Social Science & Medicine 181 (2017) 122–130

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

The effect of employment transitions on physical health among the elderly in South Korea: A longitudinal analysis of the Korean Retirement and Income Study

Juyeon Lee, Myoung-Hee Kim*

People's Health Institute, 36, Sadang-ro 13-gil, Dongjak-gu, Seoul, 07004, South Korea

ARTICLE INFO

Article history:
Received 13 December 2016
Received in revised form
27 February 2017
Accepted 1 April 2017
Available online 3 April 2017

Keywords:
South Korea
Retirement
Aging
Employment transitions
Subjective physical health
Fixed effects models

ABSTRACT

This study aims to answer three research questions: First, is the positive effect of retirement on physical health replicated in Korea? Second, is there any difference in health effects of employment transition according to employment status? Third, to what extent do monetary, non-monetary and work-related factors explain the effects of employment transitions on changes in physical health? The longitudinal panel data from five waves of the Korea Retirement and Income Study was used. We conducted (a) the pooled cross-sectional analysis, which used five-wave pooled data; and (b) the fixed-effects analyses to investigate how within-individual changes in employment status correspond to changes in subjective physical health among older adults aged 55 to 84. Results show that transition into retirement leads to poor physical health in Korea, and such effect was moderately mediated by both monetary and non-monetary factors. Compared to respondents who moved to non-precarious employment, those who became employers, self-employers, precarious workers, and unpaid family workers experienced significantly greater odds of reporting subjective poor physical health. Job dissatisfaction seems to be the most important mechanism through which employment transitions were translated into increasing likelihood of poor physical health. In conclusion, the social cost of retirement should consider the negative effects of retirement on the well-being and psychological health of retired individuals and their relationships with family, friends and neighbors, as well as income loss and economic uncertainty. Improving employment quality and working conditions for older working adults may be crucial in accomplishing longer and healthier working lives.

1. Introduction

Apart from a few Western countries with a strong social security system, middle-aged and older adults after retirement remain among the most socially and economically vulnerable groups in many countries. In countries with traditional family ethics, continued labor market participation well beyond the conventional retirement age became not optional but essential to make up for their income loss. It becomes more widespread as the number of adult children who provide their elderly parents with either care or financial support has decreased (Allen et al., 2011). Faced with a rapidly aging population and the ensuing risk of the financial sustainability of the pension system, the focus of policy interventions has moved to encouraging longer working lives. Many countries that previously had generous public pension systems have extended age of entitlement, reduced pension benefits and eliminated incentives for early retirement (Blöndal and Scarpetta, 1999; OECD, 2015). Despite the significant policy interests in expanding job opportunities and improving employability of older workers, the effects of employment type and quality on health among the middle-aged and older adults have not been properly examined.

A great number of studies have examined the effects of retirement on health status. Many efforts have been made to determine causality by using longitudinal panel data, whereby retirement represents a predictor rather than a consequence of poor health (Berkman et al., 2014). Previous studies that are dominantly conducted in high-income countries have produced a consistent finding with improvements in mental health and well-being after

* Corresponding author.
E-mail addresses: leejuy0802@gmail.com (J. Lee), mhkim1871@gmail.com (M.-H. Kim).

http://dx.doi.org/10.1016/j.socscimed.2017.04.002
0277-9536/

retirement (Gayman et al., 2013; Jokela et al., 2010; Latif, 2011; Mein et al., 2003; Westerlund et al., 2010). In contrast, conflicting evidence was found for the effect of retirement on physical health with some showing a beneficial effect on physical health and reduction in functional limitations or physical fatigue after retirement (van Zon et al., 2016; Westerlund et al., 2009, 2010), while others found no significant effects on physical health after retirement (Ekerdt et al., 1983; Gayman et al., 2013; Jokela et al., 2010; Mein et al., 2003).

To the best of our knowledge, however, systematic studies of health effects of retirement in countries other than United States and European countries are still lacking. The health effect of retirement may well depend on contextual factors including adequacy of pension benefit and its population coverage in a specific country as well as individual factors such as wealth, marital status, social capital and employment status prior to retirement. Furthermore, studies on employment status in old age heavily focus on retirement rather than other employment choices such as precarious employment and self-employment that are predominant among the elderly working populations. Although the adverse effects of precarious employment on health have been extensively documented, this is limited to waged workers and workers between the age of 15–64 in general. Given the marked difference in employment structure by each age group, analysis tailored to the middle-aged and older adults is needed to better understand the association between employment status and quality and health in later life.

South Korea (hereafter, Korea) provides a particularly relevant setting for studying the effects of employment transitions on health in middle-aged and older adults in a non-Western context. First, Korea represents a group of countries that accomplished unprecedented economic growth without sufficient investment in a public pension system. Second, a filial piety ethos which emphasize unconditional respect and care for parents has rapidly waned over time; the National Social Statistics Survey indicates that the proportion of respondents who support family responsibility for caring their aged parents has substantially reduced from 89.9% in 1998 to 31.8% in 2014 (Kim, 2016). Accordingly, Korea ranked first in employment rate for the age group 65 and over among the OECD countries (male 42.1%, female 23.5%) and ranked second in effective age of retirement where men fully leave the labor market at the age of 71.1 years and 69.8 years for women (OECD, 2015, 2016). Given that the average age of retirement from a primary career is 54.1 in Korea, the extended gap of 17 years represents a substantial amount of time to be filled by being self-employed or reemployed in temporary or daily positions, presumably wandering from one job to another.

In the Korea-specific context, there have been only a limited number of studies regarding retirement and health. Kim et al. (2016) found that those retired were more likely to perform physical activity and less likely to engage in heavy smoking and drinking compared to their employed counterpart. Nevertheless, we still cannot be sure that behavioral changes after retirement do necessarily lead to subsequent changes in health outcomes. Few limited studies in Korea have consistently reported a decline in self-reported health after retirement, which is in contrast to the results from the aforementioned studies in Western countries (Choi et al., 2008; Seok, 2011). With respect to depressive symptoms, employment was associated with less depressive symptoms only among young adults aged between 45 and 64, but not among older men over the age of 65 (Jang et al., 2009). In a study by Lee and Smith (2009), regardless whether retirement occurs due to a mandatory retirement policy or a voluntary retirement for pursuing more leisure time, there has not been a significant difference in CES-D scores between retirees and current workers. For those who have retired due to reasons other than leisure, retirement was associated with higher risk of depressive symptoms. However, due to the cross-sectional design, the previous studies could not determine the causal relationship between retirement and health (Choi et al., 2008; Jang et al., 2009; Lee and Smith, 2009). Another important gap in research lies in identifying potential mechanisms through which retirement negatively affects health in old age.

Two theoretical models provide potential explanations about how retirement affects health among the Korean elderly. First, the economic deprivation theory explains aggravated financial strain and uncertainty as well as a reduction in absolute household income after retirement might reduce access to material resources relevant to health, thereby leading to a deterioration in health outcomes (Janlert and Hammarström, 2009). Second, Jahoda's theory of latent function complements the economic deprivation theory by emphasizing the non-financial benefits of work including a routine time structure and regular activities, social contact, participation in a collective purpose and self-esteem which explains the harmful effects of unemployment or retirement on health (Jahoda, 1982; Warr, 1987). In the present study, we will consider both monetary and non-monetary factors as potential factors that mediate the deteriorating effect of retirement on health in the Korea-specific context. In addition, we will focus on the potential for job satisfaction to mediate the impact of employment status on change in subjective physical health.

The present study used longitudinal panel data from the Korea Retirement and Income Study that contains repeated observations on the same individuals from 2005 to 2013. We conducted (1) the pooled cross-sectional model, which used five-wave pooled data; and (2) the fixed-effects model, which focus on within-individual comparison. The fixed effects approach is used to investigate how within-individual changes in employment status including transition to retirement and other types of employment status (exposure) correspond to changes in subjective physical health (outcome) among older adults aged 55 to 84. Since the fixed effect analysis solely relies on within-individual comparison, it helps predict potential effects of changes in employment status on individual health, when adjusted for individual heterogeneity (Allison, 2012; Gunasekara et al., 2014). Based on the two theoretical models of how retirement affects health in old age, we also considered relevant monetary and non-monetary factors available in our data - household income, satisfaction with financial status, satisfaction with overall life, relationship with family, neighbors and friends, mental health status, and job satisfaction - to directly examine their potential mediating roles.

In short, in this study we aim to answer three research questions: First, is the positive effect of retirement on physical health replicated in Korea? Second, is there any difference in health effects of employment transition according to employment status? Third, to what extent do monetary, non-monetary and work-related factors explain the effects of employment transitions on changes in physical health?

2. Materials and methods

2.1. Data and sample

We used data from the Korean Retirement and Income Study (hereafter, KReIS), a nationally representative longitudinal survey of households with at least one family member aged 50 and above and their spouses or legal partners. The KReIS was launched in 2005 with the primary purpose of tracking the retirement status and income security of middle-aged and older adults in an era of rapidly aging population in Korea. Thus, KReIS contained detailed information on financial status, employment status, retirement and its

preparation, family relations, health and life satisfaction. The KReIS surveyed 8567 individuals from 5109 households at baseline (2005) selected by using a stratified cluster sampling design from the 10% sample of non-institutionalized and urban residents aged 50 years and older in the Korean Population and Housing Census in 2000. Follow-up surveys were conducted every other year, and data from the 1st to 5th waves (2005, 2007, 2009, 2011 and 2013) were available at the time of the study and the follow-up rate was 73.4% at the 5th wave.

We used both individual- and household-level data from the 1st through the 5th wave. To assess the effect of retirement on health, the study population included only individuals aged 55 to 84 based on the fact that the average age of retirement from a primary career is 54.1 in Korea (Moon et al., 2006). To address reverse causality where retirement represents a consequence of poor health rather than a predictor of poor health, we limited our study population to those who were working at the baseline (n = 11,103), and excluded those who retired primarily due to ill-health in the following years (n = 1194). We further excluded the unemployed who are actively searching for employment but unable to find work (n = 93). Thus, our original sample included 9816 observations from 2538 individuals over the five waves. Excluding observations with missing values for study variables (n = 285), our final sample consisted of 9531 observations from 2528 individuals.

2.2. Measures

2.2.1. Subjective physical health

The self-reported physical health status, our major outcome variable, was measured through a single survey question: "In general, how would you estimate that your physical health is?" with responses ranging from very poor (1) to very good (5) on a 5-point scale. We used dichotomous outcome variable of self-reported poor physical health by defining responses including poor and very poor as 1 and otherwise 0.

2.2.2. Employment transition

For a key independent variable, we used three different specifications of employment status by classifying into (a) two categories: currently working and retirees, (b) three categories: waged workers, employers with or without employees, and retirees, (c) six categories: employers with employees (hereafter, employers), employers without any employees (hereafter, self-employers), waged workers in non-precarious employment (hereafter, non-precarious workers), waged workers in precarious employment (hereafter, precarious workers), unpaid family workers, and retirees. In our study, retirees were defined as those who are not currently working and report being fully retired. The waged workers were classified into precarious and non-precarious workers based on the term of a contract: precarious workers include temporary, contingent or daily workers whose term of a contract is less than one year, and non-precarious workers were defined as permanent workers whose term of a contract is more than one year. The unpaid family workers were defined as those working more than 18 h a week without pay in a 'family businesses'.

2.2.3. Mediating factors

As potential mediators, we considered the effects of (a) monetary, (b) non-monetary, and (c) work-related factors. For monetary effects, the equivalized household income was calculated by dividing the sum of household income in the last year from all sources including earnings, interest, rent, and dividends by the square root of the number of household members who are economically dependent on each other (Förster, 1994). Along with the absolute measure of financial status, satisfaction with financial status with five categories of response from 1 = very dissatisfied to 5 = very satisfied was also included and treated as a continuous variable. For non-monetary effects, five psychosocial variables were included and treated as a continuous variable; self-reported mental health status with a five-category ordinal scale from 1 = very poor to 5 = very good, satisfaction with overall life with a five-category ordinal scale from 1 = very dissatisfied to 5 = very satisfied and three factors with respect to social and family relations including relationships with family, friends and neighbors, based on responses to a six-category ordinal scale ranging from 0 = not applicable, 1 = very dissatisfied to 5 = very satisfied. Finally, job satisfaction with six categories of response from 0 = not applicable for retirees, 1 = very dissatisfied to 5 = very satisfied were included as a measure of working condition and treated as a continuous variable.

2.2.4. Covariates

Covariates included age, sex, marital status (with or without spouse) and education level (below junior high school graduation, below high school graduation, and above college). We also included the wave variable from 1 to 5 to control for the wave-specific effects.

2.3. Statistical analysis

We first examined general characteristics of the sample and determined the prevalence of self-reported poor physical health and distribution of confounding variables by each employment status. The statistical differences between employment status for potential mediators (monetary factors: household income, satisfaction with financial status; non-monetary factors: overall life satisfaction, mental health status, relationships with family, friends and neighbors; and job satisfaction) were tested with Analysis of Variance test.

Then we conducted (a) the pooled cross-sectional model, which used five-wave pooled data; and (b) the fixed-effects model, which focus on within-individual comparison across the five waves by controlling for unmeasured time-invariant confounders. In the pooled cross-sectional model, we used the full sample of 9531 observations from 2528 individuals to estimate a series of regression models of self-reported poor physical health as a function of employment status while adjusting for confounding variables. Three different specifications of employment status were used in separate models to estimate their effects on the subjective physical health. Complex survey design parameters, including cross-sectional sampling weights and a cluster variable were incorporated into these three models. Then we examined whether the results from the cross-sectional analyses are robust in the fixed-effects models.

The fixed effects approach is used to investigate how within-individual changes in employment status (exposure) correspond to changes in subjective physical health (outcome) throughout the five waves. Since the fixed effect analysis solely relies on within-individual changes, it helps predict potential effects of changes in employment status on individual health, when adjusted for individual heterogeneity (Allison, 2012; Gunasekara et al., 2014). The fixed-effect model allows control of time-invariant individual characteristics such as gender and educational attainment and other innumerable and immeasurable characteristics of individuals that might affect the exposure-outcome association. We also adjusted for measured time-varying confounding such as marital status by including it as a covariate into the fixed-effects models. In the present study, 1177 subjects with 3741 observations were excluded from the fixed-effects analysis because they had

consistently a 1 or 0 for the binary outcome of their poor subjective physical health throughout the observation periods. If we know that a person had poor subjective physical health at all the observation periods or at none of the periods, there is no variation in employment status to explain (Allison, 2012). Thus the fixed-effects logistic estimation in SAS uses only information from 1351 subjects who, in our study, have experienced any changes in the binary outcome of their poor subjective physical health. The odds ratios of having poor subjective physical health for changes into a particular employment status were presented with a reference group of non-precarious employment.

A total of five models were fit for the fixed-effect analysis. The first model estimated the direct effect of employment transitions on changes in subjective physical health. We also investigated whether potential mediators could explain the effects of employment transitions on subjective physical health among the older adults by adding monetary, non-monetary, and work-related factors one at a time in Model 2, 3 and 4. The final model included all the potential mediators.

3. Results

3.1. General characteristics of the study population

Summary statistics for 9531 observations from our full sample of 2528 subjects who were working at the baseline (1st wave) and 5790 observations from the restricted sample of 1351 subjects who had experienced at least one change in self-reported physical health throughout the observation periods (2005, 2007, 2009, 2011, 2013) are presented in Table 1. In the full sample, self-employers were the most common type, making up over 40% of the older working population in Korea, followed by unpaid family workers (17%), precarious workers (16.4%), non-precarious workers (10.9%), and employers (2.9%). The self-employers mainly worked for skilled-agricultural and fishery jobs and sales whereas precarious workers were dominantly in unskilled occupations such as cleaners, helpers, food preparation assistants and laborers in construction, manufacturing and transport. In the meantime, there were only about 10.5% of the middle-aged and older adults who were fully retired due to reasons other than ill health. For self-reported physical health, 33.1% and 4.7% of the respondents reported “poor” and “very poor”, respectively. Compared with the full sample, the restricted sample included higher proportion of unpaid family workers (20.5%) and lower proportion of subjects who were non-precarious workers (8.5%). The restricted sample also had greater proportions of subjects who reported “poor (41.6%) and “very poor” (4.7%) for their physical health as compared to the full sample.

Table 2 shows the cross-sectional prevalence of self-reported poor physical health for the six-employment status. In the full sample, the prevalence of self-reported poor physical health was higher for unpaid family workers (50.2%), self-employers (39%), retirees (36%) and precarious workers (35.6%) compared to employers (25.4%) and non-precarious workers (22.6%). Compared with the full sample, the gaps between non-precarious workers and other groups except employers became smaller.

Table 1
Summary statistics of study variables.

Variable	Full sample (N = 9531 [2,528subjects])		Restricted sample (N = 5790 [1351 subjects])	
	Freq./Mean	% or SD	Freq./Mean	% or SD
Employment status				
Employers	280	2.9	118	2.0
Self-employers	4039	42.4	2501	43.2
Non-precarious workers	1034	10.9	490	8.5
Precarious workers	1561	16.4	894	15.4
Unpaid family workers	1621	17.0	1187	20.5
Retirees	996	10.5	600	10.4
Self-reported physical health				
Very poor	446	4.7	273	4.7
Poor	3159	33.1	2408	41.6
Neither	2817	29.6	1702	29.4
Good	2850	29.9	1332	23.0
Very good	259	2.7	75	1.3
Other covariates				
Age (mean, SD)	66.1	6.0	66.6	6.0
Sex (Male)	5482	57.5	3012	52.0
Marital status (with spouse)	7791	81.7	4691	81.0
Education				
<= Junior high school	7446	78.1	4843	83.6
High school	1530	16.1	752	13.0
>=College	555	5.8	195	3.4
Monetary mediators				
ln(Household income)	9.20	1.13	9.14	1.06
Satisfaction with financial status	2.85	0.89	2.8	0.87
Non-monetary mediators				
Satisfaction with overall life	3.28	0.67	3.24	0.65
Self-reported good mental health	3.34	0.87	3.27	0.86
Satisfaction with family relations	3.72	0.72	3.70	0.72
Satisfaction with friend relations	3.65	0.71	3.64	0.71
Satisfaction with neighbor relations	3.68	0.67	3.68	0.66
Work-related mediator				
Job satisfaction	2.78	1.23	2.73	1.20

Note: the full sample was used for the cross-sectional model, whereas the restricted sample was used for fixed-effects logistic regression estimation. Frequency and column percentages are presented for categorical variables, and means and standard deviations are presented for continuous variables. ln = natural logarithm. Unit of equivalized household income: 1000 won.

Table 2
Self-reported poor physical health (Poor SPH; %) by employment status.

Employment status	Full sample (N = 9531 [2,528subjects])		Restricted sample (N = 5790 [1351 subjects])	
	N	Poor SPH(%)	N	Poor SPH(%)
Employers	280	25.4	118	45.8
Self-employers	4039	39.0	2501	46.6
Non-precarious workers	1034	22.6	490	36.1
Precarious workers	1561	35.6	894	43.5
Unpaid family workers	1621	50.2	1187	52.9
Retirees	996	36.0	600	44.7

Note: the full sample was used for the cross-sectional model, whereas the restricted sample was used for fixed-effects logistic regression estimation.

3.2. Distribution of confounding variables and potential mediators

Table 3 shows the distribution of covariates and potential mediators by employment status. The retirees tended to be older (mean age: 67.8 years) than other groups, followed by self-employers (67.1), unpaid family workers (66.4), employers (64.8), precarious workers (64.6) and non-precarious workers (62.3). Male workers were predominant in all employment categories except for unpaid family workers, 96% of whom were women. The proportion of female workers was relatively greater in precarious workers (44.7%). For marital status, precarious workers were less likely to be living with a spouse (75%), while employers (85%) and unpaid family workers (93.7%) were more likely to have a spouse. For education, the proportion of college graduation was the highest among employers (28.2%), followed by non-precarious workers (15.6%), retirees (12.2%), self-employers (3.4%), precarious workers (3.3%) and unpaid-family workers (0.4%).

All the potential mediators showed significantly different distributions across employment status ($p < 0.001$). Precarious workers and retirees showed poorer conditions in all the potential mediators including monetary and non-monetary factors. Precarious workers (12.9%), self-employers (24.8%), retirees (24.7%) and unpaid family workers (26.7%) were less likely to report 'satisfied' or 'very satisfied' with their financial status compared to the employers (44.6%) and non-precarious workers (29.9%). For all the five non-monetary factors, precarious workers and retirees were less likely to report satisfaction compared to the other four groups. Unpaid family workers had relatively lower satisfaction with overall life (35.7%) and mental health (40%) but higher satisfaction with family (77.9%), friend (66.8%) and neighbor relations (75.8%). For job satisfaction, the higher proportions of non-precarious workers (50.6%) and employers (50.7%) reported 'satisfied' or 'very satisfied' while self-employers (34%), precarious workers (27.3%) and unpaid-family workers (24.4%) were less likely to satisfy with their jobs.

3.3. Results of the regression models

The results from the pooled cross-sectional analysis and fixed-effects analysis are presented in Table 4, separated into the three different specifications of employment status. The odds ratios were adjusted for confounding factors including wave, age, sex, marital status and educational level. Retirement was significantly associated with poor physical health compared to continued working (adjusted OR: 1.62, 95% CI: 1.38–1.91). Meanwhile, there was a significant heterogeneity within the currently working older adults. In using classification 2, the odds of reporting poor physical health was greater for self-employers compared to waged workers (adjusted OR: 1.18, 95% CI: 1.04–1.35). When we further divided employment status into six categories in classification 3, the adjusted odds of reporting poor physical health were greater than 1 and statistically significant in precarious employment, unpaid family work, self-employment and retirement compared to non-precarious employment. These patterns of association between employment status and subjective poor physical health were robust in the fixed-effects analysis. In contrast to the pooled cross-sectional analysis, the odds of reporting poor physical health also became statistically significant in respondents who moved into employers (adjusted OR: 1.92, 95% CI: 1.03–3.58).

Table 5 presents the results from the mediation analysis using the fixed-effects models. In model 2 and 3, where employment status was included separately with monetary and non-monetary factors, the risks of reporting poor physical health were moderately attenuated for respondents who moved into retirement, unpaid family work and precarious employment, and declined only slightly for those who became self-employers and employers. The percentages of changes in adjusted ORs for those who became self-employers, precarious workers, unpaid family workers and retirees were more substantial in model 2 (3.1%, 6.7%, 9.7%, 9.0%) than model 3 (1.2%, 1.2%, 0.0%, 8.7%). For those who became employers, non-monetary factors added to model 3 did not reduce the adjusted ORs but rather strengthened the odds of reporting poor physical health compared to non-precarious employers (2.14, 95% CI: 1.09–4.18).

Meanwhile, in Model 4 where job satisfaction was included, the adjusted ORs were substantially reduced for all employment status. The percentages of changes in adjusted ORs for all the employment status were greater than 10%. In model 5, where all the variables were included, we found adjusted ORs consistently greater than 1 with statistical significance for those who became precarious workers (adjusted OR: 1.49, 95% CI: 1.05–2.11) and unpaid family workers (adjusted OR: 2.36, 95% CI: 1.44–3.85). Among potential mediators, satisfaction with financial status, overall life satisfaction, self-reported mental health status and job satisfaction showed significant negative associations with subjective poor physical health even after all other variables were included, indicating that they were independent risk factors for self-reported poor physical health among the elderly population. On the contrary, satisfaction with family and neighbor relations showed positive association with subjective poor physical health.

4. Discussion

Our major findings are as follows: (a) transition into retirement leads to poor physical health in Korea, and such effect was moderately mediated by both monetary and non-monetary factors; (b) compared to respondents who moved to non-precarious employment, those who became employers, self-employers, precarious workers, and unpaid family workers experienced significantly greater odds of reporting subjective poor physical health; (c) these effects of employment transitions on changes in subjective poor physical health were more substantially mediated by monetary factors than non-monetary factors. However, job dissatisfaction seems to be the most important mechanism through which employment transitions were translated into changes in subjective poor physical health. We now discuss our findings in more detail.

Our result that transition into retirement leads to poor physical health is unique and inconsistent with the previous studies conducted mostly in Western countries where either improvements or no effects in physical health were observed after retirement (Ekerdt et al., 1983; Gayman et al., 2013; Jokela et al., 2010; Mein et al., 2003; van Zon et al., 2016; Westerlund et al., 2009, 2010). By using data from the Whitehall II study, Jokela et al. (2010) found that physical health was improved after statutory and early voluntary

Table 3
Distribution of confounding variables and potential mediators by employment status.

Potential mediators	Employers	Self-employers	Non-precarious workers	Precarious workers	Unpaid family workers	Retirees
Confounders						
Age (Mean)	64.8	67.1	62.3	64.6	66.4	67.8
Sex (Men, %)	80.0	73.0	74.5	55.3	4.4	60.9
Marital status (with spouse, %)	85.0	79.4	84.7	75.0	93.7	78.3
Education (college graduation, %)	28.2	3.4	15.6	3.3	0.4	12.2
Monetary mediators						
ln(Household income) (mean)	9.66	9.15	9.55	9.16	9.11	9.08
Satisfaction with financial status						
Very dissatisfied	3.2	5.5	3.4	8.4	4.3	6.9
Dissatisfied	20.4	27.8	28.1	42.6	26.8	29.0
Neither	31.8	42.0	38.5	36.1	42.3	39.4
Satisfied	39.6	23.6	28.2	12.4	25.0	22.0
Very satisfied	5.0	1.2	1.7	0.5	1.7	2.7
Non-monetary mediators						
Satisfaction with overall life						
Very dissatisfied	0.4	0.7	0.1	0.6	0.9	0.8
Dissatisfied	6.8	9.0	6.1	14.4	8.4	10.0
Neither	35.0	50.0	48.7	57.7	55.0	53.4
Satisfied	54.6	39.3	43.8	26.9	35.0	34.4
Very satisfied	3.2	0.9	1.3	0.3	0.7	1.3
Self-reported good mental health						
Very poor	1.1	2.2	1.2	1.6	1.8	1.6
Poor	12.5	16.0	11.6	16.7	19.9	12.2
Neither	31.8	32.8	31.8	34.4	38.3	37.6
Good	41.4	43.2	47.5	42.2	36.3	44.0
Very good	13.2	5.8	7.9	5.1	3.7	4.7
Satisfaction with family relations						
N/A (=0)	0.0	0.8	0.8	1.0	0.2	1.6
Very dissatisfied	0.4	0.4	0.1	0.5	0.1	0.4
Dissatisfied	1.4	2.5	2.4	4.6	1.8	3.9
Neither	18.2	23.0	27.7	34.0	19.9	35.1
Satisfied	65.7	65.2	61.6	56.1	69.3	51.3
Very satisfied	14.3	8.2	7.5	3.8	8.6	7.6
Satisfaction with friend relations						
N/A (=0)	0.0	0.3	0.2	0.9	0.9	1.0
Very dissatisfied	0.4	0.1	0.0	0.1	0.5	0.5
Dissatisfied	2.1	3.0	2.4	5.4	3.0	3.8
Neither	22.5	28.3	31.2	38.6	28.9	41.4
Satisfied	66.1	60.6	60.6	51.4	59.9	47.4
Very satisfied	8.9	7.6	5.5	3.6	6.9	5.9
Satisfaction with neighbor relations						
N/A (=0)	0.0	0.1	0.2	0.3	0.0	0.5
Very dissatisfied	0.0	0.2	0.1	0.2	0.2	0.7
Dissatisfied	1.8	2.4	3.5	5.1	1.3	5.6
Neither	30.4	26.9	38.4	40.9	22.7	43.7
Satisfied	63.2	62.3	53.1	50.2	67.2	45.2
Very satisfied	4.6	8.2	4.7	3.3	8.6	4.3
Work-related mediators						
Job satisfaction						
N/A (=0)	0.0	0.0	0.0	0.0	0.0	100.0
Very dissatisfied	0.7	2.7	0.6	1.9	2.8	0.0
Dissatisfied	17.1	20.7	10.7	25.4	25.6	0.0
Neither	31.4	42.7	38.1	45.4	47.2	0.0
Satisfied	44.3	32.0	46.1	26.1	23.7	0.0
Very satisfied	6.4	2.0	4.5	1.2	0.7	0.0

Note: Observations in the full sample (N = 9531) were used. The number in each cell is the column percentage within each potential mediating factor. All the mediators including monetary, non-monetary and work-related factors were treated as continuous variable in the fixed effect analysis. Thus, Analysis of Variance tests were conducted for the eight associations between mediators and employment status, $p < 0.0001$. ln = natural logarithm. Unit of equivalized household income: 1000 won.

retirement whereas retirement due to ill health was associated with poor physical functioning. Meanwhile, Mein et al. (2003) identified no difference in physical health decline between those who continued to work and those who retired in the Whitehall II study. The physical health of those who retired in poor health had rather improved over time. These studies, however, only included British civil servants who have worked under favorable working conditions and were provided with adequate pension. Retirement might be beneficial to their health by relieving job-related stress and decreasing opportunity costs of time, thereby encouraging additional leisure physical activities and health care utilization (Grossman, 1972). More recently in United States, van Zon et al. (2016) also identified a declining rate of increase in functional limitations after retirement using data from the Health and Retirement Study from 1992 to 2012. Then, why does retirement lead to poor health in Korea?

Multiple fixed-effect analyses support two hypothetical mechanisms underlying the association between retirement and subjective poor physical health. First, in the present study, the effect of retirement was partially mediated by financial status measured in both absolute and relative terms. This supports the economic deprivation theory where financial strain and uncertainty after

Table 4
The estimated association between employment status and subjective al health obtained from pooled cross-sectional and fixed-effects models.

Employment status	Pooled cross-sectional		Fixed-effects	
	Adjusted OR[a]	95% CI	Adjusted OR[b]	95% CI
Classification 1				
Currently working (ref.)[c]	1	REF	1	REF
Retirees	1.62***	1.38–1.91	1.72***	1.345–2.18
Classification 2				
Waged workers (ref.)	1	REF	1	REF
Self-employers[d]	1.18**	1.04–1.35	1.36*	1.02–1.82
Retirees	1.82***	1.51–2.19	1.95***	1.49–2.55
Classification 3				
Non-precarious workers (ref.)	1	REF	1	REF
Employers	1.16	0.86–1.57	1.92*	1.03–3.58
Self-employers[d]	1.52***	1.26–1.82	1.61**	1.11–2.34
Precarious workers	1.45**	1.2–1.75	1.64**	1.19–2.27
Unpaid family workers	1.52**	1.2–1.91	2.79***	1.79–4.35
Retirees	2.29***	1.84–2.84	2.66***	1.89–3.75

*p < 0.05, **p < 0.01, ***p < 0.0001.
[a] Odds ratios adjusted for confounding factors including age, sex, marital status, education level, wave.
[b] Odds ratio adjusted for time-variant confounding factors (wave, marital status).
[c] The currently working includes all employment status except retirement.
[d] Self-employers include employers, self-employers and unpaid-family workers.

Table 5
Fixed-effects logistic regression of an older adult's subjective poor physical health.

	Model 1		Model 2			Model 3			Model 4			Model 5		
	OR[a]	95% CI	OR[a]	95% CI	% Diff[b]	OR[a]	95% CI	% Diff[b]	OR[a]	95% CI	% Diff[b]	OR[a]	95% CI	%Diff[b]
Employment status														
Non-precarious workers (ref.)	1	REF	1	REF		1	REF		1	REF		1	REF	
Employers	1.92*	1.03–3.58	1.91*	1.02–3.61	0.52	2.14*	1.09–4.18	−11.46	1.65	0.88–3.12	14.06	1.89	0.96–3.71	1.56
Self-employers	1.61*	1.11–2.34	1.56*	1.06–2.3	3.11	1.59*	1.06–2.39	1.24	1.3	0.89–1.91	19.25	1.41	0.94–2.13	12.42
Precarious workers	1.64**	1.19–2.27	1.53*	1.1–2.12	6.71	1.62**	1.15–2.29	1.22	1.41*	1.02–1.95	14.02	1.49*	1.05–2.11	9.15
Unpaid family worker	2.79***	1.79–4.35	2.52***	1.6–3.98	9.68	2.79***	1.72–4.52	0	2.11**	1.34–3.33	24.37	2.36**	1.44–3.85	15.41
Retired	2.66***	1.89–3.75	2.42***	1.7–3.44	9.02	2.43***	1.67–3.52	8.65	–	–	–	–	–	–
Monetary factors														
ln(Household income)			1.03	0.96–1.09								1.06	0.99–1.13	
Satisfaction with financial status			0.6	0.55–0.65								0.82	0.74–0.91	
Non-monetary factors														
Satisfaction with overall life						0.51	0.46–0.55					0.51	0.46–0.55	
Self-reported good mental health						0.44	0.38–0.5					0.54	0.47–0.63	
Satisfaction with family relations						1.17	1.04–1.31					1.18	1.05–1.33	
Satisfaction with friend relations						1.02	0.91–1.15					1.05	0.93–1.19	
Satisfaction with neighbor relations						1.19	1.05–1.36					1.21	1.06–1.37	
Job satisfaction									0.56	0.51–0.61		0.76	0.68–0.85	

*p < 0.05, **p < 0.01, ***p < 0.001.
[a] Odds Ratio was adjusted for time-variant variable (wave, marital status).
[b] Percentage of difference = (adjusted OR in model 1 - adjusted OR in extended model)/(adjusted OR in model 1)*100.

retirement might reduce access to material resources that improve health (Janlert and Hammarström, 2009). Secondly, the decline of physical health after retirement, which is unique in Korea, was also partially explained by non-monetary factors, notably poor mental health status, lower satisfaction with overall life, relationships with family, friends and neighbors. This supports the theory of latent function proposed by Jahoda (1982), that is, work provides not only financial but also non-financial benefits— such as a structured schedule and regular activities, social contact, participation in collective purpose, self-esteem. This reflects the Korean-specific features of strong work ethics. Given that Koreans put a heavy emphasis on having a fulfilling occupation and working the longest hours among the OECD countries, retirement might denote a loss of identity, self-esteem and lower opportunities for social contact that might lead to increasing life dissatisfaction and poor mental health status (Khang, 2007; Kim and Do, 2013; OECD, 2016).

Although continued working into older ages showed favorable impacts on subjective physical health, such effects were not the same across employment types. Compared to respondents who moved into non-precarious employment, those who became employers, self-employers, precarious workers and unpaid family workers experienced significantly greater odds of reporting poor physical health. These results were robust to different estimation methods (pooled cross-sectional vs. fixed-effects model). Monetary factors, particularly satisfaction with financial status, seem to be a more important mechanism rather than non-monetary psychosocial factors mediating the association between employment status and subjective physical health, especially for those who moved to precarious workers and unpaid family workers. However, we found that job dissatisfaction seems to be the most important mechanism through which employment transitions, notable transition into employers, self-employers, precarious workers and unpaid family workers, were translated into poor subjective physical health. The greatest reductions in adjusted ORs of reporting poor physical health were produced for all the employment status when job satisfaction variable was included, and the associations between employment status and subjective poor physical health lost statistical significance for employers and self-employers. These results

may imply that it is important to take into consideration employment quality in expanding job opportunities and improving employability of the older working population. The active aging policies would contribute to achieving healthy aging only if it expands employment opportunities in favorable working conditions for older adults who have the ability and desire to continue working.

Meanwhile, it is noteworthy that transitions into self-employers and unpaid family workers comprising the biggest proportion of the employment status among older adults in Korea as well as the present study (more than 50% of the older workforce) was associated with higher likelihood of reporting poor physical health compared to their non-precarious counterpart. For unpaid family workers, the odds of reporting poor physical health was even greater than those who moved into precarious employment. Although the self-employed and their unpaid family workers have shown better mental health and wellbeing and higher satisfaction in family, friend and neighbor relations, their job satisfaction was far lower than employers and non-precarious workers. Our findings confirmed the mediating effect of job satisfaction in the association between employment status and subjective physical health, particularly for the self-employment and their unpaid family workers. Despite the adverse health impacts of transitions into self-employment and unpaid family work, the large informal sector in the Korean labor market becomes normal. The government has focused on creating an enabling environment for these entrepreneurs to solve the chronic unemployment and overcome a prolonged period of slow economic growth. However, Korea is not the only country where informal sector drives the considerable part of the entire economy in the lack of quality jobs in the formal sector. Furthermore, women disproportionately engage in informal sector. In the present study, women represent 95.6% of the unpaid family workers, who work more than 18 h a week without pay in a 'family businesses'. This gender disparity in employment opportunities is also widespread across the low and middle-income countries in Asia and African regions.

Previous studies in Western societies have provided strong evidence on poor health indicators of self-employment. Benach et al. (2004) analyzed the third European Survey on Working Conditions 2000 and found that self-employers had higher likelihood of reporting job dissatisfaction, stress, fatigue, backache and muscular pains, but lower levels of health-related absenteeism than full-time permanent employees. Blanchflower (2004) found self-employers were less likely to feel satisfied in working hours, more likely to find their work stressful and have difficulties in maintaining work-and-family balance. In a study by Borrell et al. (2004), small employers and petit bourgeois were more likely to report poor health than manager and skilled supervisors due to their uncertain status and economic strain. In Korean-specific context, Jang et al. (2011) also found that self-employers aged 30–55 years had greater likelihood of having cardiovascular diseases and risk factors such as hypertension, diabetes mellitus and increased waist circumference than white-collar workers in a large scale shipbuilding company.

Despite the significant association between self-employment and poor physical health, we can still not be sure that this represents a causal relationship. Since there is a possibility that self-employment is endogenous and is chosen by the individuals, poor health may lead employees to make a transition into self-employment because they are able to continue working whilst having work-limiting health conditions (Zissimopoulos and Karoly, 2007). If this is true, poor physical health causes self-employment rather than the opposite. This selection bias holds for the association between transition into employers, unpaid family workers and precarious employment and changes in health status, too. Even so, the large proportion of older workforce in informal sector in Korea evidently shows that they become the last bastion for the middle-aged and older adults who desire to continue working even beyond their physical capability.

This study has several limitations. First, we did not consider heterogeneity in retirement characteristics. Voluntary retirement has a negligible effect on well-being through the trade-off between dissatisfaction with household income and satisfaction with free-time whereas involuntary retirement is associated with lower well-being (Bender, 2012; Bonsang and Klein, 2012; Dingemans and Henkens, 2015). Additionally, involuntary retirees are associated with a greater likelihood of smoking more and lower likelihood of drinking less alcohol than a non-retiree (Henkens et al., 2008). Thus, the adverse effect of retirement in this study may have been overestimated for voluntary retirement. If we disaggregate retirement into voluntary and involuntary retirement, then the negative effect of retirement on self-reported poor physical health might increase for the involuntary retirees and diminish for the voluntary retirees. In Korea, however, previous studies have found that both voluntary and involuntary retirement at mid- and old-age have significantly higher risk of poor health than their working counterpart despite the adverse effects being greater in involuntary retirement (Choi et al., 2008; Park and Kang, 2016; Seok, 2011). Secondly, the effect of retirement on self-reported physical health might differ by type of work and working conditions prior to retirement. Those who were doing physically demanding assignments are more likely to report better physical health after retirement. Thus, it would be important to consider employment history in investigating health effects of retirement. Thirdly, the present study only examined short-term changes in health after retirement. Although subjective physical health declined immediately after retirement, retirement might lead to long-term improvement in subjective health status among the older adults (Coe and Zamarro, 2011). Further research is needed to assess whether adverse health effect of retirement lasts longer. Finally, we only investigate job satisfaction as a measure of working conditions. Further research is needed, however, to understand potential mediators - for example, hours working each week and job insecurity - that might explain differences in health status among the older working adults.

Despite these limitations, findings from this research provides empirical evidence from Korea that retirement has adverse effects on subjective physical health, with these effects being moderately mediated by monetary and non-monetary factors. This suggests that, beyond income loss and the economic uncertainty, the social cost of retirement should consider the negative effects of retirement on the well-being and mental health of retired individuals and their relationships with family, friends and neighbors. Furthermore, given that there were significant differences in health status according to employment transitions, we can conclude that improving employment quality and working conditions for older working adults may be crucial in accomplishing longer and healthier working lives.

Acknowledgements

This study was supported by the Young Fellowship Program from the People's Health Institute, Korea. The data for this study was provided by the Korea National Pension Research Institute.

References

Allen, K., Bednárik, R., Campbell, L., Dieterich, A., Hirsch, E., Emilsson, T., 2011. Governance and Finance of Long-term Care across Europe. Overview report. University of Birmingham/European Centre for Social Welfare Policy and Research, Birmingham/Vienna.

Allison, P.D., 2012. Logistic Regression Using SAS: Theory and Application. SAS Institute.

Benach, J., Gimeno, D., Benavides, F.G., Martinez, J.M., del Mar Torné, M., 2004. Types of employment and health in the european union. Eur. J. Public Health 14, 314–321.
Bender, K.A., 2012. An analysis of well-being in retirement: the role of pensions, health, and 'voluntariness' of retirement. J. Socio-Economics 41, 424–433.
Berkman, L.F., Kawachi, I., Glymour, M.M., 2014. Social Epidemiology. Oxford University Press.
Blanchflower, D.G., 2004. Self-employment: More May Not be Better. National Bureau of Economic Research.
Blöndal, S., Scarpetta, S., 1999. The Retirement Decision in OECD Countries. OECD Economics Department Working Papers. OECD Publishing, Paris.
Bonsang, E., Klein, T.J., 2012. Retirement and subjective well-being. J. Econ. Behav. Organ. 83, 311–329.
Borrell, C., Muntaner, C., Benach, J., Artazcoz, L.a, 2004. Social class and self-reported health status among men and women: what is the role of work organisation, household material standards and household labour? Soc. Sci. Med. 58, 1869–1887.
Choi, S., Lee, G., Lee, S.-M., 2008. Effect of social networks and retirement on health of the Korean elderly. J. Korea Gerontol. Soc. 28, 291–307.
Coe, N.B., Zamarro, G., 2011. Retirement effects on health in Europe. J. Health Econ. 30, 77–86.
Dingemans, E., Henkens, K., 2015. How do retirement dynamics influence mental well-being in later life? A 10-year panel study. Scand. J. Work Environ. Health 41, 16–23.
Ekerdt, D.J., Baden, L., Bossé, R., Dibbs, E., 1983. The effect of retirement on physical health. Am. J. Public Health 73, 779–783.
Förster, M.F., 1994. Measurement of Low Incomes and Poverty in a Perspective of International Comparisons. OECD Labour Market and Social Policy Occasional Papers. OECD Publishing, Paris.
Gayman, M.D., Pai, M., Kail, B.L., Taylor, M.G., 2013. Reciprocity between depressive symptoms and physical limitations pre- and postretirement: exploring racial differences. J. Aging Health 25, 555–573.
Grossman, M., 1972. On the concept of health capital and the demand for health. J. Political Econ. 80, 223–255.
Gunasekara, F.I., Richardson, K., Carter, K., Blakely, T., 2014. Fixed effects analysis of repeated measures data. Int. J. Epidemiol. 43 (1), 264–269.
Henkens, K., van Solinge, H., Gallo, W.T., 2008. Effects of retirement voluntariness on changes in smoking, drinking and physical activity among Dutch older workers. Eur. J. Public Health 18, 644–649.
Jahoda, M., 1982. Employment and Unemployment: a Social-psychological Analysis. Press Syndicate of the University of Cambridge, New York.
Jang, K.-H., Park, W.-J., Kim, M.-B., Lee, D.-K., Chae, H.-J., Moon, J.-D., 2011. Comparison of cardiovascular disease status between large scale industry office and self employed male workers. Korean J. Occup. Environ. Med. 23, 130–138.
Jang, S.-N., Cho, S.-I., Chang, J., Boo, K., Shin, H.-G., Lee, H., et al., 2009. Employment status and depressive symptoms in Koreans: results from a baseline survey of the Korean longitudinal study of aging. J. Gerontol. Ser. B Psychol. Sci. Soc. Sci. 64B (5), 677–683.
Janlert, U., Hammarström, A., 2009. Which theory is best? Explanatory models of the relationship between unemployment and health. BMC Public Health 9, 235.
Jokela, M., Ferrie, J.E., Gimeno, D., Chandola, T., Shipley, M.J., Head, J., et al., 2010. From midlife to early old age: health trajectories associated with retirement. Epidemiol. Camb. Mass.) 21, 284.
Khang, S., 2007. Escape from the Workaholic Syndrome. Mayday, Seoul, South Korea.
Kim, J., Cha, S.-E., Kawachi, I., Lee, S., 2016. Does retirement promote healthy behaviors in young elderly Korean People? J. Behav. Health 5, 45–54.
Kim, M.H., Do, Y.K., 2013. Effect of husbands' employment status on their wives' subjective well-being in Korea. J. Marriage Fam. 75, 288–299.
Kim, Y., 2016. The family support and policy implications on support environment changes. Health Welf. Policy Forum 62–79.
Latif, E., 2011. The impact of retirement on psychological well-being in Canada. J. Socio-Economics 40, 373–380.
Lee, J., Smith, J.P., 2009. Work, retirement, and depression. J. Popul. Ageing 2, 57–71.
Mein, G., Martikainen, P., Hemingway, H., Stansfeld, S., Marmot, M., 2003. Is retirement good or bad for mental and physical health functioning? Whitehall II longitudinal study of civil servants. J. Epidemiol. community health 57, 46–49.
Moon, H.P., Kim, D.S., Yoon, H.S., Park, C.G., Lee, S.H., Lee, S.S., et al., 2006. Socio-economic Ripple Effect of Population Aging and Policy Agenda. Korea Development Institute, Seoul.
OECD, 2015. Pensions at a Glance 2015: OECD and G20 Indicators. OECD Publishing, Paris.
OECD, 2016. OECD Labour Force Statistics 2015. OECD Publishing, Paris.
Park, H., Kang, M.Y., 2016. Effects of voluntary/involuntary retirement on their own and spouses' depressive symptoms. Compr. Psychiatry 66, 1–8.
Seok, S.H., 2011. The effect of retirement on health. Q. J. Labor Policy 11, 81–102.
van Zon, S.K.R., Bültmann, U., Reijneveld, S.A., de Leon, C.F.M., 2016. Functional health decline before and after retirement: a longitudinal analysis of the Health and Retirement Study. Soc. Sci. Med. 170, 26–34.
Warr, P., 1987. Work, Unemployment, and Mental Health. Oxford University Press.
Westerlund, H., Kivimäki, M., Singh-Manoux, A., Melchior, M., Ferrie, J.E., Pentti, J., et al., 2009. Self-rated health before and after retirement in France (GAZEL): a cohort study. Lancet 374, 1889–1896.
Westerlund, H., Vahtera, J., Ferrie, J.E., Singh-Manoux, A., Pentti, J., Melchior, M., et al., 2010. Effect of retirement on major chronic conditions and fatigue: French GAZEL occupational cohort study. Bmj 341.
Zissimopoulos, J.M., Karoly, L.A., 2007. Transitions to self-employment at older ages: the role of wealth, health, health insurance and other factors. Labour Econ. 14, 269–295.