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Association between change in employment status and new-onset depressive symptoms in South Korea – a gender analysis

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Objectives This study aimed to investigate the association of change in employment status with new-onset depressive symptoms, particularly differences stemming from workers' gender, in South Korea.

Methods We analyzed data from the ongoing Korean Welfare Panel Study. After excluding participants who had depressive symptoms at baseline (2007), we analyzed 2891 participants who became a precarious or permanent worker or unemployed at follow-up (2008) among waged workers who were permanent or precarious workers at baseline. Workers were classified as permanent workers if they had full-time, secure jobs and were directly hired by their employers; workers not meeting all these criteria were classified as precarious workers. Depressive symptoms were assessed annually using the 11-item Center for Epidemiologic Studies Depression Scale. To reduce potential bias due to pre-existing health conditions, we also examined the association in a subpopulation excluding participants with any pre-existing chronic disease or disability.

Results Compared to those who maintained permanent employment, workers who became unemployed following precarious employment had higher odds of developing depressive symptoms [odds ratio (OR) 2.30, 95% confidence interval (95% CI) 1.01–5.25]. In gender-stratified analyses, new-onset depressive symptoms were strongly associated with the change from precarious to permanent employment (OR 2.57, 95% CI 1.20–5.52) as well as the change from permanent to precarious employment (OR 2.88, 95% CI 1.24–6.66) among females; no significant association was observed in the male subpopulation.

Conclusions This study found that changes from precarious to permanent work or from permanent to precarious work were associated with new-onset depressive symptoms among South Korean women.

Key terms depression; gender difference; mental health.

The number of workers in precarious employment has been increasing worldwide (1). According to the Organization for Economic Cooperation and Development (OECD) statistics, more than 1.8 billion people – more than half the labor force in developing countries – are currently working without formal contracts and benefits and earning low wages. This number is expected to increase to two-thirds of the workforce in developing countries by 2020 (2). Evidence also demonstrates an increase in precarious employment and a decrease in

permanent full-time employment in developed countries in Europe and North America (3–5).

It is well-known that unemployment is an independent risk factor for poor mental health status, including depression (6–7). For example, Brenner and Levi's research using longitudinal data on Swedish women suggests that long-term unemployment could be associated with poor psychological well-being and severe depressive reaction (8). However, much less research has been devoted to determining whether precarious employment

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is related to mental health outcomes, despite indications that precarious employment involves lower income, job insecurity, lower job autonomy, and poor supervisor support – all potential risk factors for depression (9–11). Several studies in Finland showed that precarious jobs, such as temporary or atypical employment, were associated with depression after adjusting for potential confounders (12–14). Another study, of female workers in South Korea, reported that precarious employment is associated with a higher prevalence of mental disorders compared to permanent employment (15). However, due to their cross-sectional design, these studies could not determine the temporal relationship between precarious employment and depression (12–15). In addition, Virtanen et al (16) showed that poor mental health conditions such as hostility and aggressiveness are predictive of temporary employment, implying a possible reverse causation: people with poor mental health conditions may be more likely to be precarious employees.

Even among prospective studies, the association between precarious employment and depression is controversial. The Whitehall II study (17) in Britain showed that change toward secure permanent employment was inversely associated with depression among male civil servants. Prospective studies in Denmark have shown that job insecurity, a major characteristic of precarious employment, is an independent predictor of depression (18–19). In contrast, Bardasi et al (20) concluded that precarious employment, including temporary and part-time employment, was not related to mental health. Further, very few employment transitions were associated with worsening health outcomes using 10-year longitudinal data with annual follow-up. Importantly, these previous prospective studies were conducted in Western countries, which have different social contexts in terms of labor market policies and welfare states, perhaps making them less applicable to East Asian countries (18–21).

Emerging concerns suggest that women's health could be disproportionately affected by precarious employment (22). Menendez et al (23) pointed out that gender division of labor and patriarchy are more likely to force women to work in precarious employment with lower-paid and shorter-term contract jobs. Additionally, women with precarious jobs tend to experience constant variations in work schedule, producing hardship in balancing work and family responsibilities. However, few studies have examined how the impact of precarious employment on health could differ by gender.

South Korea, which has a relatively weak labor force and underdeveloped welfare programs (24–25), has experienced an increase in the precarious workforce in the last two decades. In 2010, an estimated 39.7% of male workers and 63.5% of female workers were precarious employees in South Korea (26). Therefore, we prospectively examined how change in employment

status is related to new-onset depressive symptoms and whether this association differs by gender using nationally representative data from South Korea.

Methods

We analyzed data from the ongoing Korean Welfare Panel Study (hereafter KOWEPS), an annual, nationwide, longitudinal study of a representative sample of 18 856 participants from 7072 households who were recruited by two-stage stratified cluster sampling at baseline (www.koweps.re.kr). In conjunction with the Social Welfare Research Institute of Seoul National University, the Korean Institute of Social and Health Affairs launched KOWEPS in 2006. To date, data from the 1st through the 4th waves (2006–2009) have been publicly released. A full description of the study can be found in the most recent version of the KOWEPS user's guide (27).

The classification of employment in the 1st wave survey (conducted in November–December 2006) was different from the 2nd and 3rd wave surveys (conducted in April–July of 2007 and 2008, respectively); the present analyses used participants from the 2nd survey as a baseline study population to maintain consistent classification of employment status over time. At each of the three surveys, the interviewer queried the worker's employment status at December 31 of the prior year.

Measurement of employment status

Employment status of waged workers was classified as either permanent or precarious. KOWEPS contains a structured set of questions to define precarious employment, accounting for the unique employment situations in South Korea. In this study, only workers who satisfied *all* four of the following conditions were defined as permanent workers: (i) directly hired by their employers (not subcontracted or dispatched workers or self-employed workers without employees); (ii) full-time workers (not part-time workers); (iii) no fixed term in their employment contract (not temporary workers); and (iv) a high probability of maintaining the current job (having relatively less job insecurity and not a day laborer). Those who did not meet all four criteria were categorized as precarious workers. Unemployed workers were defined as those who were not employed at the time of the survey and had been actively looking for a job during the previous four weeks. Day laborers and temporary workers who were not working at the time of survey but planned to work were classified as precarious workers.

There were 17 478 participants at baseline (2nd wave survey of KOWEPS, 2007). The baseline study

population was limited to participants who did not have depressive symptoms and who were either permanent workers or precarious workers older than 18 years. After excluding workers with missing values for any variables used in the analyses, a total of 2891 workers were analyzed in this study (figure 1.). We measured the change in employment status by checking employment status at follow-up (3rd wave survey, 2008). When employment status was permanent or precarious worker or unemployed at follow-up (2008), they were included in the analyses (hereafter, full population). Therefore, change in employment status was categorized into six groups: (i) maintaining permanent employment (reference group); (ii) changing from permanent to precarious employment; (iii) becoming unemployed from permanent employment; (iv) maintaining precarious employment; (v) changing from precarious to permanent employment; and (vi) becoming unemployed from precarious employment.

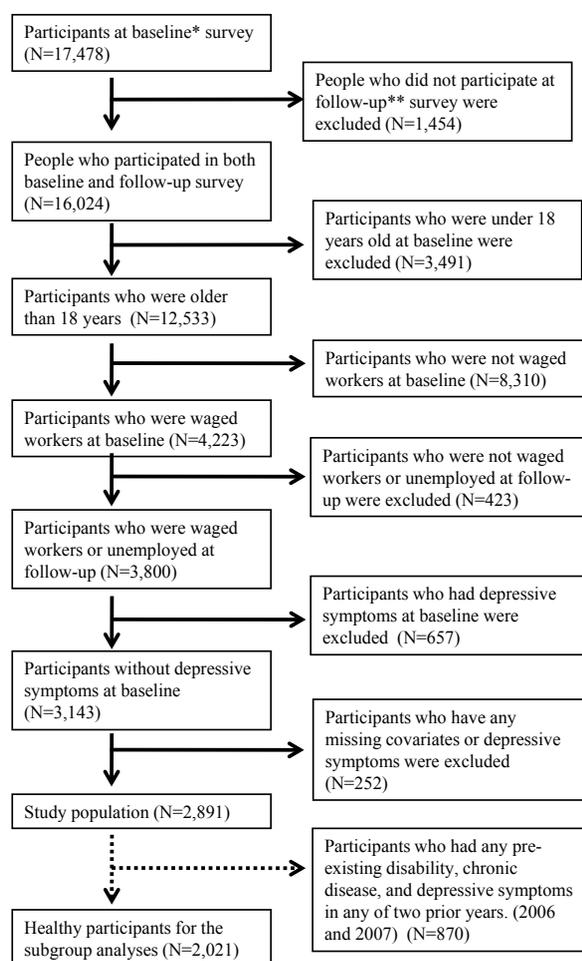


Figure 1. Flow diagram for selection of study population. * 2nd wave survey (2007) of the Korean Welfare Panel Study. ** 3rd wave survey (2008) of the Korean Welfare Panel Study

Outcome variables and covariates

Using the 11-question version of the Centers for Epidemiologic Studies Depression Scale (hereafter, CES-D), KOWEPS assessed depressive symptoms annually (28). The summed score of the 11-question version CES-D ranged from 0–33 and the present study defined conditions with a summed score >9 as depressive symptoms (29). Several validation studies have shown that CES-D has a reasonable psychometric property in South Korea and other East-Asian countries (30–33).

All potential confounders were measured at baseline survey (2007). Age was included as a continuous variable; education was classified as junior high or less, high school, college, and university or more; marital status was divided into currently married, never married, and previously married, including the widowed and divorced; and residential area was assessed as living in a metropolitan area or in a rural area. Equivalized household income, calculated by dividing household income by the square root of the number of household members, was log-transformed and included as a continuous variable.

We also considered health-related confounders – disability, chronic disease, and smoking – measured at baseline. They were included as dichotomous variables: having any disability (versus none), having any chronic disease (versus none), and current smoker (versus current non-smoker).

Data analysis

Multivariate logistic regressions were applied to examine the associations between change in employment status and new-onset depressive symptoms. To examine whether the association differed by gender, we created five interaction terms by multiplying gender and change in employment status. In addition, to reduce potential bias due to pre-existing health conditions, we generated a smaller population (hereafter, subpopulation) after excluding workers who had pre-existing disability, chronic disease, or depressive symptoms in any of the two prior years (2006 and 2007). We checked the significance of five interaction terms as a whole in a fully-adjusted model with the full population as well as the subpopulation. Because depressive symptoms in workers belonging to the same family could be interrelated (598 workers had family members among 2891 workers), we used the Huber-White sandwich estimator to calculate odds ratio (OR) confidence intervals (CI) robust to within-family correlation (34–35). The associations are summarized as estimated OR with their 95% CI. All analyses were performed using STATA/SE version 11.0 (StataCorp, College Station, TX, USA).

Results

Compared to workers who maintained permanent employment, precarious workers were more likely to be women, have less education, be previously married, be smokers, and have chronic diseases (table 1). The overall incidence of depressive symptoms was 9.5% (274/2891 participants), but tended to be higher for females, people aged ≥ 65 years, and those with less education. Previously married people were more likely

Table 1. Employment status and incidence of depressive symptoms at follow-up (2008) among workers in South Korea without depressive symptoms at baseline (2007), by sociodemographic characteristics and health-related conditions (N=2891). [Perm employ=permanent employment; precar employ=precarious employment.]

Characteristics	Perm employ (N=1654)	Precar employ (N=1237)	P-value ^a	New-onset depressive symptoms (N=2891) %	P-value ^b
	%	%			
Sociodemographics					
Gender			<0.001		0.034
Male	66.9	57.4		8.6	
Female	33.1	42.6		11.0	
Age (years)			<0.001		0.003
≤ 24	3.3	2.2		2.6	
25–34	31.9	22.1		7.8	
35–44	35.2	30.0		7.8	
45–54	20.8	22.1		11.5	
55–64	7.1	14.1		13.4	
≥ 65	1.8	9.5		14.2	
Education			<0.001		<0.001
Junior high or less	12.3	30.4		16.4	
High school graduate	38.1	39.0		9.2	
College graduate	14.5	8.6		9.0	
University graduate or more	35.2	22.0		5.4	
Marital status			<0.001		<0.001
Currently married	73.2	70.4		8.6	
Never married	22.2	19.0		8.8	
Previously married	4.6	10.7		20.2	
Residential area			0.366		0.068
Rural area	49.0	47.3		8.5	
Metropolitan area	51.0	52.7		10.4	
Health-related conditions					
Smoking			0.002		0.485
Yes	37.3	31.8		10.0	
No	62.7	68.2		9.2	
Having any disability			0.127		0.670
Yes	2.8	3.8		10.8	
No	97.2	96.2		9.4	
Having any chronic disease			<0.001		0.002
Yes	15.1	26.0		12.9	
No	84.9	74.0		8.6	

^a P-value of the Chi-square test comparing the distribution of precarious and permanent employment in the different groups.

^b P-value of the Chi-square test comparing the incidence of depressive symptoms in the different groups.

to develop depressive symptoms compared to those never or currently married. Individuals with disabilities and chronic diseases were also more likely to develop depressive symptoms.

Table 2 shows a gender-specific distribution of the study population by change in employment status and new-onset depressive symptoms at follow-up. For males, 49.9% maintained permanent employment at follow-up, and 7.2% developed depressive symptoms at follow-up. For females, 39.2% maintained permanent employment, and 7.1% developed depressive symptoms at follow-up. The distribution of new-onset depressive symptoms was similar between male and female workers across change in employment status in general; however, female workers had a higher incidence of new-onset depressive symptoms than male workers among those workers who changed from precarious to permanent employment (11.6% versus 6.8%) or became unemployed from precarious employment (26.7% versus 18.5%).

Association between change in employment status and depressive symptoms

After adjusting for confounders, our analyses showed that the odds of depressive symptoms among people who became unemployed from precarious employment were 2.3 times higher (OR 2.69, 95% CI 1.01–5.85) (table 3). However, no significant association was observed in the subpopulation analyses restricted to workers without any chronic disease or disability at baseline.

Both populations were checked for gender interaction: the P-value for five gender interaction terms as a whole was 0.545 in the full population and <0.001 in the subpopulation. Since there was a statistically significant interaction by gender in the subpopulation, we stratified the subpopulation by gender and examined the association between change in employment

Table 2. Change in employment status and new-onset depressive symptoms, stratified by gender (N=2891).

Employment status Baseline (2007) Follow-up (2008)	Male (N=1874)				Female (N=1077)			
	Distrib- ution		Incidence of depressive symptoms		Distrib- ution		Incidence of depressive symptoms	
	N	%	N	%	N	%	N	%
Baseline: permanent								
Follow-up: permanent	906	49.9	65	7.2	422	39.2	30	7.1
Follow-up: precarious	181	10	16	8.8	108	10.0	16	14.8
Follow-up: unemployed	17	0.9	2	11.8	20	1.9	2	10.0
Baseline: precarious								
Follow-up: precarious	343	18.9	45	13.1	331	30.7	46	13.9
Follow-up: permanent	340	18.7	23	6.8	181	16.8	21	11.6
Follow-up: unemployed	27	1.5	5	18.5	15	1.4	4	26.7

Table 3. Association between change in employment status and new-onset depressive symptoms (2008) in South Korea. [OR=odds ratio; 95% CI=95% confidence interval]

Employment status Baseline (2007) Follow-up (2008)	Full population (N=2891)				Subpopulation ^a (N=2021)			
	Unadjusted		Fully adjusted ^b		Unadjusted		Fully adjusted ^c	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Baseline: permanent								
Follow-up: permanent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Follow-up: precarious	1.61 ^d	1.06–2.47	1.25	0.81–1.94	2.06 ^e	1.21–3.48	1.66	0.97–2.84
Follow-up: unemployed	1.57	0.55–4.53	1.27	0.45–3.65	0.71	0.09–5.30	0.57	0.80–4.05
Baseline: precarious								
Follow-up: precarious	2.03 ^f	1.50–2.74	1.22	0.88–1.68	2.09 ^f	1.38–3.15	1.44	0.94–2.23
Follow-up: permanent	1.20	0.83–1.73	1.00	0.68–1.46	1.40	0.87–2.25	1.22	0.75–1.96
Follow-up: unemployed	3.54 ^e	1.65–7.60	2.30 ^d	1.01–5.25	3.98 ^d	1.30–12.18	2.67	0.84–8.40

^a The population includes workers without a disability or chronic disease at baseline and without depressive symptoms in the two prior years (2006 and 2007).

^b Adjusted for age, sex, marital status, educational level, household equivalized income, residential area, smoking status, having any chronic disease, and having any disability at baseline.

^c Adjusted for age, sex, marital status, educational level, household equivalized income, residential area, and smoking status at baseline.

^d P<0.05.

^e P<0.01.

^f P<0.001.

Table 4. Gender-specific association between change in employment status and new-onset depressive symptoms (2008) in South Korea. [OR=odds ratio; 95% CI=95% confidence interval]

Employment status Baseline (2007) Follow-up (2008)	Fully adjusted model in the subpopulation ^{a, b}					
	Male (N=1296)			Female (N=725)		
	N	OR	95% CI	N	OR	95% CI
Baseline: permanent						
Follow-up: permanent	709	1.00	Referent	329	1.00	Referent
Follow-up: precarious	121	1.19	0.57–2.50	73	2.88 ^c	1.24–6.66
Follow-up: unemployed	10	1.54	0.21–10.98	15 ^d		
Baseline: precarious						
Follow-up: precarious	192	1.59	0.90–2.81	182	1.50	0.69–3.25
Follow-up: permanent	253	0.76	0.39–1.46	115	2.57 ^c	1.20–5.52
Follow-up: unemployed	11	0.84	0.10–7.00	10	8.01 ^e	1.99–32.26

^a Adjusted for age, sex, marital status, educational level, household equivalized income, residential area, and smoking status at baseline.

^b The population includes workers without a disability or chronic disease at baseline and without depressive symptoms in the two prior years (2006 and 2007).

^c P<0.05.

^d Female workers who became unemployed from permanent employment were excluded in the analysis because none of them developed depressive symptoms at the follow-up.

^e P<0.01.

status and new-onset depressive symptoms separately for male and female workers (table 4). No statistically significant association was observed in the male subpopulation. However, in the female subpopulation, changes from permanent to precarious employment (OR 2.88, 95% CI 1.24–6.66) and from precarious employment to unemployed (OR 8.01, 95% CI 1.99–32.26) were significantly associated with new-onset depressive symptoms. Further, the change from precarious to

permanent employment was also significantly associated with new-onset depressive symptoms (OR 2.57, 95% CI 1.20–5.52) in the female subpopulation.

Discussion

Our results indicate that changes from precarious to permanent work or from permanent to precarious work were associated with new-onset depressive symptoms among South Korean women. Workers who became unemployed following precarious employment had higher odds of developing new-onset depressive symptoms compared to those who maintained permanent employment, after adjusting for confounders. Additionally, the association between change in employment status and new-onset depressive symptoms was affected by workers' gender in the subpopulation analyses restricted to workers without any chronic disease or disability at baseline and without depressive symptoms in the two prior years (2006 and 2007).

The gender stratification revealed a significant difference in the association between change in employment status and new-onset depressive symptoms. Notably, new-onset depressive symptoms were strongly associated with a change from precarious to permanent employment as well as from permanent to precarious employment for female workers. However, no significant association was observed for male workers. It is also noteworthy that in a subpopulation of healthy male workers, those who became unemployed from precarious employment were not at greater risk of new-onset depressive symptoms.

This phenomenon suggests a possibility that baseline physical illness may be the reason for developing depressive symptoms for male workers who became unemployed following precarious employment. The potential role of baseline physical illness in unemployment could also be investigated; it is possible that unhealthy workers were laid off due to their physical conditions, while healthy workers were laid off for financial or other reasons not connected to their health.

Interestingly, we also detected a strong association with depressive symptoms for female workers changing from precarious to permanent employment. This perhaps indicates that a shift toward secure, full-time employment may put female workers at risk for depressive symptoms. The finding is consistent with a previous Korean study describing that female workers who moved from precarious to permanent employment reported poorer health compared to female workers who maintained permanent employment (36). At least three explanations can be proposed. First, women may have more difficulty maintaining work/life balance when holding a full-time job than part-time precarious employment because they retain considerable domestic responsibilities. This is particularly plausible in South Korea, where, because of strong patriarchal social traditions (24) and the Confucian ideology of male superiority (37), females are required to undertake most domestic responsibility regardless of their employment. A second possible explanation is that the permanent jobs available to female precarious workers, though more secure, may not be better in terms of wages or working conditions. Previous research found pervasive work-related discrimination (eg, discrimination in hiring, pay, and promotion) for female workers in South Korea (38). Finally, it is possible that female workers moving from part- to full-time work are making the shift due to a partner's illness or disability that prevents full-time work. Since previous studies found that family caregivers are at high risk of developing depressive symptoms (39), female workers who increase their work hours to support an ill or disabled partner are likely at high risk of developing depressive symptoms. Future studies are required to investigate the exact mechanisms by which employment change produces poor health outcomes among female workers, with more consideration that women's health could be disproportionately affected by the labor market and workplace flexibility (23).

In the analyses with the full population, an interesting difference was noted in the relationship between becoming unemployed and new-onset depressive symptoms based on workers' previous employment status. When precarious workers became unemployed, the odds of developing depressive symptoms were significantly higher than for those who remained permanently employed. However, permanent workers who lost their

jobs were not at a higher risk for depressive symptoms. Previous studies in South Korea have shown that precarious workers are more likely to have poor mental health than permanent workers (15, 40). Additionally, unemployment is an important risk factor for depressive symptoms (7, 41–42). Therefore, the change from precarious employment to unemployment could be a "double burden" to mental health.

An alternative explanation for this phenomenon is social, financial, and contextual issues that are often involved when a worker becomes unemployed. For example, permanent employment is more likely to be seen as "official employment" compared to precarious employment in the context of receiving severance pay. In South Korea in 2010, 27.3% of precarious workers were eligible for severance pay compared to 99.3% of permanent workers (26). Additionally, the change from permanent employment to unemployment could be voluntary: permanent workers were defined as those with good job stability, making them less likely to be forced to leave a position. Thus, in terms of financial status and social support, permanent workers may be better equipped to deal with unemployment than precarious workers. Notably, however, our study may prohibit a valid inference because of the small number of participants who transitioned to unemployed from permanent employment (N=41).

Finally, a biological pathway could be considered because both unemployment and precarious employment might affect human immune functions (43). Arentz et al (44) reported that unemployment may aggravate some aspects of the immune system such as phytohemagglutinin reactivity of lymphocytes. Job insecurity, which is common in precarious employment, is also known to be associated with an increased risk of flu-like illness even after adjusting for confounders such as the presence of a longstanding illness (45). More biological research is required to understand how becoming unemployed from precarious employment is linked to depressive symptoms.

The present analyses have several limitations. First, there could be issues in classifying precarious employment due to the dichotomous classification. But since this potential misclassification was not associated with new-onset depressive symptoms, we expect any misclassification to be non-differential, which might bias the result toward the null. Another issue is that the definition of precarious employment in this paper includes the female workers who voluntarily decided to work part-time because their partner is the main breadwinner, and those workers may not be at a higher risk of feeling job insecurity or depression. Future research could use a more specific classification or a continuous scale such as "precariousness", which can capture differences within each of the categories of permanent and precarious employment (10, 46–47).

Second, there may be potential selection bias. Participants who developed depressive symptoms were less likely to participate in the follow-up survey, and these individuals were more likely to be precarious workers or unemployed. However, 92% of the baseline study population completed the survey at follow-up, thus the influence of selection bias on the association is expected to be relatively small.

Third, despite adjusting for potential confounders, including health-related conditions, unmeasured residual confounders may exist. We did not have any information about participants' medical history of depressive symptoms or other mental disorders. However, our analyses adjusted for baseline health conditions (ie, having any chronic diseases or any disability), which are strongly related to depressive symptoms (48, 49), and we also found a consistent relationship in the sub-population analyses after excluding participants with depressive symptoms during the two prior years. So the bias caused by these unmeasured confounders would not fully explain the strong association we found.

The present study has several strengths. First, we obtained a large study population that is nationally representative of South Korea. Second, compared to previous cross-sectional studies in South Korea (15, 40), the present study's prospective design, which excluded participants with depressive symptoms at baseline, makes it robust against the possibility that people with depressive symptoms are more likely to become precarious workers. Third, we found significant relationships between change in employment status and new-onset depressive symptoms after adjusting for potential confounders and excluding participants with other health conditions that could be a source of new-onset depressive symptoms. Fourth, permanent and precarious employment was assessed using a structured questionnaire that considered the unique employment relationships in South Korea. Compared to previous research that defined precarious employment as workers with part-time, daily labor, and temporary employment (40), the definition of precarious employment in the present research included other types of vulnerable employment, such as subcontract workers, dispatched workers, etc. Finally, most previous studies focused on the health effects of transition from precarious to permanent employment (50–52), but the present analyses also explored the health effect of changing from permanent to precarious employment.

Concluding remarks

This study found that becoming unemployed is associated with new-onset depressive symptoms when previous employment status was precarious. Additionally, we reported a specific impact on female workers, showing that changes from precarious to permanent employment

and from permanent to precarious employment were associated with new-onset depressive symptoms only among females. To our knowledge, this is one of the first prospective studies to show that the association between change in employment status and depressive symptoms differs by workers' gender.

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