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Mechanisms Linking Employment Type and Health:
Panel Data Analysis with Fixed-Effects Models

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Using twelve waves of data from the Korean Welfare Panel Study (2006-2017), we evaluate mechanisms linking employment type to various health outcomes, including depression, self-esteem, and self-rated health with a focus on differences between standard and other types of employment. Guided by prior research, we examine several mechanisms such as economic insecurity and psychosocial stressors, using fixed-effects models that control for unobserved time-invariant individual heterogeneity. Our findings confirm the importance of selection in that much of the association between employment type and health observed in simple cross-sectional OLS models loses significance in fixed-effects models. We also find supporting evidence for the mediating role of economic insecurity and psychosocial stressors. For instance, the lower levels of satisfaction in job and life conditions help explain lower self-esteem of male nonstandard workers relative to standard workers. It is also interesting that the hypothesized mediators often suppress the relationship between employment status and health in which a significant relationship is revealed only when the specific mediator is taken into account. Findings of this study will shed valuable insights on the pathways in which specific employment types affect men's and women's health outcomes.

Keywords: Nonstandard Employment, Self-employment, Health, Fixed-effects Models, Mechanisms, Depressive Symptoms, Self-esteem, Self-rated Health

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Ⅰ. Introduction

South Korean society has experienced substantial transformations in its economic and labor market structure in recent decades. Of particular importance is an increasing labor market segmentation between standard, full-time jobs and nonstandard jobs (and self-employment), which has been intensifying after the financial crisis of the late 1990s. The rise of nonstandard employment (e.g., part-time, temporary, and contract work) and self-employment has drawn much scholarly and public attention due to often poor job quality and potentially negative implications for workers (e.g., Holzer, Lane, Rosenblum, & Andersson, 20111; Kalleberg, 2009). Nonstandard employment, also referred to as atypical, contingent, irregular, nontraditional, or precarious work, deviates from standard employment, which is regular, full-time work with expectations of continuous employment (Houseman, & Osawa, 2003; Kalleberg, 2000).[1] In particular, health implications of nonstandard work have received growing attention since many characteristics associated with nonstandard work, such as job insecurity and low income, are found to be important social determinants of health (Benach et al., 2014; De Witte, Pienaar, & De Cuyper, 2016). Understanding health effects of nonstandard work is important for South Korean society in light of the large share of nonstandard work and discriminatory treatment against nonstandard workers under rigid labor market segmentation. The percentage of nonstandard workers, including both those in waged work and self-employment, is unusually high in South Korea among OECD countries (OECD, 2015). According to recent data, about one out of three waged workers are classified to hold nonstandard jobs, and the share of workers who are

1) It is worth noting that many scholars in the US and Europe classify self-employment as a form of nonstandard employment in that it deviates from the traditional full-time, standard employment arrangement (e.g., Kalleberg, 2000). In South Korea, government statistics separate self-employment (classified as nonwaged work) from other nonstandard employment arrangements (classified as waged work). Following the standard of the Korean government and also considering the high proportion of self-employment in the Korean labor market, we separate self-employees from other nonstandard workers in our analyses.

self-employed is over 20% (Ministry of Employment and Labor, 2017). In addition, South Korean nonstandard workers are exposed to unfavorable work conditions, including low wages, lack of benefits, and employment instability, all of which may have negative effects on health (Ban, 2012; Kim, 2014; Sohn, 2011).

Prior research finds that nonstandard work and self-employment are often negatively associated with workers' health in South Korea (e.g., depressive symptoms and physical health). In particular, evidence from studies that explicitly deal with endogeneity and selection indicates that the health impact of nonstandard work and (self-employment) is likely causal (e.g., Byun & Lee, 2018; Kim, Kim, Park, & Kawachi, 2008; Lim, Jeon, Kim, & Woo, 2018). However, relatively little research has evaluated the exact pathways of nonstandard work and self-employment to health disadvantages. Existing studies are also limited in that they relied mostly on a single health outcome or mechanism and, more importantly, often fail to consider the potential role of selection (e.g., Lee, Do, & Cho, 2017). To address this gap in the literature, our study examines several mechanisms linking employment status to various health outcomes, such as economic insecurity and psychosocial stressors, while controlling for unobserved heterogeneity. For this purpose, we use nationally representative longitudinal data (Korean Welfare Panel Study) to estimate fixed-effects models with a focus on gender differences. As far as we know, very few studies have examined various mediators in the relationship between employment type and multiple health outcomes, net of the potential role of selection, like we do. Findings of this study will shed valuable insights on the pathways in which a specific employment type affects men's and women's health outcomes. These results will further help create effective policy measures to mitigate negative health implications of unstable employment status (e.g., nonstandard work) in South Korea.

II. Theoretical and Empirical Background

1. Employment type and health

Due to their inferior job quality in comparison to standard employment, nonstandard jobs (including self-employment) are often considered "bad" (Kalleberg et al., 2000). As well documented, nonstandard workers and self-employees often receive low wages and lack fringe benefits (e.g., Hozler et al., 2011; Kalleberg et al., 2000). Those in nonstandard/self-employment are also less likely than regular, full-time employees to be protected by unions and labor laws (Quinlan, 1999; Sverke, Hellgren, & Naswall, 2002). More important, the rising share of nonstandard/self-employment reflects fundamental changes in the employment landscape given that it has increased economic instability and inequality among workers (Holzer et al., 2011; Kalleberg, 2011). For these reasons, scholars view the spread of nonstandard work and self-employment as an indicator of increasing employment pricarity in the global economy, since the risks have been increasingly transferred from employers to workers (Kalleberg, 2000, 2009; Rodgers, 1989; Vosko, 2010).

A growing body of literature has documented negative effects, including bad health outcomes, of nonstandard work arrangements (including self-employment) on workers. Studies in the United States and Europe, for instance, find that nonstandard work and self-employment are often associated with mental health problems (e.g., depressive symptoms) to higher mortality risk and to physical health problems (e.g., self-rated health, coronary heart disease, and occupational injuries) (for a review see Benach et al., 2014; Price & Burgard, 2008). It is worth adding here that the impact of nonstandard work arrangements on health may differ by gender. Across most industrial countries, women make up a large percentage of nonstandard workers. This trend is referred to as "the feminization of nonstandard employment" (Blossfeld & Hakim, 1997; Kalleberg, 2000). Theoretical explanations for women's

disproportionate representation in nonstandard employment often emphasize flexibility (e.g., reduced work hours and flexible schedules), which help realize women's work/life balances and/or preferences (Blossfeld & Hakim, 1997; Hakim, 1997). On the other hand, some scholars view women's nonstandard work to be a consequence of the labor market structure that restricts women from obtaining (high-quality) standard employment (e.g., Walsh, 1999; Yu, 2002). No matter what stance is taken, these theoretical explanations suggest that women's nonstandard work should be understood in the context of both labor market and family, which has different health implications by gender (e.g., Benach et al., 2014; Kalleberg et al., 2000).

2. Mechanisms linking employment status and health

1) Economic instability and health outcomes

Evidence from prior research suggests several mechanisms that may underlie the relationship between employment type and health outcomes. First of all, limited economic resources and the financial insecurity of nonstandard workers can affect workers' health adversely since economic resources from employment are the major source for workers to purchase goods and services critical for maintaining and enhancing good health (Burgard & Lin, 2013). The importance of economic resources is well documented: for instance, unemployment and associated economic strain have a detrimental impact on both physical and mental health outcomes (Price, Choi, & Vinokur, 2002;). Among South Korean workers, low income was found to be among the main factors accounting for high depressive symptoms for temporary workers as well as self-employed individuals (e.g., Song & Kim, 2012).

Beyond objective economic conditions, economic insecurity and unstable labor market status may harm workers' health. Studies increasingly document that the fear or perception of economic insecurity itself is a risk factor for health. The fear of

losing one's job in the near future is negatively associated with both mental and physical health outcomes (Sverke, Hellgran, & Näswall, 2002). In addition, the direct experience of employment instability (e.g., firm restructuring or layoff) led to poorer physical health (self-rated) and biomedical indicators (e.g., Ferrie, Shipley, Stansfeld, & Marmot, 2002; Geuskens, Koppes, van den Bossche, & Joling, 2012). Various theories, including work stress theories and the job demand control model, also indicate that job insecurity has a negative effect on workers' health due to lack of control and an imbalance in expectations between employers and employees (e.g., See De Witte et al., 2016 for a review). Under such circumstances, those with an unstable employment status (e.g., part-time or temporary jobs) are thus exposed to immediate or prolonged stress. Evidence shows that stress can cause a series of health problems, including the malfunction of the immune system, which may trigger negative health consequences (e.g., McEwen, 2002).

In fact, the negative effects of perceived job insecurity on both physical (e.g., incidents of coronary heart disease) and mental health are widely found as confirmed by several meta-analyses (e,g., Sverke, Hellgren, & Näswall, 2002; Virtanen et al., 2013). Furthermore, there is evidence that job instability may link nonstandard work to bad health outcomes: according to a meta-analysis of 27 studies, increased job instability among temporary workers was associated with increased psychiatric morbidity and occupational injuries (2006). Among South Korean workers, job insecurity resulting from unemployment and changes from regular to irregular jobs are also associated with increased stress and a higher level of depression (Byun & Lee, 2018; Koh et al., 2004).

2) Psychosocial stressors and spillover effects

Theories on the link between work and health have also focused on the interplay of work with other domains of life. For example, responsibilities in work can intersect with responsibilities in other domains, such as a caregiver role for the

elderly or children (Bianchi & Milkie, 2010). When conflicts or spillover in responsibilities in work and family occur, workers tend to develop various health problems such as poor self-rated health, hypertension, obesity, and musculoskeletal problems (e.g., Frone et al., 1996; Grzywacz, 2000).

Besides, research documents that the perception of social position is an important determinant of health. According to the Whitehall study of British civil servants, there is a gradient in health (reduced mortality risks) along with the hierarchy of occupational status and rank (Marmot et al., 1998). The effect of relative positions in occupation and employment on health is also found in other studies on hypertension and heart attacks (e.g., Colhoun, Hemingway, & Poulter, 1998; Moller, Theorell, deFaire, Ahlnom, & Hallqvist, 2005). All this evidence implies that nonstandard work (and self-employment) may harm workers' health through increased psychosocial stressors from work and negative spillover effects on other domains of life. The importance of employment in determining one's health may be more salient in South Korea in light of rigid labor market segmentation and limited mobility from nonstandard/self-employment to standard employment. In this context, one's employment status not only signals one's current economic condition and labor market status, but it also indicates future career trajectories and socioeconomic status.

In fact, prior research on US workers finds that nonstandard workers, both men and women, report lower job satisfaction due to the lack of control over the work process, high level of work-related stress, and an undesirable work environment (Benach, 2014; Price & Burgard, 2008). Research further documents that those with lower job satisfaction tend to change jobs more frequently than those satisfied with their jobs (e.g., Carmeli & Weisberg, 2006). Recent studies in South Korea find that nonstandard workers are also less likely than standard workers to be satisfied with their jobs and that a job change from standard to nonstandard work results in declining job satisfaction (e.g., Park & Kang, 2016; Sohn, 2011). More important, evidence shows that differences in job satisfaction are found to help explain health

disparity between standard and nonstandard workers (e.g., Lee et al., 2017).

Work can also have spillover effects on other domains of life, such as family relationships and social network/resources, which may in turn affect health. For instance, differences in social and family relationships account for health differentials between standard and nonstandard workers, and how stressors in each domain affect health also varies by gender in South Korea (Kim, Lim, Song, & Han, 2012). These study findings suggest that holding a nonstandard job or being self-employed, which is likely involved with undesirable job conditions with limited prospects for career advancement in the South Korean labor market, may have a negative impact on a worker's overall life satisfaction and well-being.[2)]

3) Our study

As noted above, one important imitation of prior research is that most studies examining linkages between employment type and health have often relied on a cross-sectional research design (e.g., using a single wave from longitudinal data) and the role of selection and endogeneity was not adequately addressed. It is therefore not clear to which extent the observed effects of mediating factors reflect selection or causality. This is unfortunate in light of growing evidence that unobserved selection may explain substantial health disparity across different employment types (e.g., Byun & Lee, 2018; Kim et al., 2012; Lim et al., 2018). Therefore, evidence is very limited about exact pathways linking specific employment types to health outcomes when the potential role of selection is controlled for.

2) The Korean Welfare Panel Study provides multiple measures for the level of a respondent's satisfaction in various domains, including job, family relationship, social relationship, and overall life conditions. In the supplementary analyses, we evaluated whether the level of satisfaction in these domains mediated the association between nonstandard work and health outcomes. We found evidence for the mediating role of job and overall life satisfaction, but not for family and social relationships. For the models to be parsimonious and also because of space limitations, we therefore decided to include the levels of satisfaction with job and overall life conditions in the analyses.

To address these limitations, in this study we attempt to account for endogeneity using multiple waves of longitudinal data and fixed-effects models. Fixed-effects models control for time-invariant, unobserved individual heterogeneity such as personality, unmeasured health conditions, and motivations/preferences that may select individuals into different employment types and affect the association between work and health (Wooldridge, 2002). By doing so, we evaluate the role of mediators in linking employment status to health outcomes while taking into account endogeneity. In addition, we broaden the literature by evaluating several posited mechanisms that may underlie the associations between employment types and multiple health outcomes, including economic insecurity and psychosocial stressors (see Data and Methods section for details). Employing multiple health outcomes and various mediators will enhance our understanding regarding the health impact of nonstandard work since pathways linking work to health might differ by the dimension of health considered (e.g., Burgard & Lin, 2013).

Ⅲ. Data and Methods

1. Data

In this study, we use 12 waves of data from the Korean Welfare Panel Study (KWPS). The KWPS is an annual longitudinal study, which was designed to represent 90% of the 2005 Census (excluding islands and special facilities). The baseline survey (2006) included a representative sample of 15,251 individuals from 7,072 households with oversampling of low-income households. In 2012 (wave 7), a new panel of 1,500 households was added to address sample attrition. As of 2012, 6,581 households out of 6,723 households that were included in the survey (including the original panel and a new panel added in 2012) completed interviews with a

response rate of 97.89%. The retention rate of the original panel was 62.19% in wave 12 (i.e., 4,398 out of 7,072 households remained in the study). The KWPS suits well the purpose of this study since it provides information on respondents' labor market activities along with various health outcomes and posited mechanisms (e.g., income instability and job satisfaction) considered in the study.

In light of our research question that examines mechanisms linking different employment types and health outcomes, our analytic sample includes men and women of working ages (18 – 64 years old). In addition, listwise deletion is used to handle missing cases since the proportion of missing cases is small. For example, in the case of annual income (which has the most missing cases) only 2.4 percent of the sample among those who provide complete information on health outcomes do not report income. Analytic sample includes 46,451 person-year observations for men and 51,633 for women (in the case of depressive symptoms) and the sample size is a little smaller for other health indicators (see Table 3 for details).

2. Measures

1) Health outcomes

In this study, we consider both mental and physical health outcomes using depressive symptoms, self-esteem, and self-rated health. First, depressive symptoms are measured based on the CES-D scale (11 items) with the question about how many days a respondent has experienced specific symptoms each week. Four response options range from 0-1, 2-3, 4-5, to 6-7 days. After reverse coding two items with positive wording, the level of depressive symptoms was calculated as a mean response to the 11 items (an alpha reliability is 0.87) in order to address missing responses for some of the items (e.g., Lim & Raymo, 2016). Second, self-esteem is based on 10 times from Rosenberg's global self-esteem. Respondents are asked on a 4-point scale for 10 items (e.g., I have a positive attitude toward

me), ranging from strongly disagree, average/so- so, agree somewhat, to strongly agree. Similar to self-esteem, items with negative wording (e.g., I feel I do not have much to be proud of) were reverse-coded and all items are calculated as a mean response to 10 items (an alpha reliability is 0.80). Third, self-rated health is based on a question about a respondent's overall physical health conditions. Five response options include very dissatisfied, dissatisfied, neither dissatisfied nor satisfied, satisfied, and very satisfied.[3] For these health outcomes, high scores thus refer to higher depressive symptoms/self-esteem, or better physical health conditions.

2) Employment type

Using information on a respondent's labor force participation and employment status, we categorize a respondent's employment type into standard employment (reference), nonstandard employment, self-employment, and non-employment. Specifically, wage workers are divided into standard and nonstandard workers: regular wage workers are coded as standard workers whereas temporary wage workers, daily laborers, and those with other (temporary) public jobs are classified as nonstandard workers. Individuals with self-employment include business owners, self-employees, and family workers. Following the classification of the Korean Statistics Bureau and in consideration of a large proportion of self-employment in Korean labor market, we separate self-employment from nonstandard employment in the analyses.[4] Non-employment refers to those who are unemployed or out of the labor force.[5]

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3) Due to the use of fixed-effects models and for the consistency of results across different health outcomes, we treat the measure of self-rated health as a continuous variable instead of a categorical variable (Lim et al., 2018; Wooldridge, 2002). According to supplementary analyses that estimated both cross-sectional OLS and Ordered Logit Model, results are substantially the same regardless of the choice of model.

4) It is worth noting that many scholars classify self-employment as a form of nonstandard employment arrangements as noted above (e.g., Houseman & Osawa, 2003; Kalleberg, 2000; Kalleberg et al., 2000).

3) Posited Mediators

First, we examine the mediating role of economic insecurity using three measures: (1) annual income (logged), (2) the experience of job instability, and (3) the experience of income instability. For the measure of the experience of job instability, those who experienced a job loss due to lay off, plant closure, or termination of contract over the past year are coded 1. If a respondent is not employed, we coded those who experienced difficulty finding a job due to unstable employment as 1. In addition, those who report "low wages/income or slow business" as a reason for leaving a job (or for those not in the labor force, if they experienced difficulty finding a job since jobs available offered too low wages) was considered to have experienced income instability. Second, as a proxy for psychosocial stressors and spillover effects of work, we include the levels of satisfaction in job and overall life conditions. These measures are based on the question, "How much are you satisfied in this area?" with five response options from very dissatisfactory to very satisfactory. Considering the distribution of responses, we collapse them into three categories, consisting of dissatisfactory, neither satisfactory nor dissatisfactory, and satisfactory.

4) Controls

All models control for various demographic and socioeconomic characteristics that might be related to both one's employment status and health (e.g., Price & Burgard, 2008). Specifically, we consider age, a place of residence (Seoul, metro cities, other cities, town/villages), marital status (single, married, divorced, widowed), and the number of children (0, 1, 2 or more). In addition, we control for the level of education, which includes less than high school, high school, junior college, and

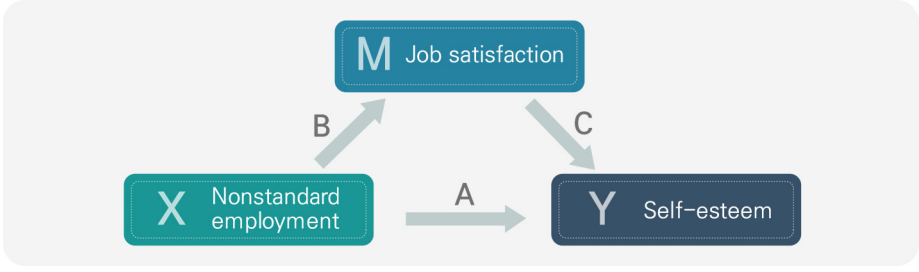
5) Since the primary purpose of this study is to evaluate mediators linking employment type and health outcomes in light of an increasing labor market segmentation and employment instability in South Korea, we will focus mostly on differences between standard employees and those with nonstandard/self-employment when discussing results.

university. Finally, drinking behavior is also considered since alcohol consumption is associated with health outcomes and the pattern of drinking might differ across employment types (Chon, Kim, Cho, & Ryoo, 2010). We measure drinking behavior using the frequency of weekly alcohol consumption, ranging from never, less than 1 time, 2-3 times, to more than 4 times. Except for gender, all covariates are time-varying variables, measured at each interview.

2. Methods

As discussed above, we estimate fixed-effects models to consider the issue of selection. For all health outcomes, we use the Ordinary Least Squares (OLS) regression model out of consideration for the characteristics of health measures and compatibility of results across models (see Footnote 3 and Results section for details). In addition, robust standard errors are used in all models since nonindependence could introduce a bias when the same individuals contribute to multiple observations (for details, see Cameron & Miller, 2015). Considering theoretical debates and empirical evidence on gender differences in the health effects of nonstandard work (e.g., Menéndez et al., 2007), we estimate models separately for men and women.

Figure 1. Path Diagram Showing Mediation



Note: Detailed explanations for mediation analysis are presented in Footnote 6.

Analytically, we conduct two sets of analyses. The first analysis is to estimate and compare results from simple cross-sectional OLS models and fixed-effects models to examine the extent to which selection plays a role in the observed association between employment status and health (Table 3). Then, we estimate fixed-effects models to evaluate several posited mechanisms linking employment type and three health outcomes (Tables 4-6). Specifically, we estimate four models for each health outcome: the baseline model evaluates the relationship between various employment types and health outcomes while controlling for demographic and socioeconomic characteristics as well as health behavior (alcohol consumption). In the next two models, several posited mechanisms (e.g., annual income, the level of job satisfaction) are introduced to examine whether/how the relationships between employment types and health outcomes observed in the baseline model change. The final model (Model 4) includes all posited mechanisms and controls. Figure 1 shows pathways between employment types and health using the example of job satisfaction as a posited mediator (M) linking nonstandard employment (X) and self-esteem (Y). If a significant relationship between nonstandard employment (X) and health outcome (Y) disappears when the hypothesized mediator (M) is included, M is considered to fully mediate between X and Y. If the relationship between X and Y remains but in a smaller magnitude (i.e., weakens), M partially mediates between X and Y.

Ⅳ. Results

1. Descriptive statistics

1) Sample characteristics by gender

<Table 1> presents sample characteristics (means/percentages and standard deviations) for the entire sample and separately by gender. The percentage of standard employment is 28.9%, followed by nonstandard (22.2%) and self-employment (16.6%). When broken down by gender, men are much more likely to be employed in standard employment (39.8%) than women (19.1%). It is also clear that women are concentrated in nonstandard employment: about one fourth hold nonstandard jobs while 45% of women are out of the labor force altogether. The proportion of self-employment is much higher for men (21.2%) compared to women (12.5%), which reflects that many displaced workers (due to layoff or involuntary early retirement) are absorbed into self-employment (Keum, 2012). As for health outcomes by gender, women report more depressive symptoms than men ($p<0.001$), consistent with prior research (Salk, Hyde, & Abramson, 2017). On the contrary, men rate their health better than women ($p<0.001$). There are no notable gender differences in self-esteem.

Table 1. Sample Characteristics by Gender

Variables	Total		Men		Women	
	M/%	SD	M/%	SD	M/%	SD
Age	42.58	12.37	42.83	11.86	42.36	12.81
Employment type						
Standard employment	28.89		39.77		19.10	
Nonstandard employment	22.23		20.09		24.15	
Self-employment	16.58		21.16		12.47	
Nonemployment	32.30		18.98		44.28	
Health outcomes						

Variables	Total		Men		Women	
	M/%	SD	M/%	SD	M/%	SD
Depressive symptoms	1.32	0.42	1.28	0.39	1.35	0.45
Self-rated health	3.48	0.94	3.55	0.92	3.41	0.95
Self-esteem	3.13	0.43	3.13	0.44	3.13	0.42
Annual income (logged)	5.40	3.40	6.72	2.76	4.21	3.48
Experience of job instability	3.18		3.68		2.72	
Experience of income insecurity	3.21		3.69		2.77	
Job satisfaction						
Not satisfied	19.76		21.45		18.24	
Neither	30.48		29.20		31.64	
Satisfied	49.76		49.35		50.12	
Life satisfaction						
Not satisfied	9.17		9.55		8.84	
Neither	34.97		35.14		34.81	
Satisfied	55.86		55.32		56.35	
Region						
Seoul	18.56		17.96		19.11	
Metro Cities	28.68		28.21		29.10	
Cities	37.11		37.47		36.79	
Town/Villages	15.65		16.36		15.00	
Educational attainment						
Less than high school	22.43		17.53		26.84	
High school	36.78		37.88		35.80	
Junior college	13.47		13.00		13.89	
University or more	27.31		31.59		23.47	
Marital status						
Single	21.74		24.72		19.05	
Married	68.23		68.27		68.19	
Widowed	3.47		0.96		5.73	
Divorced	6.57		6.05		7.04	
Number of children						
0	56.75		55.74		57.66	
1	16.32		16.48		16.17	
2+	26.93		27.78		26.16	
Alcohol consumption						
Never	38.72		21.69		54.04	
<= 1 time per week	38.18		38.72		37.69	
2-3 times per week	16.04		26.30		6.80	
>4 times per week	7.06		13.29		1.46	
N	98,084		46,451		51,633	

2) Health outcomes and mediators by gender and employment status

Due to substantial differences in employment type by gender, we further present mean differences in health outcomes and hypothesized mediators by employment status and gender (Table 2). According to Table 2, standard workers, both men and women, have better health outcomes compared to those in other employment types. But there are some nuanced differences too. Nonstandard workers, for instance, report the highest level of depressive symptoms among employed men, but the levels of depressive symptoms are similar between women in nonstandard employment and self-employment. Besides, the finding that self-employed men and women rate their health worse than employees with nonstandard work suggests that working conditions of self-employment, including long hours and poor financial rewards, might have a negative impact on their health (Ban, 2012; Kim, 2014).

With regard to posited mechanisms, those in nonstandard employment are exposed most to both employment instability and income insecurity, in particular among men. It is also worth noting that nonstandard workers, regardless of gender, are least likely to be satisfied with their jobs and overall life conditions among those in the labor force. Overall, results from Tables 1-2 show that those in nonstandard employment and self-employment fare worse than standard workers in terms of health outcomes and posited mediators considered in this study.

Table 2. Health Outcomes and Mediators by Gender and Employment Status

Variables	Men				Women			
	ST	NST	SELF	NON	ST	NST	SELF	NON
Depressive symptoms	1.19	1.31	1.27	1.44	1.25	1.37	1.35	1.39
Self-rated health	3.75	3.52	3.47	3.23	3.70	3.42	3.30	3.32
Esteem	3.25	3.06	3.14	2.96	3.26	3.12	3.14	3.08
Annual income (logged)	8.17	7.35	7.44	2.20	7.57	6.85	4.71	1.19
Experience of job instability	1.82	7.00	0.95	7.12	1.93	5.65	0.67	2.05
Experience of income insecurity	1.52	6.22	1.36	8.18	1.45	4.87	0.90	2.72
Job satisfaction								
Not satisfied	10.20	29.39	18.27	40.16	7.74	20.19	18.38	21.67
Neither	24.68	33.88	30.88	31.86	23.65	32.43	30.26	35.04
Satisfied	65.12	36.74	50.85	27.99	68.61	47.39	51.37	43.29
Life satisfaction								
Not satisfied	3.48	13.54	7.85	19.94	3.83	10.88	8.59	9.96
Neither	26.67	43.85	39.24	39.07	26.41	40.05	35.77	35.32
Satisfied	69.85	42.61	52.92	41.00	69.76	49.08	55.64	54.72
N	18,472	9,334	9,827	8,818	9,863	12,468	6,438	22,864

Note: ST = Standard employment; NST = Nonstandard employment; SELF = Self-employment; Non = Non-employment.

2. Results from regression analyses

1) Comparing results from OLS models and fixed-effects models

While findings from Tables 1-2 are informative, they do not account for potential confounders and the role of selection into different employment types. Therefore, in Table 3 we present results from simple cross-sectional OLS models and fixed-effects models to illustrate the role of selection in the relationship between employment status and health while controlling for various compositional characteristics (that may be related to both labor force participation and health) and robust standard errors in all models.

Table 3. Summary Results from OLS Models and Fixed-Effects Models

Variables	OLS					
	Depression		Self-Esteem		Self-Rated Health	
	Men	Women	Men	Women	Men	Women
Employment type						
Standard employment (omitted)						
Nonstandard employment	0.063***	0.047***	-0.096***	-0.057***	-0.086***	-0.041**
Self-employment	0.031***	0.023*	-0.016*	-0.020*	-0.046**	-0.012
Non-employment	0.219***	0.107***	-0.234***	-0.131***	-0.478***	-0.227***
Variables	**FE**					
	Depression		Self-Esteem		Self-Rated Health	
	Men	Women	Men	Women	Men	Women
Employment type						
Standard employment (omitted)						
Nonstandard employment	0.004	0.007	-0.024**	-0.023***	-0.010	0.022
Self-employment	0.007	0.009	0.013	-0.003	0.036	0.062**
Non-employment	0.068***	0.021**	-0.080***	-0.052***	-0.136***	-0.007
N	46,451	51,633	46,449	51,633	46,446	51,630

Note: All models include robust standard errors and controls (e.g., age, region, education, marital status, the number of children, and alcohol consumption), but results for them are not presented due to space limitation. Full tables are available upon request. * p<0.05; ** p<0.01; *** p<0.001

Results from OLS models reveal stark health disparity between standard employment (reference category) and other employment types. More important, those in nonstandard employment show clear health disadvantages, regardless of gender across all health measures. In addition, self-employed men and women fare worse than standard workers in all health outcomes: one exception is that self-employed women do not differ from those in standard employment in terms of self-rated health.

Next, results from fixed-effects models show that, compared to simple cross-sectional OLS models, many of the negative associations between nonstandard/self-employment and health disappear in fixed-effects models. For

example, the levels of depressive symptoms are no longer significantly higher for those in nonstandard employment and self-employment, regardless of gender (reference is standard employment). It implies that higher depressive symptoms of nonstandard workers, often observed in prior research, might be a reflection of selection of individuals, who have unobserved characteristics that may have a negative impact on mental health, into nonstandard employment (Byun & Lee, 2018; Lim et al., 2018). It, therefore, indicates that the role of selection needs to be taken into account when evaluating health outcomes of nonstandard workers as well as self-employees. At the same time, it is worth noting that nonstandard workers, both men and women, still report lower self-esteem than standard workers even after compositional characteristics—both observed and unobserved—are controlled for.

Interestingly, results from fixed-effects models for self-rated health are quite different from those from OLS models. Significantly negative association of nonstandard work (for both men and women) and self-employment (for men) with self-rated health disappears in fixed-effects models, again indicating the potential role of negative selection. However, women in self-employment report better self-rated health than those in standard employment. It is plausible that self-employed women have unobserved characteristics (e.g, personality or unmeasured health conditions), which may have negative implications for physical health and have been working as a suppressor, and, once they are controlled for, self-employment appears to be conducive to women's self-rated health (Gordon, 2015).

2) Evaluating hypothesized mediators using fixed-effects models

After examining the potential role of selection in the associations between employment status and health outcomes, we evaluate posited mechanisms underlying these associations using fixed-effects models (Tables 4-6). Baseline models (Model 1) are equivalent to those presented in <Table 3> (Panel B).

Table 4. Results from Fixed-Effects Models, Depressive Symptoms

Variables	Men				Women			
	M1	M2	M3	M4	M1	M2	M3	M4
Age	-0.018*** (0.001)	-0.018*** (0.001)	-0.014*** (0.001)	-0.014*** (0.001)	-0.022*** (0.001)	-0.022*** (0.001)	-0.016*** (0.001)	-0.016*** (0.001)
Employment type								
Standard employment (omitted)								
Nonstandard employment	0.004 (0.007)	-0.005 (0.007)	-0.009 (0.007)	-0.117 (0.007)	0.007 (0.007)	0.005 (0.007)	-0.003 (0.007)	-0.003 (0.006)
Self-Employment	0.007 (0.009)	0.004 (0.009)	0.009 (0.009)	-0.001 (0.009)	0.009 (0.010)	0.010 (0.011)	-0.006 (0.010)	-0.004 (0.010)
Non-employment	0.068*** (0.009)	0.037*** (0.010)	0.038*** 0.008	0.017 (0.010)	0.021** (0.007)	0.023** (0.009)	0.005 (0.007)	0.011 (0.008)
Annual income (logged)		-0.007*** (0.002)		-0.005** (0.001)		0.001 (0.001)		0.001 (0.001)
Experience of job instability		0.025** (0.010)		0.021* (0.010)		0.000 (0.012)		-0.010 (0.011)
Experience of income insecurity		0.010 (0.010)		0.001 (0.010)		0.060*** (0.012)		0.042*** (0.011)
Job satisfaction								
Not satisfied (omitted)								
Neither			-0.044*** (0.006)	-0.043*** (0.006)			-0.055*** (0.006)	-0.054*** (0.006)
Satisfied			-0.070*** (0.006)	-0.069*** (0.006)			-0.081*** (0.006)	-0.081*** (0.006)
Life satisfaction								
Not satisfied (omitted)								
Neither			-0.181*** (0.009)	-0.180*** (0.009)			-0.237*** (0.010)	-0.237*** (0.010)
Satisfied			-0.262*** (0.010)	-0.261*** (0.010)			-0.328*** (0.010)	-0.327*** (0.010)
Constant	2.054*** (0.041)	2.086*** (0.042)	2.145*** (0.039)	2.167*** (0.039)	2.284*** (0.045)	2.270*** (0.045)	2.385*** (0.042)	2.372*** (0.043)
N	46,451	46,451	46,451	46,541	51,633	51,633	51,633	51,633

Note: Robust standard errors in parentheses. All models include controls such as age, region, educational attainment, marital status, the number of children, and alcohol consumption, but results for them are not presented due to space limitation. Full tables are available upon request. * p<0.05; ** p<0.01; *** p<0.001

First, <Table 4> provides results for depressive symptoms for men and women. Results from the baseline model show that nonstandard work is not associated with depressive symptoms once time-invariant individual heterogeneity is controlled for.

It applies to both men and women. As discussed above, these results suggest the role of selection into nonstandard and self-employment, which has negative implications for mental health (see Table 3). In addition, non-employment is positively associated with depressive symptoms, regardless of gender. In the next two models (Models 2-3), two sets of posited mechanisms linking nonstandard work and health are introduced, i.e., the measures for economic instability and the levels of satisfaction in job and overall life conditions (as psychosocial stressors). One notable change is that non-employed women no longer report more depressive symptoms than standard workers in Model 3. This change indicates that non-employed women's lower levels of job/life satisfaction (Table 2) account for their significantly higher depressive symptoms than standard workers observed in Model 1. In addition, we find that for men, economic insecurity and lower job/life satisfaction jointly explain a higher level of depressive symptoms among the non-employed (Model 4).

Table 5. Results from Fixed-Effects Models, Self-Esteem

Variables	Men				Women			
	M1	M2	M3	M4	M1	M2	M3	M4
Age	0.003*** (0.001)	0.003*** (0.001)	-0.002* (0.001)	-0.002* (0.001)	0.004*** (0.001)	0.004*** (0.001)	-0.001 (0.001)	-0.001 (0.001)
Employment type								
Standard employment (omitted)								
Nonstandard employment	-0.024** (0.007)	-0.021** (0.007)	-0.008 (0.007)	-0.007 (0.007)	-0.023** (0.007)	-0.020** (0.007)	-0.014* (0.006)	-0.012 (0.006)
Self-Employment	0.013 (0.010)	0.016 (0.010)	0.019* (0.009)	0.021* (0.009)	-0.003 (0.010)	0.002 (0.010)	0.009 (0.010)	0.013 (0.010)
Non-employment	-0.080*** (0.009)	-0.054*** (0.010)	-0.049*** (0.009)	-0.034** (0.010)	-0.052*** (0.007)	-0.037*** (0.008)	-0.037*** (0.007)	-0.025** (0.008)
Annual income (logged)		0.007*** (0.001)		0.004** (0.001)		0.003** (0.001)		0.002* (0.001)
Experience of job instability		0.003 (0.010)		0.006 (0.010)		0.006 (0.011)		0.013 (0.010)
Experience of income insecurity		0.002 (0.010)		0.011 (0.010)		-0.041*** (0.011)		-0.027** (0.011)

Variables	Men				Women			
	M1	M2	M3	M4	M1	M2	M3	M4
Job satisfaction								
Not satisfied (omitted)								
Neither			0.006 (0.006)	0.006 (0.006)			0.011* (0.005)	0.011* (0.005)
Satisfied			0.070*** (0.006)	0.069*** (0.006)			0.063*** (0.006)	0.063*** (0.006)
Life satisfaction								
Not satisfied (omitted)								
Neither			0.125*** (0.008)	0.125*** (0.008)			0.133*** (0.008)	0.133*** (0.008)
Satisfied			0.247*** (0.009)	0.246*** (0.009)			0.238*** (0.008)	0.238*** (0.008)
Constant	3.014*** (0.045)	2.980*** (0.046)	2.983*** (0.043)	2.959*** (0.044)	2.940*** (0.039)	2.929*** (0.040)	2.926*** (0.038)	2.916*** (0.038)
N	46,449	46,449	46,449	46,449	51,633	51,633	51,633	51,633

Note: Robust standard errors in parentheses. All models include controls such as age, region, educational attainment, marital status, the number of children, and alcohol consumption, but results for them are not presented due to space limitation. Full tables are available upon request. * p<0.05; ** p<0.01; *** p<0.001

Next, Table 5 presents results for self-esteem. Results from Model 1 show that both men and women in nonstandard employment have significantly lower self-esteem compared to those in standard employment (p<0.01), even after controlling for observed and unobserved compositional characteristics. According to results from the subsequent models (Model 3), for men, dissatisfaction in job/life account for lower self-esteem among nonstandard workers observed in Model 1. As seen in Table 2, the levels of job/life satisfaction are lowest for nonstandard workers among employed men, which appears to fully mediate the negative association between nonstandard employment and self-esteem among men found in Model 1.[6)]

6) If a variable (M) mediates the relationship between X (independent variable) and Y (dependent variable), significant associations are usually observed between X & Y, and X & M. Results for the relationship between X & M are not presented in this paper due to space limitation. Also, most studies present results by showing changes in the relationship between X and Y when M is included (without presenting results for X→M) like we do (e.g., Schneider & Reich, 2015). To validate our results, we confirmed these relationships (X→M) in the supplementary analyses. In addition, in the OLS regression, mediation effects can be estimated with three sets of

For women, nonstandard work is still negatively associated with self-esteem when the levels of job/life satisfaction are taken into account but the coefficient drops in magnitude (Model 3). This result implies job/life satisfaction partially mediates the relationship between nonstandard work and women's self-esteem as discussed in the previous section.

Another interesting finding is that self-employed men have higher self-esteem than standard workers with the inclusion of satisfaction measures in Model 3 ($p<0.05$). It appears that self-employed men's lower job/life satisfaction than men holding standard jobs (see Table 2) were suppressing the relationship between self-employment and self-esteem. With the presence of suppressor variables, the total effect (i.e., the effect of self-employment on self-esteem) becomes close to zero and a significant association is revealed only when a mediator (job/life satisfaction in this case) is included in the model (Gordon, 2015; Wheaton, 1985).[7] Therefore, once the levels of job/life satisfaction, i.e,. mediators that behave as suppressors between the predictor and outcome variable, are controlled for, the positive association between men's self-employment and self-esteem emerges. It is also worth noting that female nonstandard workers' lower self-esteem (compared to a reference group) disappears in Model 4: we find that economic insecurity and dissatisfaction in job/life

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regression, i.e., X→Y, X→M, and (X+M)→Y (Baron & Kenny, 1986). Using the example shown in Figure 1, total effects are the sum of direct effects (A) and indirect effects (of nonstandard employment on self-esteem with mediation through job satisfaction), i.e., (B*C). Results from three sets of regression show that the corresponding figures are A -0.1199 ($p<0.001$), B -0.4757 ($p<0.001$), and C 0.1567 ($p<0.001$). Therefore, total effects are -0.1944 since A+(B*C) = -0.1199 -0.0745. A different coefficient for nonstandard employment (in the presence of job satisfaction), compared to that presented in Table 5, results from the fact that models presented in Table 5 include other employment types (e.g., self-employment) and mediators (e.g., life satisfaction). These results from supplementary analyses confirm the mediating role of job satisfaction (for more details about mediation analyses, see Baron & Kenny, 1986; Gordon, 2015, pp.395-419).

7) The suppressing effect of a mediator often occurs when the indirect effect has the opposite sign as the direct effect (see Gordon, 2015, pp.394-419 and Wheaton, 1985, for more details and examples). In the supplementary analyses, we confirmed that this is the case: for example, the signs of the direct effect (of self-employment on self-esteem) and of the indirect effect (of self-employment on self-esteem with mediation through job or life satisfaction) are the opposite.

jointly account for their diminished self-esteem.

Table 6. Results from Fixed-Effects Models, Self-Rated Health

Variables	Men				Women			
	M1	M2	M3	M4	M1	M2	M3	M4
Age	0.004*	0.003*	-0.006***	-0.006***	0.010***	0.010***	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment type								
Standard employment (omitted)								
Nonstandard employment	-0.010	-0.008	0.020	0.018	0.022	0.021	0.039**	0.037**
	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)
Self-Employment	0.036	0.040	0.050*	0.051*	0.062**	0.060*	0.087***	0.083***
	(0.021)	(0.021)	(0.020)	(0.020)	(0.023)	(0.023)	(0.022)	(0.023)
Non-employment	-0.136***	-0.110***	-0.075***	-0.072**	-0.007	-0.011	0.021	0.010
	(0.019)	(0.022)	(0.019)	(0.022)	(0.015)	(0.018)	(0.014)	(0.018)
Annual income (logged)		0.008*		0.003		-0.001		-0.002
		(0.003)		(0.003)		(0.002)		(0.002)
Experience of job instability		0.022		0.029		0.003		0.018
		(0.021)		(0.020)		(0.023)		(0.023)
Experience of income insecurity		0.021		0.040		-0.003		0.028
		(0.022)		(0.021)		(0.024)		(0.023)
Job satisfaction								
Not satisfied (omitted)								
Neither			0.031*	0.032**			0.059***	0.060***
			(0.012)	(0.012)			(0.012)	(0.012)
Satisfied			0.092***	0.092***			0.098***	0.099***
			(0.013)	(0.013)			(0.013)	(0.013)
Life satisfaction								
Not satisfied (omitted)								
Neither			0.283***	0.283***			0.290***	0.291***
			(0.018)	(0.018)			(0.016)	(0.016)
Satisfied			0.584***	0.584***			0.556***	0.557***
			(0.020)	(0.020)			(0.018)	(0.018)
Constant	3.380***	3.335***	3.296***	3.275***	2.955***	2.961***	2.909***	2.914***
	(0.094)	(0.096)	(0.090)	(0.091)	(0.089)	(0.090)	(0.085)	(0.086)
N	46,446	46,446	46,446	46,446	51,630	51,630	51,630	51,630

Note: Robust standard errors in parentheses. All models include controls such as age, region, educational attainment, marital status, the number of children, and alcohol consumption, but results for them are not presented due to space limitation. Full tables are available upon request. * p<0.05; ** p<0.01; *** p<0.001

Lastly, Table 6 presents results for self-rated health. At baseline (Model 1), there are no differences in self-rated health among employed men when unobserved heterogeneity is controlled for. As discussed in Table 3, this finding implies the presence of negative selection (e.g., health and other unmeasured characteristics) into nonstandard and self-employment among men. It is, however, important to note that self-employed men rate their health better than those in standard work when the levels of job/life satisfaction are introduced in Model 3. Similar to results for self-esteem (Model 3, Table 5), self-employed men's lower job/life satisfaction (relative to those in standard jobs) seems to have been a suppressor for the association between self-employment and self-rated health.

In contrast, self-employed women report better self-rated health than those in standard employment at baseline, and economic insecurity or levels of job/life satisfaction do not account for their better physical health (Models 2 and 3). Interestingly, when life satisfaction is taken into account, female nonstandard workers now have better health than standard workers (Model 3, supplementary results). This change also implies the suppressing effects of female nonstandard workers' low life satisfaction in self-rated health. According to Table 2, the proportion of nonstandard workers reporting their life to be satisfactory (49.1%) is the lowest among all women, even lower than non-employed women (54.7%).

V. Conclusions and Discussion

In this study, using nationally representative longitudinal data (Korean Welfare Panel Study), we evaluate several mechanisms that have been suggested by prior research to link employment type to health outcomes, such as economic insecurity and psychosocial stressors. In light of evidence on the potential role of selection (Byun & Lee, 2018; Lim et al., 2018), we employ fixed-effects models to examine

pathways through which specific employment types may affect various health outcomes with a focus on differences between standard employment and other types of employment. To the best of our knowledge, this is among the first studies to evaluate multiple mechanisms between nonstandard/self-employment and health outcomes, both physical and mental, using statistical analyses that take into account the issue of endogeneity.

As expected, we find supporting evidence for the role of selection in the relationship between nonstandard employment and health. As discussed in Table 3, much of the negative association between nonstandard employment (as well as self-employment) and health observed in OLS models disappears in fixed-effects models when unobserved time-constant individual heterogeneity is controlled for. It is also worth noting that the role of selection differs by employment type and health outcome. For example, for nonstandard workers, their worse mental and physical health (relative to standard workers) loses significance in fixed-effects models, suggesting that individuals with certain characteristics (i.e., unobserved individual heterogeneity such as personality) are sorted into different employment types, which may account for the negative relationship between nonstandard work and health observed in simple OLS models. Similarly, self-employment (compared to standard employment) is no longer associated with lower self-esteem in fixed-effects models. However, nonstandard workers, regardless of gender, still report lower self-esteem than their counterparts in standard employment in fixed-effects models even after adjusting both observed and unobserved characteristics. It implies that nonstandard employment appears to have a causal impact on self-esteem. In the South Korean labor market context, employment type signals one's current labor market position as well as one's future socioeconomic status due to limited mobility between standard and nonstandard employment (Kim, 2016); therefore, the inability to secure a regular, standard job may negatively affect a worker's perception of self-worth, which results in lower self-esteem (e.g., Marmot et al., 1998; Moller et al., 2005).

In addition, the role and direction of selection differs by gender for those in self-employment in terms of self-rated health: men's significant difference between standard and self-employment found in OLS models disappears in fixed-effects models but self-employed women rate their health better than standard workers in fixed-effects models. Results for men indicate a negative selection (e.g., personality or unmeasured underlying health issues) into self-employment among men. However, the positive association between self-employment and women's self-rated health observed in fixed-effects models implies that self-employment can be beneficial to women's physical health, possibly thanks to flexibility that self-employed women may enjoy such as reduced work hours and control over work schedules relative to those in wage employment. One of the major theoretical explanations for women's nonstandard employment (including self-employment and family business) focuses on women's preferences in work and career choices and argues that some women prefer nonstandard jobs (e.g,, part-time jobs) in order to realize their preferences (e.g., to balance work and family) (e.g., Hakim, 1995, 1997). If such preferences do not vary over time, these features, as unobserved time-invariant individual characteristics, are cancelled out in fixed-effects models. Therefore, the positive association between self-employment and women's physical health in fixed-effects models provides some supporting evidence for a causal impact that self-employment has on women's health in the Korean labor market context where self-employees are less subject to rigid corporate culture (e.g., long work hours, mandatory after-work social gatherings) than those in waged economy. It is important to note that health benefits of self-employment apply only to women, not to men, reflecting persistent gender norms that expect men to be providers and women to be caregivers and that self-employment is often an involuntary choice after layoffs (resulting from restructuring of corporations) or involuntary early retirement (Bumpass & Choe, 2004; Kim & Cho, 2009; Menendez et al., 2007). These findings indicate that we need to apply a multidimensional approach when studying health implications of nonstandard work by considering both physical and mental health

effects as well as by considering the potential role of selection into different employment types across gender.

As for posited mechanisms, we find that job and life satisfaction fully mediate a positive association between nonstandard work and self-esteem among men and weaken the association among women (Model 3, Table 5). As noted in Table 2, nonstandard workers report very low levels of job/life satisfaction, i.e., the lowest among those employed, for both men and women. And the magnitude of differences in the levels of job/life satisfaction between nonstandard workers and other employees is much bigger for men than for women. These results suggest that holding nonstandard work is detrimental to men's self-esteem through increased psychosocial stressors and negative spillover effects, which lower their job/life satisfaction, in South Korean society with rigid labor market segmentation and strong expectations for men as breadwinners. Prior research suggests the potential mediating role of psychosocial stressors (e.g., job satisfaction) for nonstandard workers' health (Lee, Do, & Cho, 2017), and by examining both job and life satisfaction while accounting for endogeneity, our study further substantiates the mediating effect of psychosocial stressors in various life domains on nonstandard workers' health outcomes.

We also find evidence on the role of job/life satisfaction as mediators for men in self-employment in self-esteem and self-rated health. Similar findings are observed for female nonstandard workers in terms of self-rathe health. It is interesting that the levels of job/life satisfaction operate as suppressor variables in these cases in that the relationships between nonstandard/self-employment and health outcomes become significant only when these mediators are included in the model. As noted above, it happens because direct and indirect effect may operate in the opposite direction (see Footnote 7 for details). These results indicate that it is important to recognize and pay more attention to suppressing effects of mediators, which have often been ignored in previous research. All together, these findings substantiate the importance of understanding the exact pathway linking employment status to various health

consequences.

In spite of useful insights that our study can provide for mechanisms between nonstandard work and health, this study has some limitations. First, while fixed-effects models can help deal with the issue of endogeneity by removing time-constant, unobserved, individual heterogeneity, they cannot control for characteristics that vary over time. In addition, fixed-effects models are not suited to address the issue of reverse causality. In the supplementary analyses, we tested the association between nonstandard employment and health outcomes by using lagged dependent variables (i.e., nonstandard employment measured in year t-1 and health outcomes measured in year t) and found that results are robust across different model specifications. In fact, some previous studies have explicitly attempted to address the selection issue (e.g., instrumental variable estimation and propensity score matching) when studying the effects of employment status on health (e.g., Byun & Lee, 2018; Kim et al., 2008). Built upon such findings, our study further evaluates various pathways that may link nonstandard employment and health while taking into account endegeneity with fixed-effects models. Second, self-employed women's better physical health than those in standard jobs is not explained by mediators considered in this study. It suggests that pathways linking employment to health may differ by employment type and a specific health outcome and that there may exist different mechanisms beyond what were considered in this study.

Based on the findings and limitations of the present study, future studies will need to examine more mechanisms underlying the associations between employment status and different health outcomes. In particular, it will be useful to evaluate multiple mechanisms by specific employment type (e.g., temporary or self-employment) and by gender while addressing the issue of selection, using different analytical strategies. For example, evaluating the extent to which job changes (e.g., standard to nonstandard job) are associated with changes in posited mechanisms (e.g., job/life satisfaction) and then how they are related to health outcomes will be a useful extension to deal with reverse causality. In addition, given

the importance of psychosocial stressors documented in this study, we need more evidence on how stressors in different domains are linked to specific physical and mental health issues among workers with various employment statuses. Research utilizing more direct measures of health (e.g., biomarkers) will also help us understand exact pathways between nonstandard work and health among South Korean workers.

In conclusion, our study extends our understanding of mechanisms between employment type and various health outcomes by documenting evidence while considering the issue of endogeneity using fixed-effects models. Especially, the findings that psychosocial stressors and economic insecurity help explain bad health outcomes of nonstandard workers have important policy implications. It is necessary to improve working conditions of nonstandard workers and to reduce discrimination against them so as to avoid negative spillover effects of nonstandard jobs that will otherwise result in undesirable health outcomes.

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고용형태와 건강의 매개변수:
고정효과 모형을 이용한 패널 회귀분석

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본 연구는 한국복지패널 1차(2006년)부터 12차(2017년) 자료를 사용하여 고용형태와 다양한 건강 변수와의 상관관계를 설명하는 매개변수를 고정효과 모형을 토대로 분석하였다. 이 분석방법의 사용은 변수간 내생성(endogeneity)과 미관측 선택(unobserved selection)이 고용지위와 건강의 상관관계에 영향을 미칠 수 있다는 점을 고려한 것으로, 이를 통해 개인의 시불변한 미관측 이질성(individual time-invariant unobserved heterogeneity)을 통제하고자 하였다. 매개변수로는 선행 연구에서 제시된 경제적 요인과 사회심리적 요인 등을 고려하였다. 분석결과, 경제적 불안정과 사회심리적 스트레스 요인이 고용형태간 다르게 나타나는 건강 상태를 설명하는데 도움을 주는 것으로 드러났다. 예를 들면, 낮은 직업 만족도와 생활 만족도가 비정규직 종사자들의 낮은 자아존중감을 설명하는 매개변수임이 드러났다. 또한 이들 매개변수의 억제효과(suppressor effect)도 확인되었다. 향후 고용지위와 건강의 상관관계를 매개하는 변수들을 더 다양하고 정확하게 밝혀나갈 필요가 있으며, 이러한 연구 결과를 바탕으로 한 효과적인 보건정책의 수립도 필요하다.

주요 용어: 건강, 고정효과 모형, 매개변수, 비정규직 노동, 우울증, 자아 존중감, 자영업