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Short Communication

Characteristics and Socio-Demographic Distribution of Precarious Employment Among Korean Wage Workers: A Proposition of Multidimensional Approach Using a Summative Score

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ABSTRACT

Introduction: There is a growing global interest in the issue of precarious employment. We aimed to analyze the characteristics and socio-demographic distribution of precarious employment using a summative score approach.

Methods: To operationalize precarious employment, we utilized data from the Korean Working Conditions Survey and focused on three distinct dimensions: employment insecurity, income inadequacy, and a lack of rights and protections. By constructing a summative scale ranging from -16 to 2, with lower scores indicating higher precariousness, we measured employment precariousness among Korean wage workers. To compare employment precariousness according to survey participant characteristics, we employed the Wilcoxon Rank Sum Test.

Results: We analyzed a weighted number of 38,432 workers. The overall sample showed a median (Q1, Q3) summative scale score of -3 (-6, -1). The median summative score was lower for women compared to men (men: -2; women: -5; $p < 0.001$), as well as for young or older workers compared to middle-aged workers (young: -4; middle-aged: -2; older: -5; $p < 0.001$). Similarly, workers with lower educational levels (middle school or below: -8; high school: -5; college or above: -2; $p < 0.001$) and non-white collar workers (blue collar: -5; service/sales worker: -6; white collar: -2; $p < 0.001$) experienced higher levels of employment precariousness.

Conclusion: Our findings indicate that certain vulnerable groups, such as women, young or older adults, workers with low educational attainment, and caregiving or low-skilled elementary workers, are disproportionately exposed to high employment precariousness. Active policy interventions are needed to improve the employment quality of vulnerable groups.

1. Introduction

Substantial academic attention has been devoted to precarious employment as a major social determinant of health among workers [1]. Although there is no consensus on the precise definition of precarious employment, studies often use the term to describe work characterized by an unstable employment relationship, inadequate material rewards, and a lack of workers' rights and protection [2,3]. Precarious employment can be viewed as the antithesis of the concept of "decent work," a term first proposed by

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the International Labor Organization in 1999 [4]. Decent work refers to productive, fairly compensated employment that provides workers with security, freedom, equity, and dignity.

In recent years, there has been a significant shift in how researchers conceptualize and measure precarious employment [5]. While the definition of precarious employment has always been debated in the literature, earlier studies tended to rely on a unidimensional definition based solely on the type of employment contract. However, contemporary research recognizes that precarious employment is a multidimensional construct that encompasses various negative work conditions such as employment insecurity, low wages, a lack of rights, and vulnerability [2,6,7]. As a result of this shift, several novel approaches have been proposed to reflect the multidimensional nature of precarious employment. For instance, the Employment Precariousness Scale (EPRES) [6] is arguably the most widely used measure in European studies and assesses multidimensional precarious employment (MPE) in six distinct dimensions: temporariness, disempowerment, vulnerability, wages, rights, and exercise of rights. The Precarious Employment Scale (PES), developed in the context of the United States, incorporates non-standard work hours and training opportunities [8]. However, a recent systematic review of the definition of MPE proposed three dimensions: employment insecurity, income adequacy, and lack of rights and protection [2]. Based on these measurements, high-quality and impactful studies have been conducted and published in Western countries over the past few years. For instance, Swedish studies found that MPE is associated with an increased risk of incident stroke [9] and occupational injuries [10]. Meanwhile, research from the United States has found that MPE is positively associated with body mass index (BMI) [11] and the risk of obesity in children [12].

In the past few years, there has been an increasing societal and academic interest in precarious employment in the Republic of Korea. Some key characteristics related to the precarious employment situation in the Republic of Korea have been highlighted in the existing literature. First, due to recent globalization and digitalization, there has been a noticeable rise in the proportion of workers in insecure employment positions in the Republic of Korea [13], which has been has been further accelerated by the recent COVID-19 pandemic [14]. Moreover, in the Republic of Korea, labor market dualization has resulted in significant disparities in labor protection, welfare, and wage levels between workers in small-sized enterprises with non-regular employment and those in large corporations with regular employment [15]. Previous Korean studies have demonstrated that precarious employment is positively associated with poor subjective health [16], musculoskeletal pain [17], depressive symptoms [18], and unhealthy lifestyles [19,20]. However, studies on the health effects of precarious employment among Korean workers have several major limitations. Until recently, the majority of Korean studies have predominantly defined precarious employment solely based on employment insecurity. Moreover, the existing body of Korean literature lacks a systematic conceptualization of precarious employment.

There is a lack of universal consensus regarding the specific components that constitute precarious employment. However, a recent study conducted by Kreshpaj et al. has made a significant contribution to the conceptualization of precarious employment through a comprehensive systematic review of both qualitative and quantitative studies in the existing literature [2]. Furthermore, studies that were based on this conceptual framework have effectively captured the dynamic nature of precarious employment and explored its implications for health outcomes [9,10,21–23]. Based on this conceptualization, we propose a multidimensional approach to the operationalization of precarious employment based on the Korean Working Conditions Survey (KWCS-OPE). The KWCS is a nationwide survey conducted regularly by the Occupational Safety and Health Research Institute (OSHRI), designed to include a large number of workers in the Republic of Korea, making it a highly versatile dataset [24]. We believe that the present study will contribute to promoting future studies that provide a better understanding of precarious employment among Korean workers.

2. Methods

2.1. Study sample

The study sample was drawn from the sixth KWCS, conducted from October 2020 to April 2021. The KWCS is a nationwide, repeated cross-sectional survey conducted every three years by the OSHRI. The KWCS was designed to include a nationally representative sample of South Korean workers [24]. In total, 50,538 workers were included in the initial sample. We limited our sample to employed workers (wage workers), totaling 33,063 workers. After excluding those with missing values for sociodemographic variables (educational attainment: n = 53; 0.2%), we were left with 33,010 workers. After applying sample weights to the individuals, the final sample consisted of 38,432 workers (weighted N).

2.2. Ethics statement

The Institutional Review Board of Severance Hospital approved this study (4-2023-0145).

2.3. Multidimensional precarious employment

2.3.1. Theoretical framework

Before operationalizing the scale, we scrutinized the theoretical frameworks proposed in the literature. Although several studies have conceptualized and operationalized MPE, only one systematic review has been published on its definition. A recent study by Kreshpaj et al. summarized the definition of MPE that has been used in various research fields, including economics, sociology, and public health, in the current literature [2]. They identified three distinct dimensions, each consisting of two or four themes. The first dimension, “employment insecurity,” consists of four themes: “contractual relationship insecurity,” “contractual temporariness,” “contractual underemployment,” and “multiple jobs/sectors.” The second dimension, “income adequacy,” consists of two themes: “income level” and “income volatility.” The third dimension, “lack of rights and protection,” consists of four themes: “lack of unionization,” “lack of social security,” “lack of regulatory support,” and “lack of workplace rights.” Each theme is also constituted by multiple subthemes that are the specific variables used to measure the MPE in previous studies.

2.3.2. Operationalization of multidimensional precarious employment

The dimensions or themes of MPE identified by Kreshpaj et al. represent the conceptual domains of MPE rather than specific variables. Each theme of the MPE is composed of multiple subthemes that serve as proxy indicators for its operationalization. Jonsson et al. operationalized the Swedish Registered based Operationalization of Precarious Employment (SWE-ROPE) based on the same theoretical framework [22]. However, it is noteworthy that the proxy indicators vary depending on the information available in the dataset; the differences between SWE-ROPE and KWCS-OPE are summarized in Table 1. The survey questions and rationale for their use are presented in Table S1 (Supplementary Material). Among 10 themes, we found no suitable items for one theme, “lack of social

Table 1
Theoretical framework and operationalization of MPE (SWE-ROPE: Swedish Registered based Operationalization of Precarious Employment; KWCS-OPE: Korean Working Conditions Survey based Operationalization of Precarious Employment)

Dimension	Themes	SWE-ROPE		KWCS-OPE	
		Proxy indicators	Operationalization	Proxy indicators	Operationalization
Employment insecurity					
	Contractual relationship insecurity	Indirect employment	a. Directly employed by the employer b. Employed by an agency c. Self-employment and direct employment combined d. Self-employed e. Solo self-employed	Indirect employment	a. No b. Yes
	Contractual temporariness	Employment stability	a. Stable employment b. Unstable employment	Length of contract	a. ≥1 year b. ≥1 month and <1 year c. <1 month
	Underemployment	No proxy indicator used	NA	Underemployment	a. Full-time employment b. Part-time employment
	Multiple jobs	Having multiple jobs	a. 1 b. 2 c. ≥3	Having multiple jobs*	a. 1 b. 2 c. ≥3
Income adequacy					
	Income level	Income level (% of median)	a. ≥200 b. 120199 c. 80–199 d. 60–79 e. <60	Net monthly wage (unit: ₩)	a. ≥400 b. 300–399 c. 200–299 d. <200
	Income volatility	No proxy indicator used	NA	Income predictability†	a. High predictability b. Medium predictability c. Low predictability
Lack of rights and protection					
	Lack of unionization	Likelihood of being covered by collective bargaining (%)	a. >90 b. 71–90 c. ≤70	Trade union	a. Yes b. No/Don't know
	Lack of social protection	No proxy indicator used	NA	No proxy indicator available	NA
	Lack of regulatory support	No proxy indicator available	NA	Number of employees in company	a. ≥5 b. <5
	Lack of workplace right	No proxy indicator used	NA	Involvement in work process†	a. High involvement b. Medium involvement c. Low involvement

The theoretical framework and development of the KWCS-OPE were informed by a systematic review conducted by Kreshpaj et al. [2] and the SWE-ROPE developed by Jonsson et al. [22].
* Having multiple jobs was excluded from KWCS-OPE in the further analysis.
† Detailed survey questionnaires and operationalization are presented in the supplementary materials (Table S1).

security." To serve as an indicator of "lack of regulatory support," we used the number of employees in the company, considering that companies with fewer than five employees are exempt from regulations pertaining to working hours, annual leave, termination, and additional allowances as specified in the Labor Standards Act [25]. Therefore, the number of employees in the company is acknowledged as an important factor that affects working conditions and worker health in the Republic of Korea. Additionally, the proxy indicator "multiple jobs" was excluded from the KWCS-OPE in further analysis because only 0.6% of the sample responded to have 2 or more jobs, giving the variable a negligible impact on measuring MPE.

2.3.3. Summative scale of multidimensional precarious employment

After operationalizing the MPE, we quantified the degree of exposure to MPE for individual workers using a summative approach. Developing a summative scale is important as it allows us to assess the overall degree of exposure to multidimensional precarious employment for individual workers and often serves as the main independent variable for qualitative research [6,22].

To construct a summative scale for the KWCS-OPE, we used the criteria summarized in Table S2. Direct employment was assigned a score of 0, whereas indirect employment was assigned a score of -2 [26]. A contract duration of ≥1 year was assigned a score of 0, a contract duration between one month and one year was assigned a score of -1, and a contract duration of <1 month was assigned a score of -2. Full-time employment was assigned a score of 0, whereas part-time employment was assigned a score of -2. Not having multiple jobs was assigned a score of 0, having two jobs was assigned a score of -1, and having three or more jobs was assigned a score of -2.

For net monthly wage, a net monthly wage of 200–299₩ was assigned a score of -1, and a net monthly wage of <200₩ was assigned a score of -2. Consistent with the SWE-ROPE, high income status was assigned a positive score (1 for 300–399₩ and 2 for ≥400₩), reflecting that high material reward can partially offset the other precariousness. High income predictability was assigned a score of 0, medium income predictability was assigned a score of -1, and low income predictability was assigned a score of -2.

Having a trade union was assigned a score of 0, whereas not having a trade union was assigned a score of -2. A score of 0 was assigned if the number of employees in the company was ≥5, while -2 was assigned if the number of employees in the company was <5. High involvement in the work process was assigned a score of 0, medium involvement in the work process was assigned a score of -1, and low involvement in the work process was assigned a score of -2. The overall KWCS-OPE score ranges from -16 to 2, with a lower score indicating a higher degree of MPE. When using tertile values as a criterion, a summative score ranging from -2 to 2 can be classified as indicating low precariousness a score ranging from -5 to -3 can be classified as indicating moderate precariousness and a

score of -6 or below can be classified as indicating high precariousness.

2.4. Statistical analysis

The sampling weight assigned to each survey participant was used for all the statistical analyses. First, we explored the distribution of the MPE characteristics in the overall sample. Next, we compared the differences in the distribution of the summative scale of the KWCS-OPE using the Wilcoxon Rank Sum Test. All statistical analyses and visualizations were performed using R software (version 4.2.3; R Foundation for Statistical Computing, Vienna, Austria).

3. Results

Table S3 shows the baseline characteristics of the study participants (weighted N = 38,432). The study sample comprised 56.5% men and 43.5% women. Among the survey participants, 36.7% had blue-collar jobs, 17.4% worked in the service or sales sector, and 45.9% had white-collar jobs.

The distribution of MPE in the study population is shown in Table 2. The results showed that 5.7% of wage workers had indirect employment, 21.8% had a labor contract duration of less than one year, 16.8% had part-time employment, and 0.6% had multiple jobs. Consequently, we excluded the item "having multiple jobs" from the KWCS-OPE, considering its low prevalence. Next, 28.2% had a net monthly wage less than 200 ₩ and 2.4% had low income predictability. Regarding the lack of rights and protection, 76.0% did not have a trade union in their company, 19.6% worked in a company with fewer than 5 employees, and 20.2% had few opportunities to be involved in their work processes. The prevalence of missing values was high in the variables "net monthly wage" (N = 1840; 4.8%) and "number of employees in company" (N = 1701; 4.4%).

Table 2
Distribution of MPE among overall study sample

Proxy indicators	Overall
	N = 38,432
Employment insecurity	
Indirect employment	
Direct employment	36,097 (93.9%)
Indirect employment	2208 (5.7%)
Missing	127 (0.3%)
Length of contract	
≥1 year	30,060 (78.2%)
1 month − 1 year	6092 (15.9%)
<1 month	2280 (5.9%)
Missing	0 (0.0%)
Underemployment	
Full-time employment	31,787 (82.7%)
Part-time employment	6454 (16.8%)
Missing	191 (0.5%)
Having multiple jobs*	
1	38,183 (99.4%)
2	231 (0.6%)
≥ 3	18 (0.0%)
Income adequacy	
Net monthly wage (unit: ₩)	
≥400	6350 (16.5%)
300−399	7760 (20.2%)
200−299	11,640 (30.3%)
<200	10,842 (28.2%)
Missing	1840 (4.8%)
Income predictability	
High predictability	36,144 (94.0%)
Medium predictability	1220 (3.2%)
Low predictability	912 (2.4%)
Missing	156 (0.4%)
Lack of rights and protection	
Trade union	
Yes	7963 (20.7%)
No	30,450 (76.0%)
Missing	19 (0.1%)
Number of employees in company	
≥5	29,192 (76.0%)
<5	7539 (19.6%)
Missing	1701 (4.4%)
Involvement in work process	
High involvement	19,605 (51.0%)
Medium involvement	11,150 (29.0%)
Low involvement	7756 (20.2%)
Missing	221 (0.6%)

* Having multiple jobs was excluded from KWCS-OPE in the further analysis.

Fig. 1 shows the distribution of the summative scores of the KWCS-OPE for the overall sample. The median (Q1, Q3) of the summative scale of KWCS-OPE was -3 (-6, -1) in the overall sample.

Fig. 2 shows the differences in the KWCS-OPE scores according to the sociodemographic characteristics of the workers. The median KWCS-OPE scores were lower for women, older individuals, those with lower levels of education, and those working in blue-collar or service/sales occupations.

Fig. 3 illustrates the 10 occupations with the lowest average KWCS-OPE scores, indicating that caregivers and low-skilled elementary workers had high levels of precariousness.

4. Discussion

In this study, we propose a multidimensional approach for assessing precarious employment among Korean wageworkers. Based on the theoretical framework proposed by Kreshpaj et al., we construct an MPE using three distinct dimensions: employment insecurity, income adequacy, and lack of rights and protection [2]. To operationalize the MPE, eight proxy indicators within the content of the sixth KWCS were selected. Next, we employed a summative score approach to represent the overall degree of exposure to MPE, with a scale ranging from -16 (high precariousness) to 2 (low precariousness). Our study is meaningful in that it is the first to propose a multidimensional measure to assess precarious employment in the Korean context. Therefore, this study could inform subsequent studies conducting more in-depth investigations into the determinants of precarious employment or its health impacts.

Notably, there are substantial differences in the theoretical backgrounds of the MPE measurements used in the literature. While the EPRES, PES, and KWCS-OPE share several dimensions of precarious employment: employment instability, low wages, a lack of employee representation (e.g., a trade union), and interpersonal power imbalance (e.g., a lack of workplace rights), some dimensions were not included in the KWCS-OPE and SWE-ROPE. Specifically, Kreshpaj et al. [2] considered work environments as a consequence rather than a component of precarious employment. Therefore, the KWCS-OPE does not consider a lack of control over work time or unstandardized working time arrangements as elements of precariousness, which were included in the PES [8] and EPRES for Europe [27]. Additionally, the dimension of training opportunities or skill discretion, which was included as a separate aspect of precarious employment in the PES [8], was considered part of the work environment and excluded in the KWCS-OPE. The prominent strength of tools such as SWE-ROPE and KWCS-OPE lies in their robust theoretical backgrounds, which are based on a systematic literature review of the definition of MPE [2]. Nevertheless, the dimensions and definitions of MPE remain controversial, opening up possibilities for the development of alternative theoretical backgrounds and measurement tools.

Compared with the SWE-ROPE, the KWCS-OPE additionally identified proxy indicators for income volatility, lack of workplace rights, and lack of regulatory support, enabling a more comprehensive measurement of precarious employment [2]. However, the SWE-ROPE is a measurement tool based on register-based data and

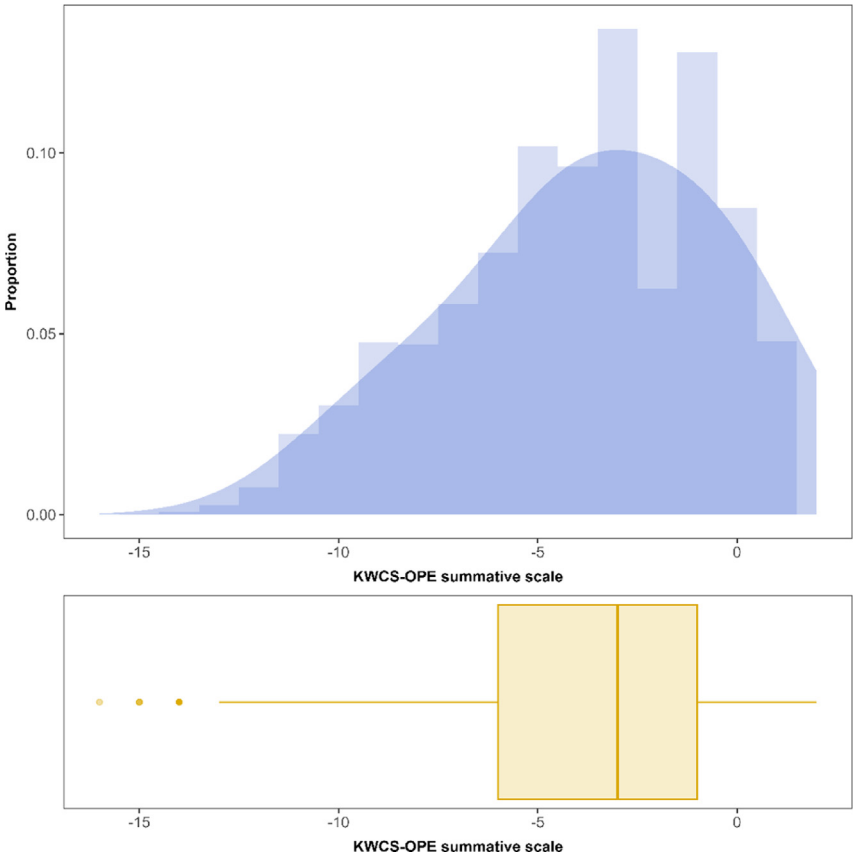


Fig. 1. Distribution of summative scale of KWCS-OPE.

has the advantage of being able to measure the MPE for a national-level sample (N > 4,000,00), as well as enabling longitudinal analysis. On the other hand, survey-based measurements, such as the KWCS-OPE, have a main limitation in that they do not allow the investigation of the longitudinal outcomes of MPE. In addition, in this study, we excluded self-employed workers, unlike SWE-ROPE, because we recognized that it would be difficult to compare the characteristics of precariousness between the self-employed and wageworkers among Korean workers. In particular, we believe that more active research should focus on the precariousness of self-employed workers with ambiguous characteristics, such as dependent self-employed workers [28] and gig workers [29], before operationalizing MPE among self-employed workers.

Our findings are consistent with those of previous studies that MPE is higher among women, young or older workers (age <35 or ≥55), workers with low educational attainment, and blue-collar or service/sales workers [30,31]. Therefore, this study suggests that despite regional variations in precarious employment and the labor environment, certain characteristics consistently manifest as vulnerable groups in terms of MPE. These findings underscore the need for policy interventions aimed at mitigating social inequalities in accessing decent work. Additionally, there is a need for further research to investigate the issue of precarious employment among workers in other vulnerable positions, including migrant workers, which has not been addressed in the present study [32].

In qualitative studies, MPE measurements have been applied in the literature through three main methodological approaches: individual element, summative score, and typology [3]. First, the individual element approach explores the association between individual indicators of precarious employment and health consequences using multivariate regression models that adjust for other relevant covariates. However, a limitation of this approach is that it is challenging to capture the health effects of the combined exposure to various elements of precarious employment. Second, a summative scoring approach represents workers' precariousness at a specific point in the continuous spectrum of MPE. The most well-known examples include measurements such as EPRES, PES, and SWE-ROPE. While the summative score approach simplifies various elements of precarious employment into a single variable, it also poses a challenge in interpreting what MPE scores, expressed as continuous variables, actually represent. Furthermore, there is currently limited literature available on how to set the weights of each variable when constructing a continuous variable of the MPE. These limitations can be alleviated through the typology approach, which aims to identify various types of MPE through a latent class analysis. However, the interpretation of clusters in the typology approach is inevitably influenced by researchers' subjective interpretations, and there is a possibility that clustering may not be generalizable across time, region, and other contextual factors. In this study, we described how the KWCS-OPE can be transformed into a summative scale. However, it is not necessary for researchers to quantify the items in the KWCS-OPE to study MPE. Multiple approaches can be applied to the same measurement [22], and different approaches complement each other in understanding the MPE.

Our study had several limitations. First, as it was constructed using cross-sectional survey data, the longitudinal effect of MPE may not have been explored through this dataset, unlike PES and SWE-ROPE. Second, formal validation of the summative scale of the KWCS-OPE was not included. Nevertheless, it has consistently been found that MPE is higher among vulnerable groups that were previously known to have high precariousness, such as women, young or older workers, those with low educational levels, and

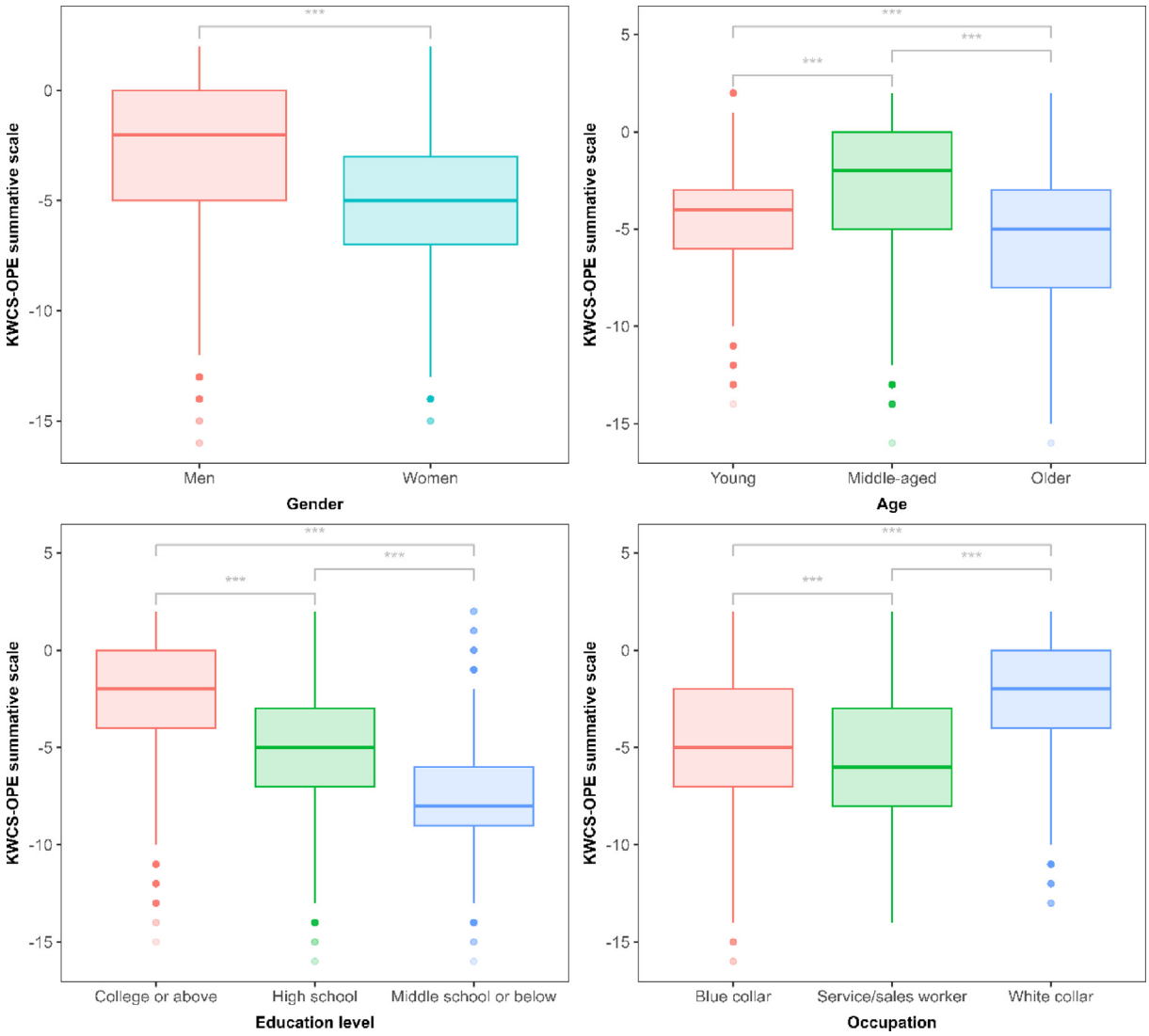
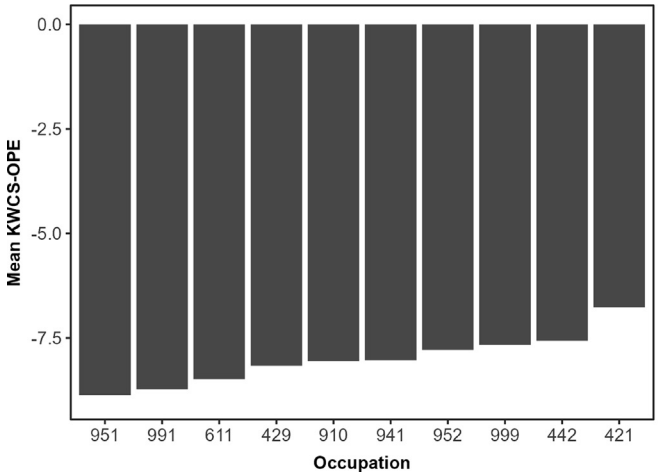


Fig. 2. Summative scale of KWCS-OPE according to socio-demographic characteristics of workers. The Wilcoxon Rank Sum Test was used (***$p < 0.001$).

those in blue-collar occupations. This indicates that the KWCS-OPE captures precarious employment among Korean workers, both theoretically and empirically. Third, we assigned equal weights to each element to construct a summative scale. Currently, there are no guidelines or evidence on how to weigh each element. This limitation forced researchers to assign equal weights to each item or dimension. This issue is largely unknown in this field and should be actively addressed in future studies. Finally, the KWCS does not



Code	Occupation
951	Domestic cores and infant rearing helpers
991	Agriculture, forestry and fisheryrelated elementary workers
611	Crop growers
429	Other caregiving, health and personal service workers
910	Construction and mining laborers
941	Cleaners and sanitation workers
952	Food preparation related elementary workers
999	Other service related elementary workers
442	Food and beverage service workers
421	Caregiving and health service workers

Fig. 3. 10 occupations with the lowest average KWCS-OPE summative scale.

include proxy indicators for social security and protection, such as social insurance coverage. Therefore, a lack of social security was not considered in the KWCS-OPE. The social security system in the Republic of Korea encompasses distinct policies such as pension schemes, healthcare insurance, and employment insurance.Exclusion from such social security provisions can lead to an exacerbation of the adverse impact of low wages and employment insecurity on health. Therefore, the following studies should include the lack of social security as a crucial component when examining precarious employment.

5. Conclusion

In this study, we proposed a novel measurement method for assessing the MPE based on the content of KWCS, namely, KWCS-OPE. It conceptualizes precarious employment as comprising three distinct dimensions: employment insecurity, income adequacy, and a lack of rights and protection. Vulnerable groups such as women, young or older adults, workers with low educational attainment, and caregiving or low-skilled elementary workers were exposed to a high degree of MPE. These findings highlight the need for policy implications that effectively address and mitigate the adverse effects of precarious employment on the well-being and health of vulnerable groups.

Ethical statement

The Institutional Review Board of authors' institution approved this study (4-2023-0145).

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None to declare.

Conflicts of interest

All authors have no conflicts of interest to declare.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.shaw.2023.07.002.

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