	0.282*** (0.047)	0.272*** (0.046)
Observations	48058	48058	48058	48058

Note: Coefficients from OLS regression models – 5 Likert Scale for poor self-rated health status and continuous score (0–60) for depression symptom – are reported. Standard errors in parentheses. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–26 (Age). Flag variables indicating imputed values were included in all models to account for potential bias introduced by mean imputation, but are omitted from the table for brevity. Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A2. Ordered Logistic Regression Results Predicting Self-Rated Health Status (Three Categories: Good/Very Good, Fair, Poor/Very Poor) among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Self-Rate Health Status (3 Categories)	(2) Self-Rate Health Status (3 Categories) With Satisfaction and Social Insurance
Living Alone (= 1)	0.266** (0.082)	0.211* (0.082)
Woman (= 1)	0.083 (0.043)	0.107* (0.043)
Ever Married	-0.368*** (0.063)	-0.244*** (0.062)
Employment (ref. Not in labor force)		
Employed	-0.400*** (0.043)	-0.342*** (0.043)
Unemployed	-0.006 (0.082)	-0.088 (0.082)
Student (= 1)	-0.518*** (0.080)	-0.458*** (0.079)
Age (ref. 20~26 years old)		
27~30 years old	0.187** (0.059)	0.162** (0.060)
31~34 years old	0.436*** (0.067)	0.386*** (0.066)
35~39 years old	0.745*** (0.070)	0.719*** (0.069)
Education (ref. ~HS graduation)		
Junior/Vocational College	-0.271*** (0.058)	-0.132* (0.059)
University	-0.471*** (0.055)	-0.227*** (0.056)
More than Graduate School	-0.312* (0.140)	-0.009 (0.144)
Social Insurance Contribution		-0.008*** (0.002)
Satisfaction with Household Income		-0.362*** (0.046)
Satisfaction with Housing Environment		-0.211*** (0.039)

Satisfaction with Family Relationship		-0.334*** (0.046)
Satisfaction with Social Relationship		-0.426*** (0.037)
Low-Income Household (= 1)	0.922*** (0.057)	0.605*** (0.059)
Panel Cohort (Original = 1)	0.006 (0.074)	-0.021 (0.073)
cut1	1.891*** (0.098)	1.090*** (0.105)
cut2	3.283*** (0.105)	2.502*** (0.111)
Observations	48058	48058

Note: Coefficients from ordered logistic regression models are reported. Self-rated health status is coded into three ordered categories: good/very good (1), fair (2), and poor/very poor (3). Cut points (cut1, cut2) represent estimated thresholds between adjacent categories. Standard errors in parentheses. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–26 (Age). Flag variables indicating imputed values were included in all models to account for potential bias introduced by mean imputation, but are omitted from the table for brevity. Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A3. Fixed-Effects (FE) Logistic Regression of Poor Self-Rated Health Status and Depression among Young Households in South Korea, 2005–2019 (Ages 20–39) (Coefficients)

	(1) Poor Health Status	(2) Poor Health Status w/ Social Ins. Cont.	(3) Depression	(4) Depression w/ Social Ins. Cont.
Living Alone (= 1)	0.730*** (0.181)	0.662*** (0.182)	0.279 (0.176)	0.262 (0.177)
Age (ref. 20~26 years old)				
27~30 years old (C2)	0.132 (0.076)	0.162* (0.076)	-0.254*** (0.074)	-0.246*** (0.074)
31~34 years old (C3)	0.155 (0.089)	0.212* (0.091)	-0.722*** (0.090)	-0.709*** (0.091)
35~39 years old (C4)	0.239* (0.095)	0.331*** (0.100)	-1.313*** (0.101)	-1.293*** (0.105)
Living Alone * C2	-0.238 (0.213)	-0.245 (0.213)	-0.015 (0.223)	-0.018 (0.223)
Living Alone * C3	-0.355 (0.234)	-0.358 (0.234)	-0.289 (0.262)	-0.289 (0.262)
Living Alone * C4	-0.580* (0.252)	-0.575* (0.253)	0.313 (0.273)	0.312 (0.273)
Ever Married (= 1)	-0.167 (0.103)	-0.151 (0.103)	-0.319** (0.111)	-0.316** (0.111)
Employment (ref. Not in labor force)				
Employed	-0.191*** (0.057)	-0.169** (0.057)	-0.224*** (0.059)	-0.219*** (0.059)
Unemployed	0.041 (0.098)	0.049 (0.098)	0.142 (0.094)	0.144 (0.094)
Student (= 1)	-0.192* (0.094)	-0.218* (0.094)	-0.356*** (0.095)	-0.363*** (0.095)
Social Insurance Contribution		-0.006** (0.002)		-0.001 (0.002)
Low Income Households	0.227*** (0.067)	0.202** (0.067)	0.210** (0.067)	0.205** (0.068)
Observations	21250	21250	18007	18007

Note: Coefficients from fixed-effects logistic regression models are reported. Fixed-effects estimation accounts for time-invariant unobserved heterogeneity by conditioning on within-individual variation; time-invariant variables (e.g., gender, education) are therefore excluded. The reduced sample sizes reflect the exclusion of individuals with no within-person variation in the outcome variable (N = 21,250 for poor self-rated health; N = 18,007 for depression). Models 1 and 3 include control variables but exclude social insurance contribution. Models 2 and 4 additionally control for social insurance contribution. Interaction terms between living alone and age categories (C2–C4) are included to test whether the association between living alone and health outcomes varies by age group. Standard errors in parentheses. Reference categories are as follows: multi-person household (Living Alone), never married (Ever Married), not in labor force (Employment), and ages 20–26 (Age). Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A4. Random Effect (RE) Logistic Regression of Poor Self-Rated Health Status and Depression among Young Households in South Korea, 2005–2019 (Ages 20–39/By 5 year-categories) (Coefficients)

	(1) Poor Self-rated Health Status	(2) Poor Self-rated Health Status w/ Social Ins. Cont.	(3) Depression	(4) Depression w/ Social Ins. Cont.
Living Alone	0.569** (0.208)	0.390 (0.207)	0.563** (0.188)	0.326 (0.186)
Age (ref. 20~24 years old)				
25~29 years old (C2)	0.133 (0.069)	0.133 (0.069)	0.111 (0.071)	0.118 (0.072)
30~34 years old (C3)	0.418*** (0.081)	0.424*** (0.080)	-0.023 (0.084)	-0.003 (0.083)
35~39 years old (C4)	0.716*** (0.086)	0.757*** (0.085)	-0.248** (0.090)	-0.188* (0.089)
Living Alone * C2	-0.161 (0.234)	-0.155 (0.232)	-0.373 (0.228)	-0.357 (0.226)
Living Alone * C3	-0.185 (0.245)	-0.142 (0.242)	-0.618* (0.258)	-0.559* (0.255)
Living Alone * C4	-0.401 (0.251)	-0.339 (0.249)	-0.010 (0.251)	0.062 (0.248)
Woman (= 1)	0.131** (0.046)	0.155*** (0.046)	0.411*** (0.051)	0.439*** (0.051)
Education (ref. ~HS graduation)				
Junior/Vocational College	-0.380*** (0.065)	-0.294*** (0.065)	-0.621*** (0.070)	-0.515*** (0.070)
University	-0.629*** (0.062)	-0.467*** (0.064)	-0.937*** (0.067)	-0.728*** (0.068)
More than Graduate School	-0.534*** (0.145)	-0.334* (0.146)	-0.994*** (0.150)	-0.730*** (0.150)
Ever Married (=1)	-0.261*** (0.066)	-0.266*** (0.065)	-0.214** (0.070)	-0.230*** (0.068)
Employment (ref. Not in labor force)				
Employed	-0.318*** (0.045)	-0.277*** (0.045)	-0.277*** (0.050)	-0.226*** (0.050)
Unemployed	0.065 (0.089)	0.053 (0.089)	0.444*** (0.087)	0.426*** (0.086)
Student (= 1)	-0.433*** (0.084)	-0.467*** (0.084)	-0.442*** (0.089)	-0.490*** (0.089)

Social Insurance Contribution		-0.013*** (0.002)		-0.018*** (0.002)
Low-Income Household (= 1)	0.756*** (0.058)	0.598*** (0.060)	0.769*** (0.060)	0.565*** (0.062)
Panel Cohort (Original = 1)	-0.023 (0.088)	-0.053 (0.088)	0.246** (0.095)	0.205* (0.095)
Constant	-2.413*** (0.116)	-2.185*** (0.119)	-2.543*** (0.122)	-2.229*** (0.127)
Insig2u	0.530*** (0.057)	0.504*** (0.057)	0.574*** (0.054)	0.522*** (0.053)
Observations	48058	48058	48058	48058

Note: Coefficients from random-effects logistic regression models are reported. This table replicates the main age-interaction analysis (Table 5) using alternative five-year age categories (20–24, 25–29, 30–34, 35–39) in place of the four broader categories used in the main analysis, as a robustness check for age operationalization. Models 1 and 3 include all control variables but exclude social insurance contribution. Models 2 and 4 additionally control for social insurance contribution. Interaction terms between living alone and age categories (C2–C4) are included to test whether the association between living alone and health outcomes varies by age group. All models include year fixed effects. Standard errors in parentheses. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), high school graduation or less (Education), and ages 20–24 (Age). Data source: Korea Welfare Panel Study (KoWePS).

* $p < .05$, ** $p < .01$, *** $p < .001$

Table A5. Random Effect (RE) Logistic Regression of Poor Self-Rated Health Status and Depression among Young Households in South Korea, 2005–2019 (Ages 20–39/Continuous Age) (Coefficients)

	(1) Poor Health Status	(2) Poor Health Status	(3) Depression	(4) Depression
Living Alone	1.030* (0.477)	0.739 (0.474)	0.518 (0.503)	0.157 (0.498)
Age (in year)	0.055*** (0.006)	0.058*** (0.006)	-0.023*** (0.006)	-0.018** (0.006)
Living Alone * Age (in year)	-0.023 (0.015)	-0.018 (0.015)	-0.007 (0.017)	-0.002 (0.016)
Woman (= 1)	0.144** (0.047)	0.171*** (0.047)	0.399*** (0.051)	0.429*** (0.051)
Education (ref. ~HS graduation)				
Junior/Vocational College	-0.379*** (0.065)	-0.293*** (0.065)	-0.609*** (0.070)	-0.503*** (0.069)
University	-0.634*** (0.062)	-0.471*** (0.063)	-0.924*** (0.066)	-0.716*** (0.067)
More than Graduate School	-0.561*** (0.144)	-0.365* (0.145)	-0.954*** (0.150)	-0.695*** (0.150)
Ever Married (=1)	-0.302*** (0.067)	-0.315*** (0.066)	-0.185** (0.072)	-0.209** (0.070)
Employment (ref. Not in labor force)				
Employed	-0.329*** (0.045)	-0.289*** (0.045)	-0.270*** (0.050)	-0.222*** (0.050)
Unemployed	0.055 (0.089)	0.042 (0.089)	0.456*** (0.087)	0.437*** (0.086)
Student (= 1)	-0.360*** (0.083)	-0.382*** (0.082)	-0.538*** (0.087)	-0.574*** (0.086)
Social Insurance Contribution		-0.014*** (0.002)		-0.018*** (0.002)
Low-Income Household (= 1)	0.756*** (0.058)	0.598*** (0.060)	0.763*** (0.060)	0.558*** (0.062)
Panel Cohort (Original = 1)	-0.021 (0.088)	-0.051 (0.088)	0.247** (0.095)	0.206* (0.094)
Constant	-3.700***	-3.573***	-1.923***	-1.729***

	(0.190)	(0.191)	(0.197)	(0.198)
Insig2u	0.533*** (0.057)	0.510*** (0.057)	0.570*** (0.054)	0.517*** (0.053)
Observations	48058	48058	48058	48058

Note: Coefficients from random-effects logistic regression models are reported. This table replicates the main age-interaction analysis (Table 5) using continuous age (in years) in place of categorical age groups, as a robustness check for age operationalization. The interaction term between living alone and continuous age tests whether the association between living alone and health outcomes changes linearly with age within young adulthood (ages 20–39). Models 1 and 3 include all control variables but exclude social insurance contribution. Models 2 and 4 additionally control for social insurance contribution. All models include year fixed effects. Standard errors in parentheses. Reference categories are as follows: multi-person household (Living Alone), man (Woman), never married (Ever Married), not in labor force (Employment), and high school graduation or less (Education). Data source: Korea Welfare Panel Study (KoWePS).

* p < .05, ** p < .01, *** p < .001

Table A6. Attrition Analysis of Missing Data on Depression (n = 9,331) (Odds Ratio)

	(1)	(2)	(3)	(4)
	Baseline	M1 + Add Education	M2 + Household/Panel Controls	M3 + Self-Rated Health Status
Woman (= 1)	0.440*** (0.027)	0.439*** (0.027)	0.440*** (0.027)	0.434*** (0.027)
Age (ref. 20~26 years old)				
27~30 years old	0.752*** (0.029)	0.746*** (0.030)	0.763*** (0.030)	0.761*** (0.030)
31~34 years old	0.524*** (0.027)	0.517*** (0.027)	0.528*** (0.028)	0.523*** (0.028)
35~39 years old	0.342*** (0.020)	0.336*** (0.020)	0.340*** (0.020)	0.331*** (0.020)
Education (ref. ~HS graduation)				
College and University		0.947 (0.064)	0.999 (0.067)	1.024 (0.069)
More than Graduate School		1.114 (0.167)	1.190 (0.179)	1.221 (0.184)
Self-Rated Health Status				1.213*** (0.031)
Low-Income Household (= 1)			0.812* (0.081)	0.817* (0.081)
Panel Cohort (Original = 1)			1.558*** (0.099)	1.462*** (0.091)
Observations	51546	51546	51546	51546

Note: Odds ratios from logistic regression models predicting missingness on the depression variable are reported. The outcome variable is coded 1 if a respondent has missing data on the CES-D depression measure and 0 otherwise. The analysis is conducted at the individual level (n = 9,331 unique individuals) rather than the person-year level. Models are estimated sequentially: Model 1 includes gender and age only; Model 2 adds education; Model 3 adds household income stratum and panel cohort indicators; Model 4 adds self-rated health status. Odds ratios below 1.0 indicate that the characteristic is associated with lower likelihood of missing depression data (i.e., higher likelihood of valid response). Standard errors in parentheses. Reference categories are as follows: man (Woman), ages 20–26 (Age), and high school graduation or less (Education in three categories – High School Graduation or Less, College and University, and More than Graduate School). Data source: Korea Welfare Panel Study (KoWePS).

* p < .05, ** p < .01, *** p < .001