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Job displacement and social safety net on depressive symptoms in individuals aged 45 years or above: findings from the Korean Longitudinal Study of Aging

WOORIM KIM*†, YOUNG CHOI*†, TAE-HOON LEE*†, SUK-YONG JANG†‡, KYU-TAE HAN*† and EUN-CHEOL PARK†‡

ABSTRACT

This study aimed to investigate the relationship between the unemployment experience and depressive symptoms among mid-aged (ages 45–59) and elderly (ages 60 or above) persons and to examine further the effects of unemployment insurance, industrial accident compensation insurance (IACI) and national pension on the stated relationship. Data were used from the Korean Longitudinal Study of Aging (KLoSA) between 2006 and 2012. A total of 1,536 individuals employed at the 2006 baseline were followed. The association between employment status change during 2006 to 2008, 2008 to 2010 or 2010 to 2012 and depressive symptoms in years 2008, 2010 or 2012 were analysed using a generalised estimating equation model. Depressive symptoms were measured with the Center for Epidemiological Studies Depression Scale (CES-D 10) scale. The results showed that the 'employed to unemployed' group had statistically significant increases in depression scores in the mid-aged ($\beta = 0.4884$, $p = 0.0038$) and elderly ($\beta = 0.8275$, $p \leqslant 0.0001$) categories, compared to the 'employed to employed' group. Findings were maintained in groups without a social safety net. Contrastingly, the 'employed to unemployed' groups with unemployment insurance and IACI did not show statistically significant increases in depression scores. The 'employed to unemployed' category of individuals enrolled in the national pension system exhibited a lower increase of depression. Therefore, an enhanced focus on the mental health of unemployed individuals is required, in addition to the provision of a reliable social safety net.

KEY WORDS—job displacement, unemployment, depression, late-life depression, social safety net, ageing society.

* Department of Public Health, Graduate School, Yonsei University, Seoul, Republic of Korea.
† Institute of Health Services Research, Yonsei University, Seoul, Republic of Korea.
‡ Department of Preventive Medicine, Yonsei University College of Medicine, Seoul, Republic of Korea.

Background

Unemployment is an important public health problem associated with physical and psychological morbidity and increased mortality (Dooley and Catalano 1980; Ferrie *et al.* 2013). Previous studies have reported that job insecurity and unemployment are related to coronary heart disease (CHD), with newly unemployed individuals showing a higher risk of CHD (Lundin *et al.* 2014; Virtanen *et al.* 2013). Studies have also presented that unemployment increases mortality risk and that job displacement can lead to higher suicide rates (Bonamore, Carmignani and Colombo 2015; Milner, Page and LaMontagne 2013; Montgomery *et al.* 2013). Furthermore, unemployment has also been positively associated with poorer mental health and higher levels of depressive symptoms, which is particularly important as depression is currently one of the leading causes of disability (Lei *et al.* 2014; Paul and Moser 2009).

Regarding the relationship between unemployment and depression, the latent deprivation model proposed by Jahoda states that unemployed individuals become distressed because they lack the five latent functions of employment that serve important psychological needs, which are time structure, social contact, collective purpose, status and activity (Jahoda 1981). Distress results because unemployment leads to a deprivation of such characteristics. Contrastingly, Fryer proposed poverty as the main cause for unemployment distress since unemployment commonly results in material deprivation (Fryer 1992). According to this model, unemployment leads to poverty and powerlessness, which triggers adverse psychological reactions (Fryer 1992).

In line with these theoretical assumptions and previous findings citing unemployment as a risk factor for increased levels of depressive symptoms, the mental health effects of unemployment are often particularly pronounced in populations aged 45 or above. Work serves as an essential medium to interact with the society and to maintain adequate financial security among older aged individuals (Chu *et al.* 2016). Naturally, job displacement can induce financial and psycho-social burdens through financial instability and reductions in social interaction (Mandal, Ayyagari and Gallo 2011). Yet older workers often face a higher probability of becoming unemployed and find it comparatively difficult to obtain jobs of an equivalent level (Chan and Stevens 2001; Farber 1996). In addition, older workers' earnings losses after re-employment are generally higher than among younger workers and these factors explain the U-shaped association shown between age and job loss distress (Couch 1998; Paul and Moser 2009). Not surprisingly, previous studies have demonstrated that

unemployment can lead to significant risks for increased depressive symptoms in older workers (Mandal and Roe 2008).

The issue of late-life unemployment and depression is particularly important in South Korea, a rapidly ageing country expected to become the second oldest in the world by 2050 (Kim *et al.* 2011). Unemployment in the older aged populations is gaining attention because the South Korean labour force participation rate of the elderly population is markedly high, at 68.6 and 41.9 per cent for men and 43.8 and 22.7 per cent for women aged 60–64 years and 65 years or older, respectively, compared to the Organisation for Economic Co-operation and Development (OECD) average at 52.3 and 16.7 per cent for men and 32.5 and 7.6 per cent for women, respectively (Jang *et al.* 2009). South Korea also ranks first among OECD countries in the poverty rate for elderly people and has the highest suicide rate, of which over 90 per cent can be attributed to emotional and psychological status (Cho *et al.* 2011; Han and Kim 2014; Kim and Yoon 2013). Hence, South Korea's rapidly ageing society, high rates of labour force participation and poverty among elderly people show the importance of addressing old-age unemployment in South Korea because older workers who are less capable of financially sustaining their households have shown higher mental health declines during unemployment periods (Gallo *et al.* 2006).

An important aspect to consider in the relationship between unemployment and depressive symptoms is the presence of social safety nets as it can impact the effect sizes of the negative influence of unemployment on the mental health of older-aged populations (Paul and Moser 2009). As unemployment protection can mitigate the economic pressures commonly felt by workers after unemployment, individuals with higher levels of unemployment protection may be comparatively less predisposed to the negative mental health effects of unemployment (Paul and Moser 2009). In other words, the availability of social safety nets may alleviate the socioeconomic impact of unemployment and the associated negative mental health effects by acting as a reliable source of financial support and also by reducing job displacement distress (Back and Lee 2011).

The South Korean social security and pension system related to labour is composed of unemployment insurance, industrial accident compensation insurance (IACI) and the national pension. Unemployment insurance provides 50 per cent of original wages with a maximum ceiling to displaced workers for a fixed amount of days, which ranges from 90 to 240 days depending on one's age and the number of years enrolled. The IACI covers necessary medical expenditures and wages for workers who experience industrial accidents. Thus, the unemployment insurance and the IACI functions to provide financial stability for job-displaced individuals.

The national pension is a social security system targeting the enrolment of employees aged 18–59, in which contributions are calculated based on one's reported monthly earnings (Whiteford and Whitehouse 2006). Pension benefits are paid starting from the retirement age of 60 to individuals who have contributed for at least ten years. The average pension benefit level is 40 per cent of one's lifetime income contributed and the average benefit level has been reported to be generally low as the public pension scheme was introduced only in 1988. However, because around 32 per cent of South Korean elderly people live below the minimum costs of living, the availability of a guaranteed income through pension benefits can have financial buffering effects (Korea Institute for Health and Social Affairs 2008).

Previous studies have explored the relationship between unemployment and depressive symptoms but few have examined this association in East Asian populations. Additionally, studies incorporating the role of social safety nets are rare despite their potential impact on the size of negative mental health effects resulting from unemployment. Therefore, focusing on the negative mental health effects of unemployment and the mediating role of social safety nets in the stated relationship, this study aimed to investigate the effect of job displacement on depressive symptoms in the South Korean mid-aged (ages 45–59) and elderly (ages 60 or above) population. In addition, this study also intended to examine how unemployment insurance, IACI and national pension status interact in this relationship.

Materials and methods

Study population

This study was carried out using data from the Korean Longitudinal Study of Aging (KLoSA) for the years 2006, 2008, 2010 and 2012. The KLoSA is conducted by the Korean Labour Institute on a nationally representative sample of households, which are selected using a multi-stage stratified sampling method based on geographical areas. Surveys are conducted biennially through a computer-assisted personal interviewing technique and cover topics including demographics, family and social networks, physical and mental health, employment and retirement, income and wealth.

In the 2006 wave of KLoSA, 12,254 individuals were originally included. From this number of individuals, 8,688 individuals were successfully followed up (84.7% of the first-wave panel) in the 2008 panel, 7,920 individuals (77.2% of the first-wave panel) in the 2010 panel and 7,486 individuals (73% of the first-wave panel) in the 2012 panel. This study limited its study population to subjects who reported being employed at

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the study baseline in 2006 as it aimed to examine the relationship between a new onset of unemployment and individuals' depressive symptoms. Thus, a total of 1,536 individuals who were economically active and had earnings in 2006 formed the baseline population. Self-employed individuals were excluded from the analysis because they may have different characteristics regarding their job displacement and social safety nets, particularly if the individuals were business owners. Study participants were characterised into the mid-aged (ages 45–59) and the elderly (60 or above) groups as age 60 is the official retirement age in South Korea. Of the 1,536 individuals included in the baseline population, 1,469 participants were successfully followed up in 2008 to explore changes in their employment status. In 2008, individuals remained continuously employed or became unemployed. Afterwards, 1,292 individuals were followed up in 2010 and 1,087 individuals in 2012 to detect similar changes in their employment statuses.

Measures

Depressive symptoms. The outcome variable, depressive symptoms, was measured in the KLoSA using the Center for Epidemiological Studies Depression Scale (CES-D 10) developed at the Boston site of Established Populations for Epidemiological Studies of the Elderly (Kohout *et al.* 1993). The CES-D 10 inquires whether the following ten items were felt or carried out during the past week: (a) 'I was bothered by things that usually don't bother me'; (b) 'I felt difficulty concentrating'; (c) 'I felt depressed'; (d) 'I felt tired in everything I performed'; (e) 'I felt that I was doing generally well'; (f) 'I felt fearful'; (g) 'I did not think that I slept well'; (h) 'I felt generally satisfied'; (i) 'I felt alone and lonely'; and (j) 'I could not get going'. Responses are dichotomised into either a yes or a no, leading to a total score of 0–10. A total value of 4 or above indicates depression and the validity of the CES-D 10 as a screening tool for older adults has been assessed and proven (Andresen *et al.* 1994). The α coefficient for the Boston version of the CES-D 10 was reported as 0.92 for the general population and 0.80 for elderly persons aged 65 or above (Kohout *et al.* 1993).

Employment status. Employment status changes between the years 2006–2008, 2008–2010 and 2012–2012 were measured using a question that asked participants whether they were working at the time of the interview. Of the participants who replied 'yes', KLoSA further inquired if individuals were employed, self-employed or working in a family business without receiving income.

Only individuals who reported being employed were included in the 2006 baseline study population. Based on the same research question

described above, followed-up individuals were then classified as being employed or unemployed. Hence, in the 2008 measurement, individuals could be categorised into the 'employed to employed' or 'employed to unemployed' categories as only employed individuals were initially included in the 2006 measurement, meaning that individuals could either maintain or lose their jobs. However, because the study included employed and unemployed individuals starting from the 2008 measurement, employment status was then classified into the 'employed to employed', 'unemployed to employed', 'employed to unemployed' and 'unemployed to unemployed' groups in 2010 and 2012. To distinguish between unemployed and officially retired individuals without plans for future re-employment, all retired individuals were excluded.

Covariates. Demographic, socio-economic and health-related covariates were included in this study. Demographic covariates were gender (male or female), age groups (45–49, 50–54 or 55–59 for the mid-aged group and 60–64, 65–69 or 70 or above for the elderly group), region (metropolitan cities, small or medium-sized cities or rural regions) and marital status (single, divorced, separated and widowed or married). Socio-economic factors included one's education level (elementary school, middle school, high school or university and beyond), participation status in social activities (yes or no), the number of co-habiting generations (living alone, couple, two generations or three generations), wealth (quartiles), equalised household income (quartiles), unemployment insurance status, IACI status and national pension status. Equalised household income was obtained by dividing the household income by the square root of the number of household members. Equalised household income was used to account for the size of households and allow income comparability between households of different sizes. The classification of unemployment insurance, IACI and one's national pension status distinguished between the 'none' or 'enrolled' categories. Individuals were categorised as being enrolled if they had received or were currently receiving insurance or pension benefits. Individuals were also recognised as being enrolled if they were currently paying contributions that would make them eligible for benefits in the future. Lastly, health-related covariates included alcohol consumption status (yes or no), smoking status (yes or no), number of chronic diseases (0, 1, 2 or 3) and average number of activities of daily living one reported difficulty with. The alcohol consumption status was categorised based on the question 'Do you currently consume alcohol?' The smoking status was based on the question 'Did you smoke 100 or more cigarettes in the past year?', and if participants replied 'yes', they were then asked whether they currently smoked. If participants answered 'yes' to both questions, they were classified as smokers.

Statistical analysis

In order to examine the study participants' general characteristics, *t*-tests and analysis of variance (ANOVA) were performed to compare values and standard deviations. A generalised estimating equation (GEE) model was used to analyse the relationship between employment status change in years 2006–2008, 2008–2010 and 2010–2012, and depressive symptoms in years 2008, 2010 and 2012. The GEE model was utilised because it is an extension of the quasi-likelihood approach used to analyse longitudinal correlated data that accounts for time variations and correlations among repeated measurements present in longitudinal studies (Hanley, Negassa and Forrester 2003). Specifically, the GEE model has the benefit of producing reasonably accurate standard errors and is commonly used in analysing longitudinal correlated data (Hanley, Negassa and Forrester 2003).

Sub-group analysis was performed based on unemployment insurance status, IACI status and national pension status. This analysis was conducted to examine how the association between employment status change and depressive symptoms is impacted by one's insurance or pension benefit entitlement status. The calculated *p*-values were all two-sided and considered significant at $p \leqslant 0.05$. All analysis was carried out using the SAS software, version 9.4 (SAS Institute, Cary, North Carolina, USA).

Results

The characteristics of the study participants in 2008 are shown in Table 1. Tables 2 and 3 present the average CES-D 10 scores by employment status change in the years 2008–2012. In the mid-aged group, 985 (89.1%) individuals remained 'employed to employed' whereas 121 (10.9%) individuals became 'employed to unemployed' between 2006 and 2008. The mean CES-D 10 scores of the participants in 2008 were 2.61 (standard deviation (SD) = 2.50). In the elderly group, 253 (69.7%) individuals were in the 'employed to employed' group and 110 (30.3%) in the 'employed to unemployed' group, with the mean CES-D 10 scores of the whole group being 3.34 (SD = 2.82). Similarly, from 2008 to 2010, 706 (79.5%) mid-aged individuals remained employed ('employed to employed'), 48 (5.4%) shifted from 'unemployed to employed', 95 (10.7%) moved from 'employed to unemployed' and 39 (4.3%) remained unemployed ('unemployed to unemployed'). The mean depression score of the mid-aged group in 2010 was 2.75 (SD = 2.61). Similarly, in the elderly group, 227 (56.2%) remained employed ('employed to employed'), 28 (6.9%) shifted from the 'unemployed to the employed' group, 65 (16.1%) went

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TABLE 1. *General characteristics at first follow-up (2008) of individuals employed in 2006*

	Mid-aged				Elderly			
	N	%	CES-D 10[1]	*p*	N	%	CES-D 10	*p*
Gender:								
Male	684	61.8	2.47 (2.42)	0.0136	253	69.7	3.02 (2.75)	0.0009
Female	422	38.2	2.85 (2.62)		110	30.3	4.09 (2.86)	
Age:								
45–49 (60–64)	329	29.8	2.66 (2.57)	0.4832	197	54.3	3.06 (2.74)	0.1113
50–54 (65–69)	442	40.0	2.70 (2.53)		153	42.2	3.67 (2.92)	
55–59 (70 or above)	335	30.3	2.71 (2.66)		13	3.6	3.85 (2.70)	
Education level:								
Elementary school	190	17.2	3.06 (2.77)	<0.0001	146	40.2	4.05 (2.94)	0.0014
Middle school	222	20.1	3.13 (2.79)		87	24.0	2.80 (2.59)	
High school	465	42.0	2.41 (2.34)		96	26.5	2.97 (2.72)	
University and beyond	229	20.7	2.17 (2.15)		34	9.4	2.76 (2.64)	
Region:								
Metropolitan cities	560	50.6	2.48 (2.38)	0.2150	185	51.0	3.11 (2.79)	0.2426
Small or medium-sized cities	407	36.8	2.74 (2.61)		126	34.7	3.52 (2.81)	
Rural regions	139	12.6	2.78 (2.65)		52	14.3	3.75 (2.95)	
Marital status:								
Single	106	9.6	3.34 (2.86)	0.0016	61	16.8	4.42 (2.88)	0.0012
Married	1000	90.4	2.54 (2.45)		302	83.2	3.13 (2.77)	
Participation in social activities:								
No	155	14.0	3.60 (2.91)	<0.0001	69	19.0	4.31 (2.92)	0.0017
Yes	951	86.0	2.45 (2.39)		294	81.0	3.12 (2.76)	
Number of co-habiting generations:								
Living alone	41	3.7	3.27 (2.88)	0.0951	38	10.5	4.86 (2.82)	0.0045
Couple	255	23.1	2.59 (2.47)		166	45.7	3.03 (2.72)	
Two generations	673	60.9	2.66 (2.51)		117	32.2	3.37 (2.82)	
Three generations	137	12.4	2.23 (2.38)		42	11.6	3.17 (2.90)	
Unemployment insurance status:								
None	355	32.1	3.09 (2.61)	<0.0001	185	51.0	3.91 (2.86)	<0.0001

Unemployment insurance	751	67.9	2.39 (2.42)		178	49.0	2.75 (2.67)	
IACI status:								
None	356	32.2	3.04 (2.62)	<0.0001	191	52.6	3.78 (2.83)	0.0019
IACI	750	67.8	2.41 (2.42)		172	47.4	2.86 (2.75)	
National pension status:								
None	355	32.1	3.11 (2.59)	<0.0001	206	56.8	3.72 (2.95)	0.0038
National pension	751	67.9	2.38 (2.43)		157	43.3	2.85 (2.58)	
Wealth:								
Low	282	25.5	3.08 (2.63)	<0.0001	100	27.6	4.24 (2.71)	0.0021
Low-middle	275	24.9	2.82 (2.59)		78	21.5	3.04 (2.80)	
Middle-high	297	26.9	2.47 (2.48)		87	24.0	2.82 (2.72)	
High	252	22.8	2.03 (2.13)		98	27.0	3.14 (2.88)	
Equalised household income:[2]								
Low	180	16.3	3.47 (2.83)	<0.0001	184	50.7	3.71 (2.91)	0.0208
Low-middle	327	29.6	2.69 (2.59)		93	25.6	3.22 (2.67)	
Middle-high	262	23.7	2.46 (2.40)		39	10.7	3.15 (2.80)	
High	337	30.5	2.20 (2.19)		47	13.0	2.32 (2.59)	
Alcohol consumption status:								
No	727	65.7	2.49 (2.44)	0.0257	235	64.7	3.32 (2.86)	0.8449
Yes	379	34.3	2.85 (2.60)		128	35.3	3.38 (2.78)	
Smoking status:								
No	777	70.3	2.60 (2.48)	0.7728	265	73.0	3.43 (2.88)	0.3430
Yes	329	29.8	2.65 (2.56)		98	27.0	3.11 (2.67)	
Number of chronic diseases:								
0	775	70.1	2.45 (2.48)	0.0003	171	47.1	2.98 (2.86)	0.0172
1	256	23.2	2.78 (2.44)		122	33.6	3.39 (2.73)	
2	65	5.9	3.78 (2.67)		55	15.2	3.94 (2.62)	
3	10	0.9	3.22 (2.73)		15	4.1	5.00 (3.19)	
Average number of ADLs			0.02 (0.27)				0.01 (0.13)	
Total	1,106	100.0	2.61 (2.50)		363	100.0	3.34 (2.82)	

Notes: 1. Center for Epidemiological Studies Depression Scale (CES-D 10) score is expressed as mean (standard deviation). 2. Equalised household income was obtained by dividing the household income by the square root of the number of household members. IACI: insurance accident compensation insurance. ADLs: activities of daily living.

Source: Korea Longitudinal Study of Aging.

TABLE 2. *Average Center for Epidemiological Studies Depression Scale (CES-D 10) scores by employment status in 2008–2012 (mid-aged)*

	2008				2010				2012			
Employment status	N	%	CES-D 10[1]	*p*	N	%	CES-D 10	*p*	N	%	CES-D 10	*p*
Employed to employed	985	89.1	2.52 (2.46)	0.0007	706	79.5	2.59 (2.54)	0.0033	489	76.4	2.51 (2.50)	0.0034
Unemployed to employed	0	0.0	0.00 (0.00)		48	5.4	3.10 (2.90)		35	5.5	2.71 (2.75)	
Employed to unemployed	121	10.9	3.34 (2.71)		95	10.7	3.55 (2.90)		58	9.1	3.38 (3.17)	
Unemployed to unemployed	0	0.0	0.00 (0.00)		39	4.3	3.21 (2.40)		58	9.1	3.64 (2.89)	
Total	1,106	100.0	2.61 (2.50)		888	100.0	2.75 (2.61)		640	100.0	2.70 (2.64)	

Note: 1. CES-D 10 score is expressed as mean (standard deviation).
Source: Korea Longitudinal Study of Aging.

TABLE 3. *Average Center for Epidemiological Studies Depression Scale (CES-D 10) scores by employment status in 2008–2012 (elderly)*

	2008				2010				2012			
Employment status	N	%	CES-D 10[1]	*p*	N	%	CES-D 10	*p*	N	%	CES-D 10	*p*
Employed to employed	253	69.7	2.90 (2.60)	<0.0001	227	56.2	2.91 (2.80)	0.0472	218	48.8	2.81 (2.86)	0.0606
Unemployed to employed	0	0.0	0.00 (0.00)		28	6.9	2.93 (2.61)		27	6.0	2.91 (2.68)	
Employed to unemployed	110	30.3	4.36 (3.06)		65	16.1	3.71 (3.06)		86	19.2	3.31 (2.87)	
Unemployed to unemployed	0	0.0	0.00 (0.00)		84	20.8	3.76 (2.78)		116	26.0	3.57 (2.86)	
Total	363	100.0	3.34 (2.82)		404	100.0	3.21 (2.85)		447	100.0	3.08 (2.86)	

Note: 1. CES-D 10 score is expressed as mean (standard deviation).
Source: Korea Longitudinal Study of Aging.

from being 'employed to unemployed' and 84 (20.8%) remained unemployed ('unemployed to unemployed'), with a mean CES-D 10 score of 3.21 (SD = 2.85). Lastly, between 2010 and 2012, 489 (76.4%) mid-aged individuals were categorised into the 'employed to employed' group, 35 (5.5%) into the 'unemployed to employed group', 58 (9.1%) into the 'employed to unemployed' group and 58 (9.1%) into the 'unemployed to unemployed' group. The mean depression score of the mid-aged group in 2012 was 2.70 (SD = 2.64). Likewise, 218 (48.8%) elderly individuals were in the 'employed to employed' group, 27 (6.0%) in the 'unemployed to employed' group, 86 (19.2%) in the 'employed to unemployed' group and 116 (26.0%) in the 'unemployed to unemployed' group. The elderly individuals had a mean CES-D 10 score of 3.08 (SD = 2.86) in 2012.

The results of Tables 2 and 3 reveal that the highest CES-D 10 scores are found in the 'employed to unemployed' group, followed by the 'unemployed to unemployed' group, the 'unemployed to employed' group and the 'employed to employed' group in the mid-aged category. In contrast, the highest depression scores are found in the 'unemployed to unemployed' group in the elderly category, followed by the 'employed to unemployed', the 'unemployed to employed' and the 'employed to employed' groups. Apart from these results, it can also be seen from Table 1 that the mean CES-D 10 scores generally escalate with age.

The results of the GEE analysing the effect of employment status change during 2006–2008, 2008–2010 and 2010–2012 on CES-D 10 scores in 2008, 2010 and 2012 are shown in Table 4. After controlling for all covariates, compared to the 'employed to employed' reference group, the 'employed to unemployed' group had statistically significant increases in depression scores in both the mid-aged ($\beta = 0.4884$, $p = 0.0038$) and the elderly categories ($\beta = 0.8275$, $p \leqslant 0.0001$).

Lastly, Table 5 presents the results of the GEE model analysing the effect of employment status change during 2006–2008, 2008–2010 and 2010–2012 on CES-D 10 scores in 2008, 2010 and 2012 by unemployment insurance, IACI and national pension status. The main results of Table 4 were generally maintained in the unemployment insurance, IACI and national pension ineligible groups of the mid-aged and the elderly individuals. In contrast, the mid-aged and elderly 'employed to unemployed' groups who were eligible for unemployment insurance and IACI benefits did not show statistically significant increases in their depression scores compared to the 'employed to employed' group. With regard to national pension status, the 'employed to unemployed' mid-aged individuals enrolled in the national pension still showed statistically significant increases in their CES-D 10 scores compared to the 'employed to employed' group, although

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TABLE 4. *Results of the generalised estimating equation analysing the effect of employment status alteration during 2006–2008 (or 2008–2010, 2010–2012) and Center for Epidemiological Studies Depression Scale (CES-D 10) scores in 2008 (or 2010, 2012), among individuals who were employed at the 2006 baseline*

	Mid-aged			Elderly		
	β	SE	*p*	β	SE	*p*
Employment status:						
Employed to employed	Ref.			Ref.		
Unemployed to employed	0.0943	0.3254	0.7718	0.2930	0.3668	0.4243
Employed to unemployed	0.4884	0.1689	0.0038	0.8275	0.2095	<0.0001
Unemployed to unemployed	0.2832	0.2934	0.3343	0.5028	0.2698	0.0624
Gender:						
Male	Ref.			Ref.		
Female	0.1136	0.1692	0.5021	0.4786	0.2947	0.1043
Age:						
45–49 (60–64)	Ref.			Ref.		
50–54 (65–69)	0.2054	0.1426	0.1497	0.2564	0.1955	0.1896
55–59 (70 or above)	0.1586	0.1813	0.3816	0.1692	0.4225	0.6889
Education level:						
Elementary school	Ref.			Ref.		
Middle school	0.1877	0.2236	0.4013	−0.1719	0.2489	0.4899
High school	−0.1874	0.2038	0.3576	−0.2559	0.2667	0.3372
University and beyond	−0.2633	0.2428	0.2781	−0.2226	0.3888	0.5669
Region:						
Metropolitan cities	Ref.			Ref.		
Small or medium-sized cities	0.3391	0.1317	0.01	0.3858	0.2129	0.0699
Rural regions	0.1319	0.192	0.492	0.2022	0.2886	0.4835
Marital status:						
Single	Ref.			Ref.		
Married	−0.1982	0.2774	0.4748	−0.2284	0.4625	0.6214
Participation in social activities:						
No	Ref.			Ref.		
Yes	−1.0168	0.1789	<0.0001	−0.6654	0.2430	0.0062
Number of co-habiting generations:						
Living alone	Ref.			Ref.		
Couple	−0.0862	0.4584	0.8509	−0.5145	0.5522	0.3515
Two generations	−0.1250	0.4401	0.7763	−0.3809	0.5411	0.4815
Three generations	−0.1986	0.4601	0.6660	−0.1174	0.5780	0.8390
Unemployment insurance status:						
None	Ref.			Ref.		
Unemployment insurance	−0.2722	0.3812	0.4752	−0.6693	0.4078	0.1007
IACI status:						
None	Ref.			Ref.		
IACI	−0.0686	0.3264	0.8335	−0.4617	0.3869	0.2328
National pension status:						
None	Ref.			Ref.		

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TABLE 4. (*Cont.*)

	Mid-aged			Elderly		
	β	SE	*p*	β	SE	*p*
National pension	−0.1431	0.2562	0.5763	−0.0734	0.2708	0.7863
Wealth:						
Low	Ref.			Ref.		
Low-middle	−0.0450	0.1695	0.7908	−0.4479	0.2676	0.0942
Middle-high	−0.2487	0.1636	0.1284	−0.6555	0.2543	0.0100
High	−0.3044	0.1812	0.0930	−0.5646	0.2847	0.0474
Equalised household income:[1]						
Low	Ref.			Ref.		
Low-middle	−0.3556	0.2041	0.0814	−0.1189	0.2178	0.585
Middle-high	−0.3500	0.2258	0.1211	−0.1472	0.2922	0.6144
High	−0.5485	0.2308	0.0175	−0.6839	0.3442	0.0469
Alcohol consumption status:						
No	Ref.			Ref.		
Yes	0.1628	0.1477	0.2704	−0.0393	0.2423	0.8711
Smoking status:						
No	Ref.			Ref.		
Yes	0.0325	0.1394	0.8156	0.3849	0.2317	0.0968
Number of chronic diseases:						
0	Ref.			Ref.		
1	0.3179	0.1316	0.0157	0.4383	0.2228	0.0492
2	0.5729	0.2739	0.0365	0.2660	0.2685	0.3219
3	0.7542	0.512	0.1408	0.3346	0.3945	0.3964
Year:						
2008	Ref.			Ref.		
2010	0.1554	0.1042	0.1359	−0.0420	0.1888	0.8240
2012	0.1441	0.1223	0.2386	−0.1596	0.2022	0.4299
ADLs:						
0	Ref.			Ref.		
1 or above	0.7081	0.2369	0.0028	2.0149	0.8585	0.0189

Notes: 1. Equalised household income was obtained by dividing the household income by the square root of the number of household members. SE: standard error. IACI: insurance accident compensation insurance. ADLs: activities of daily living. Ref.: reference group.
Source: Korea Longitudinal Study of Aging.

the extent of the CES-D 10 score increase was reduced (β = 0.5874, p = 0.0262 *versus* β = 0.4565, p = 0.0356). The elderly group also showed similar trends (β = 1.0600, p = 0.0015 *versus* β = 0.6117, p = 0.0229).

Discussion

In line with previous findings, it was expected in this study that unemployment would be associated with higher levels of depressive symptoms. The analysed results correlated with the expected results as the mid-aged and

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TABLE 5. *Results of the generalised estimating equation analysing the effect of employment status alteration during 2006–2008 (or 2008–2010, 2010–2012) and Center for Epidemiological Studies Depression Scale (CES-D 10) scores in 2008 (or 2010, 2012), among individuals who were employed at the 2006 baseline: based on pension status*

	Mid-aged			Elderly		
	β	SE	*p*	β	SE	*p*
Unemployment insurance:						
None:						
Employed to employed	Ref.			Ref.		
Unemployed to employed	−0.2361	0.4307	0.5836	−0.2261	0.7732	0.7700
Employed to unemployed	0.5972	0.2664	0.0250	0.9959	0.3104	0.0013
Unemployed to unemployed	0.1995	0.3840	0.6034	0.6193	0.4159	0.1364
Unemployment insurance:						
Employed to employed	Ref.			Ref.		
Unemployed to employed	0.3833	0.4463	0.3904	−0.4057	0.4216	0.3359
Employed to unemployed	0.4370	0.2159	0.0492	0.5442	0.2866	0.0575
Unemployed to unemployed	0.4652	0.4748	0.3271	0.1255	0.3660	0.7316
Industrial accident compensation insurance:						
None:						
Employed to employed	Ref.			Ref.		
Unemployed to employed	−0.2686	0.4557	0.5556	−0.8098	0.7112	0.2549
Employed to unemployed	0.6595	0.2577	0.0105	1.1782	0.3233	0.0003
Unemployed to unemployed	0.1041	0.3907	0.7899	0.6223	0.4217	0.1401
Industrial accident compensation insurance:						
Employed to employed	Ref.			Ref.		
Unemployed to employed	0.3936	0.4468	0.3783	−0.1867	0.4149	0.6527
Employed to unemployed	0.3751	0.2193	0.0871	0.5301	0.2702	0.0498
Unemployed to unemployed	0.4963	0.4646	0.2854	0.3691	0.3663	0.3136
National pension:						
None:						
Employed to employed	Ref.			Ref.		
Unemployed to employed	−0.2516	0.4416	0.5688	−0.3639	0.8661	0.6744
Employed to unemployed	0.5874	0.2641	0.0262	1.0600	0.3336	0.0015
Unemployed to unemployed	0.1845	0.3868	0.6334	0.4641	0.4310	0.2816
National pension:						
Employed to employed	Ref.			Ref.		
Unemployed to employed	0.3732	0.4446	0.4012	−0.3329	0.3912	0.3948
Employed to unemployed	0.4565	0.2173	0.0356	0.6117	0.2688	0.0229
Unemployed to unemployed	0.3966	0.4626	0.3912	0.4193	0.3554	0.2380

Notes: Adjusted for gender, age, education level, marital status, region, wealth, equalised household income, alcohol consumption status, smoking status, number of chronic diseases, year, number of activities of daily living and number of instrumental activities of daily. SE: standard error. Ref.: reference group.

Source: Korea Longitudinal Study of Aging.

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elderly unemployed individuals showed higher depression scores than continuously employed individuals. Only individuals who transitioned from an employed to unemployed state showed significant escalations because those who remained unemployed or became re-employed after previous unemployment did not show significant changes. This is in contrast to a previous meta-analysis conducted by Murphy and Athanasou targeting Western participants, which concluded that job loss was associated with an increase in depressive symptoms and that re-employment was also related to a reduction in distress (Murphy and Athanasou 1999). The differences may result because this analysed study only targeted individuals aged 45 or above, with older workers being known to face further difficulties in discovering high-quality jobs and being more likely to find re-employment in jobs with poorer working conditions (Yang 2011). Paul and Moser's meta-analysis also demonstrated the negative mental health effects of unemployment and presented that a higher proportion of unemployed individuals show psychological problems (Paul and Moser 2009). Similar results were discovered in a meta-analysis conducted using cohort studies, which explained that unemployment and job insecurity posed risks for depression especially when individuals were simultaneously exposed to insecure employment (Kim and von dem Knesebeck 2016). With specific regard to studies performed targeting the older population, a previous study revealed that job loss was associated with increased depressive symptoms in individuals aged 50–64 years and that wealth acted as a central mitigating factor (Riumallo-Herl *et al.* 2014). The results of this study offer further insight into previous results as they show that job displacement leads to increased depression scores in mid-aged and elderly individuals, and that the effect size is greater among the elderly population.

Financial distress and reduced social networks have been proposed as plausible mechanisms explaining this relationship. Regarding financial distress, job displacement has been considered to be a stressful life event that leads to a reduction in private economic resources and earnings, which also decreases the capability to buy health-promoting goods (Artazcoz *et al.* 2004; Olesen *et al.* 2013). Unemployment is also likely to result in further financial strains resulting from increased contributions for health insurance because under the South Korean National Health Insurance system, employers and employees are designated to each support one half of an employee's health insurance costs. Thus, unless a direct family member of a displaced individual can provide family member national health insurance support, individuals will inevitably be required to pay higher costs for health insurance and may consequently face further financial pressures. Since financial hardships have been associated with depression, it is probable that unemployment leads to depression through financial strains

(Butterworth, Rodgers and Windsor 2009). Apart from economic loss, unemployment often implies reduced social networks and a loss of social roles. Job-displaced individuals face cessations in social and cultural participation that can also indicate declined social support (Broom *et al.* 2006). Additionally, the loss of social roles has been linked with reduced positive self-regard and perceived social standing, which can induce adverse mental health effects (Anaf *et al.* 2013; Hu *et al.* 2005).

The results of this study reveal that the mean depression scores of the study participants increase with age and that the mental health effects of unemployment are stronger in the elderly group than the mid-aged group. The prevalence of depressive symptomology has been known to increase with age, which can significantly impact wellbeing and quality of life (Singh and Misra 2009). The stronger impact of unemployment on depressive symptoms in the elderly group results because in addition to the higher likelihood of depression in the older population, unemployment also more likely results in a lower income, the cessation of asset accumulation and decreased probabilities of re-employment, which are related to stronger symptoms of depression (Chu *et al.* 2016). Moreover, the South Korean elderly workers continuing to work past the age of retirement are often those in greater financial need (Yoon 2013). This is important since South Korea has the highest poverty rate for elderly people amongst OECD countries at 47.2 per cent compared to the 12.5 per cent OECD average (Han and Kim 2014). Yet the majority of older workers experience downward labour adjustment and marginalisation from the workforce, often working in irregular positions characterised by vulnerability and low earnings (Jones and Tsutsumi 2009). Moreover, as depression has been related to illnesses that are notable public health problems in ageing societies, including chronic physical illnesses, cardiovascular diseases, Parkinson's disease, musculoskeletal disorders and decreased functional abilities, the societal effects of late-career unemployment can be particularly strong and require appropriate addressing (Gallo *et al.* 2000; Karpansalo *et al.* 2005).

The impact of unemployment in the mid-aged and elderly groups is also noteworthy because the investigated period of this study included the relatively recent worldwide economic recession. The economic recession of 2008 has caused significant job losses in many European countries, the United States of America and South Korea (Eskesen 2010; Riumallo-Herl *et al.* 2014). Not surprisingly, the economic recession has been associated with excess mortality and suicides in numerous countries (Chan *et al.* 2014; Karanikolos *et al.* 2013). Moreover, economic contraction and the resulting corporate downsizing and labour market restructuring has also contributed to higher risks for depression and has adversely impacted

individuals' mental health (Park *et al.* 2009). In fact, unemployment can be particularly damaging during recessions because it disrupts an individual's sense of coherence, which is essential in adapting to social stress (Surtees, Wainwright and Khaw 2006). Specifically, the unemployment-associated risk of ill health is prominent as elderly individuals face lower prospects of re-employment and worse economic adversity at such periods (Montgomery *et al.* 2013). It is also plausible that the societal mental health effects of increased unemployment during the recession period partially influenced the depression levels of individuals investigated in this study. Therefore, because the older-aged populations have been shown to be comparatively susceptible to labour market conditions, it is necessary to examine the societal moderating factors when contemplating policies for the ageing population, particularly in countries still recovering from the economic crisis and suffering from low employment rates.

In the relationship between unemployment and depressive symptoms, financial security can act as a moderating factor because job displacement often exerts the greatest impact on economically unstable individuals (Back and Lee 2011; Gallo *et al.* 2006). The findings of this study reveal that displaced mid-aged and elderly individuals with unemployment insurance generally do not have increases in depression scores than continuously employed individuals. On the other hand, participants without unemployment insurance showed escalations in their CES-D 10 scores. Such findings are in agreement with previous studies which demonstrated that receiving unemployment insurance benefits after unemployment helped to alleviate individuals' depression (Tefft 2011). In fact, if comprehensive unemployment benefits are available, current and future income losses may be prevented and this may protect workers from depression that results due to financial insecurity (Brugiavini 2001). Hence, although the amount of benefits received by the different participants can vary under the South Korean social security system, which states that displaced workers are entitled to 50 per cent of original wages for 90–240 days based on age and the number of years enrolled, individuals with unemployment insurance are partially guarded from current and future financial losses. Furthermore, the positive aspects of unemployment insurance may be significantly shown among mid-aged and elderly individuals because job-seeking reimbursements in this age group have been reported to be high (Sang 2003).

Likewise, unemployed mid-aged and elderly individuals enrolled in IACI showed no significant increases in depression scores compared to their employed counterparts whereas unemployed participants not enrolled in IACI exhibited statistically significant upsurges. The IACI offers financial security by compensating for medical expenditure and wage compensations related to occupational injuries and diseases, which are generally

unanticipated and cause financial strains. For instance, if individuals require nursing home care or become unemployed due to industrial accidents, those with IACI will be able to receive reliable reimbursements for medical and living costs. The IACI can act as an important social safety net in the older age groups because the 50–59 age group has been reported to receive the highest number of compensations in South Korea (Ahn, Kang and Kim 2004). Thus, being able to receive aid in times of unforeseen injuries can reduce the resulting financial strains and negative mental health effects.

Lastly, with regard to the national pension, unemployed participants both with and without national pension showed higher depression scores than employed participants. However, individuals without a national pension showed higher increases in depression scores than individuals entitled to national pension and this was prominent in the elderly participants. Stronger effects seen in the elderly group may result because unlike mid-aged persons who are not yet eligible for pension reimbursements, elderly persons are qualified to receive benefits based on previous contributions. Naturally, the financial mitigating effects of pension compensations will be stronger in the elderly group because the mid-aged group only expects future pension income whereas elderly individuals currently receive pension income. At present, the South Korean public pension scheme is immature as South Korea is a late-developing welfare state (Kim 2009; Lee and Smith 2009). However, since national pension eligibility ensures at least US $650 per month, national pensions can still put forth positive influences in at least partially relieving financial pressures and serve as a social security measure for elderly individuals (Levande, Herrick and Sung 2000). Therefore, taking into account the fact that downward income volatility shows a dose–response relationship with depression (Prause, Dooley and Huh 2009), one's national pension status can act as an important contributing factor to relieving depressive symptoms in job-displaced individuals.

This study has some limitations. First, this study did not take into account the type of one's employment status, *e.g.* whether the employment is precarious or permanent, due to data limitations. Second, the amount of unemployment insurance, IACI and national pension benefits was not measured also because of data limitations. However, the impact of this limitation may not have been very strong. This is because unemployment insurance reimbursements are given for 50 per cent of one's wages. Although the absolute amounts will differ, this ensures that beneficiaries will receive at least half of their original earnings with a maximum ceiling. The IACI provides compensations solely based on need, and the regulations governing the proportion of benefit coverage do not differ between individuals. For the national pension, while benefits depend on one's previous contributions, enrolled individuals are guaranteed at least US $650 per month.

Additionally, because the national pension in South Korea has been relatively recently introduced and is still immature, the maximum reimbursement amounts are not yet high. Still, future studies incorporating the amount of unemployment insurance, IACI and national pension compensations are needed to provide further insights. Last, as the measurements of household income and wealth in this study were based on self-reports, there may have been some limitations in recording this variable to the absolute amount.

Despite the limitations stated above, this study also has strengths. It was longitudinal in design with six years of follow-up and only individuals employed at the baseline were included to analyse the effect of new onset unemployment on depressive symptoms. In addition, this study is unique because it incorporates the effect of social safety nets on the association between unemployment and depressive symptoms. As such studies are rare, the results elude the importance of the availability of social safety nets in terms of the mental health of displaced older individuals. This is particularly important as many countries are ageing. Additionally, because East Asian countries are known to generally share similar characteristics with each other regarding depression, the findings of this study may be more widely applied in investigating the association between unemployment and depressive symptoms in the mid-aged and elderly groups.

Conclusion

This study reveals that the shift from employment to unemployment among mid-aged and elderly individuals is associated with poorer depression scores, highlighting the importance of employment status change in addressing the mental health of older individuals. The results also demonstrate the significance of social safety nets in the relationship between job loss and depressive symptoms because individuals without unemployment insurance, IACI or national pension were shown to be more vulnerable to the negative mental health effects of job displacement. Therefore, as many countries are facing a rapidly ageing population, appropriate provision of unemployed mid-aged and elderly individuals is crucial in addressing the mental health of older populations.

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References

Ahn, Y., Kang, S. and Kim, K. 2004. Analysis of occupational diseases compensated with the industrial accident compensation insurance from 2001 to 2003. *Korean Journal of Occupational and Environmental Medicine*, **16**, 2, 139–54.

Anaf, J., Baum, F., Newman, L., Ziersch, A. and Jolley, G. 2013. The interplay between structure and agency in shaping the mental health consequences of job loss. *BMC Public Health*, **13**, 1, 110.

Andresen, E. M., Malmgren, J. A., Carter, W. B. and Patrick, D. L. 1994. Screening for depression in well older adults: evaluation of a short form of the CES-D. *American Journal of Preventive Medicine*, **10**, 2, 77–84.

Artazcoz, L., Benach, J., Borrell, C. and Cortès, I. 2004. Unemployment and mental health: understanding the interactions among gender, family roles, and social class. *American Journal of Public Health*, **94**, 1, 82–8.

Back, J. H. and Lee, Y. 2011. Gender differences in the association between socio-economic status (SES) and depressive symptoms in older adults. *Archives of Gerontology and Geriatrics*, **52**, 3, e140–4.

Bonamore, G., Carmignani, F. and Colombo, E. 2015. Addressing the unemployment–mortality conundrum: non-linearity is the answer. *Social Science & Medicine*, **126**, 67–72.

Broom, D. H., D'Souza, R. M., Strazdins, L., Butterworth, P., Parslow, R. and Rodgers, B. 2006. The lesser evil: bad jobs or unemployment? A survey of mid-aged Australians. *Social Science & Medicine*, **63**, 3, 575–86.

Brugiavini, A. 2001. Early retirement in Europe. *European Review*, **9**, 4, 501–15.

Butterworth, P., Rodgers, B. and Windsor, T. D. 2009. Financial hardship, socio-economic position and depression: results from the PATH Through Life Survey. *Social Science & Medicine*, **69**, 2, 229–37.

Chan, C. H., Caine, E. D., You, S., Fu, K. W., Chang, S. S. and Yip, P. S. F. 2014. Suicide rates among working-age adults in South Korea before and after the 2008 economic crisis. *Journal of Epidemiology and Community Health*, **68**, 3, 246–52.

Chan, S. and Stevens, A. H. 2001. Job loss and employment patterns of older workers. *Journal of Labor Economics*, **19**, 2, 484–521.

Cho, M. J., Lee, J. Y., Kim, B.-S., Lee, H. W. and Sohn, J. H. 2011. Prevalence of the major mental disorders among the Korean elderly. *Journal of Korean Medical Science*, **26**, 1, 1–10.

Chu, W. M., Liao, W. C., Li, C. R., Lee, S. H., Tang, Y. J., Ho, H. E. and Lee, M. C. 2016. Late-career unemployment and all-cause mortality, functional disability and depression among the older adults in Taiwan: a 12-year population-based cohort study. *Archives of Gerontology and Geriatrics*, **65**, 192–8.

Couch, K. A. 1998. Late life job displacement. *Gerontologist*, **38**, 1, 7–17.

Dooley, D. and Catalano, R. 1980. Economic change as a cause of mental disorder. *Psychological Bulletin*, **87**, 3, 450–68.
Eskesen, L. L. 2010. Labor market dynamics in Korea – looking back and ahead. *Korea and the World Economy*, **11**, 2, 231–61.
Farber, H. S. 1996. The changing face of job loss in the United States, 1981–1993. NBER Working Paper 5596, National Bureau of Economic Research, Cambridge, Massachusetts.
Ferrie, J. E., Kivimaki, M., Shipley, M. J., Davey Smith, G. and Virtanen, M. 2013. Job insecurity and incident coronary heart disease: the Whitehall II prospective cohort study. *Atherosclerosis*, **227**, 1, 178–81.
Fryer, D. 1992. Psychological or material deprivation: why does unemployment have mental health consequences. Eithne Mclaughlin (ed), In *Understanding Unemployment: New Perspectives on Active Labour Market Policies*. Routledge, London, 103–25.
Gallo, W. T., Bradley, E. H., Dubin, J. A., Jones, R. N., Falba, T. A., Teng, H.-M. and Kasl, S. V. 2006. The persistence of depressive symptoms in older workers who experience involuntary job loss: results from the health and retirement survey. *Journals of Gerontology: Psychological Sciences and Social Sciences*, **61B**, 4, S221–8.
Gallo, W. T., Bradley, E. H., Siegel, M. and Kasl, S. V. 2000. Health effects of involuntary job loss among older workers: findings from the health and retirement survey. *Journals of Gerontology: Psychological Sciences and Social Sciences*, **55B**, 3, S131–40.
Han, S. and Kim, H. 2014. Factors influencing depression in low-income elderly living at home based on ICF model. *Journal of Korean Public Health Nursing*, **28**, 2, 333–46.
Hanley, J. A., Negassa, A. and Forrester, J. E. 2003. Statistical analysis of correlated data using generalized estimating equations: an orientation. *American Journal of Epidemiology*, **157**, 4, 364–75.
Hu, P. F., Adler, N. E., Goldman, N., Weinstein, M. and Seeman, T. E. 2005. Relationship between subjective social status and measures of health in older Taiwanese persons. *Journal of the American Geriatrics Society*, **53**, 3, 483–8.
Jahoda, M. 1981. Work, employment, and unemployment: values, theories, and approaches in social research. *American Psychologist*, **36**, 2, 184–91.
Jang, S.-N., Cho, S.-I., Chang, J., Boo, K., Shin, H.-G., Lee, H. and Berkman, L. F. 2009. Employment status and depressive symptoms in Koreans: results from a baseline survey of the Korean Longitudinal Study of Aging. *Journals of Gerontology: Psychological Sciences and Social Sciences*, **64B**, 5, 677–83.
Jones, R. S. and Tsutsumi, M. 2009. Sustaining growth in Korea by reforming the labor market and improving the education system. OECD Economics Department Working Paper 672, Organisation for Economic Co-operation and Development, Paris.
Karanikolos, M., Mladovsky, P., Cylus, J., Thomson, S., Basu, S., Stuckler, D., Mackenbach, J. P. and McKee, M. 2013. Financial crisis, austerity, and health in Europe. *Lancet*, **381**, 9874, 1323–31.
Karpansalo, M., Kauhanen, J., Lakka, T., Manninen, P., Kaplan, G. and Salonen, J. 2005. Depression and early retirement: prospective population based study in middle aged men. *Journal of Epidemiology and Community Health*, **59**, 1, 70–4.
Kim, K. W., Park, J. H., Kim, M.-H., Kim, M. D., Kim, B.-J., Kim, S.-K., Kim, J. L., Moon, S. W., Bae, J. N. and Woo, J. I. 2011. A nationwide survey on the prevalence of dementia and mild cognitive impairment in South Korea. *Journal of Alzheimer's Disease*, **23**, 2, 281–91.
Kim, S. W. 2009. Social changes and welfare reform in South Korea: in the context of the late-coming welfare state. *International Journal of Japanese Sociology*, **18**, 1, 16–32.

Kim, S.-W. and Yoon, J.-S. 2013. Suicide, an urgent health issue in Korea. *Journal of Korean Medical Science*, **28**, 3, 345–7.
Kim, T. J. and von dem Knesebeck, O. 2016. Perceived job insecurity, unemployment and depressive symptoms: a systematic review and meta-analysis of prospective observational studies. *International Archives of Occupational and Environmental Health*, **89**, 4, 561–73.
Kohout, F. J., Berkman, L. F., Evans, D. A. and Cornoni-Huntley, J. 1993. Two shorter forms of the CES-D depression symptoms index. *Journal of Aging and Health*, **5**, 2, 179–93.
Korea Institute for Health and Social Affairs 2008. *Living Profile and Welfare Service Needs of Older Persons in Korea*. Korea Institute for Health and Social Affairs, Sejong City, Republic of Korea.
Lee, J. and Smith, J. P. 2009. Work, retirement, and depression. *Journal of Population Ageing*, **2**, 1/2, 57–71.
Lei, X., Sun, X., Strauss, J., Zhang, P. and Zhao, Y. 2014. Depressive symptoms and SES among the mid-aged and elderly in China: evidence from the China Health and Retirement Longitudinal Study national baseline. *Social Science & Medicine*, **120**, 224–32.
Levande, D. I., Herrick, J. M. and Sung, K.-T. 2000. Eldercare in the United States and South Korea balancing family and community support. *Journal of Family Issues*, **21**, 5, 632–51.
Lundin, A., Falkstedt, D., Lundberg, I. and Hemmingsson, T. 2014. Unemployment and coronary heart disease among middle-aged men in Sweden: 39 243 men followed for 8 years. *Occupational and Environmental Medicine*, **71**, 3, 183–8.
Mandal, B., Ayyagari, P. and Gallo, W. T. 2011. Job loss and depression: the role of subjective expectations. *Social Science & Medicine*, **72**, 4, 576–83.
Mandal, B. and Roe, B. 2008. Job loss, retirement and the mental health of older Americans. *Journal of Mental Health Policy and Economics*, **11**, 4, 167–76.
Milner, A., Page, A. and LaMontagne, A. D. 2013. Long-term unemployment and suicide: a systematic review and meta-analysis. *PLoS One*, **8**, 1, e51333.
Montgomery, S., Udumyan, R., Magnuson, A., Osika, W., Sundin, P. O. and Blane, D. 2013. Mortality following unemployment during an economic downturn: Swedish register-based cohort study. *BMJ Open*, **3**, 7, e003031.
Murphy, G. C. and Athanasou, J. A. 1999. The effect of unemployment on mental health. *Journal of Occupational and Organizational Psychology*, **72**, 1, 83–99.
Olesen, S. C., Butterworth, P., Leach, L. S., Kelaher, M. and Pirkis, J. 2013. Mental health affects future employment as job loss affects mental health: findings from a longitudinal population study. *BMC Psychiatry*, **13**, 1, 144.
Park, S. G., Min, K. B., Chang, S. J., Kim, H. C. and Min, J. Y. 2009. Job stress and depressive symptoms among Korean employees: the effects of culture on work. *International Archives of Occupational and Environmental Health*, **82**, 3, 397–405.
Paul, K. I. and Moser, K. 2009. Unemployment impairs mental health: meta-analyses. *Journal of Vocational Behavior*, **74**, 3, 264–82.
Prause, J., Dooley, D. and Huh, J. 2009. Income volatility and psychological depression. *American Journal of Community Psychology*, **43**, 1/2, 57–70.
Riumallo-Herl, C., Basu, S., Stuckler, D., Courtin, E. and Avendano, M. 2014. Job loss, wealth and depression during the Great Recession in the USA and Europe. *International Journal of Epidemiology*, **43**, 5, 1508–17.
Sang, Y. G. 2003. An analysis on policy effects of Korean Employment Insurance System: focusing on policy beneficiaries. *The Korean Association for Policy Studies*, **12**, 4, 175–201.

Singh, A. and Misra, N. 2009. Loneliness, depression and sociability in old age. *Industrial Psychiatry Journal*, **18**, 1, 51–5.
Surtees, P. G., Wainwright, N. W. and Khaw, K. T. 2006. Resilience, misfortune, and mortality: evidence that sense of coherence is a marker of social stress adaptive capacity. *Journal of Psychosomatic Research*, **61**, 2, 221–7.
Tefft, N. 2011. Insights on unemployment, unemployment insurance, and mental health. *Journal of Health Economics*, **30**, 2, 258–64.
Virtanen, M., Nyberg, S. T., Batty, G. D., Jokela, M., Heikkila, K., Fransson, E. I., Alfredsson, L., Bjorner, J. B., Borritz, M., Burr, H., Casini, A., Clays, E., De Bacquer, D., Dragano, N., Elovainio, M., Erbel, R., Ferrie, J. E., Hamer, M., Jockel, K. H., Kittel, F., Knutsson, A., Koskenvuo, M., Koskinen, A., Lunau, T., Madsen, I. E., Nielsen, M. L., Nordin, M., Oksanen, T., Pahkin, K., Pejtersen, J. H., Pentti, J., Rugulies, R., Salo, P., Shipley, M. J., Siegrist, J., Steptoe, A., Suominen, S. B., Theorell, T., Toppinen-Tanner, S., Vaananen, A., Vahtera, J., Westerholm, P. J., Westerlund, H., Slopen, N., Kawachi, I., Singh-Manoux, A., Kivimaki, M. and Consortium, I. P.-W. 2013. Perceived job insecurity as a risk factor for incident coronary heart disease: systematic review and meta-analysis. *British Medical Journal*, **347**, f4746.
Whiteford, P. and Whitehouse, E. 2006. Pension challenges and pension reforms in OECD countries. *Oxford Review of Economic Policy*, **22**, 1, 78–94.
Yang, Y. 2011. No way out but working? Income dynamics of young retirees in Korea. *Ageing & Society*, **31**, 2, 265–87.
Yoon, H. S. 2013. Korea: balancing economic growth and social protection for older adults. *Gerontologist*, **53**, 3, 361–8.

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Address for correspondence:
Eun-Cheol Park, Department of Preventive Medicine and Institute of Health Services Research,
Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-752, Republic of Korea

E-mail: ECPARK@yuhs.ac