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Association between Job Satisfaction and Stress or Depressive Symptom of Employed Persons with Disabilities: Findings from the Panel Survey of Employment for the Disabled 2016–2023

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ABSTRACT

Background: This study conducted a longitudinal analysis of the association between job satisfaction and stress or depressive symptoms of employed persons with disabilities (PWDs) based on the data from the 1st to 8th Panel Survey of Employment for the Disabled (PSED). **Methods:** After excluding missing values, data on 1614 participants at baseline (1st wave) were analyzed using the chi-square test and generalized estimating equation (GEE) model for data from 1st to 8th PSED. **Results:** It was found that for each one-unit increase in the job satisfaction score, the stress scale decreased by 0.004 ($B: -0.004$, 95% CI: -0.006 – -0.002 , p -value: < 0.0001). Compared to the very high job satisfaction group, the low job satisfaction group was more likely to experience perceived stress (odds ratio [OR]: 2.127, p -value: 0.001) and experience depressive symptoms (OR: 3.557, p -value < 0.0001). Furthermore, in terms of the overall satisfaction with their current job among the PWDs, compared to the ‘satisfied’ group, the ‘unsatisfied’ group had higher perceived stress (OR: 1.593, p -value < 0.0001) and depressive symptoms (OR: 2.688, p -value < 0.0001). **Conclusions:** There was a close association between job satisfaction and stress or depressive symptoms among employed PWDs. This study’s findings may serve as foundational research to support improving mental health in this population. In addition, it is anticipated that these findings can be used as evidence to improve the work environment for PWDs within the context of Korean corporate culture.

KEYWORDS

Job satisfaction; depression; persons with disabilities; stress; work environment

Introduction

According to the World Health Organization (WHO) “World Disability Report,” globally, the number of persons with disabilities (PWDs) is continuously increasing due to population aging, rise of chronic diseases, and increased exposure to accidents [1]. In the past, welfare policies for PWDs were primarily centered around providing assistance from others to compensate for biological impairments [2].

However, more recently, policies have shifted toward encouraging the social participation of PWDs to enhance their quality of life [3]. To achieve this, efforts are being made globally to enact treaties, such as the Convention on the Rights of Persons with Disabilities (CRPD), and laws, including the Disability Discrimination Act (DDA), aiming to not only uphold the individual rights of PWDs but also promote rights within the work environment and facilitate social integration [4]. In Korea, as well, various legislations,



such as the “Act on Welfare of Persons with Disabilities” and the “Mandatory Employment Allocation System,” have been established to facilitate the adaptation of PWDs in the work environment [5].

Since the enactment of legislation related to PWDs, the economic indicators thereof have consistently improved. In particular, certain metrics, such as “employment rate of PWDs,” “retention rate of employed PWDs,” and “accessibility to jobs for PWDs” have demonstrated a sharp upward trend [6,7]. However, it has been reported that, in contrast to the quantitative improvement in employment indicators for PWDs, qualitative employment conditions and work environment indicators are considerably worse for PWDs relative to persons without disabilities (PWODs) [8]. Indeed, according to the “Survey on the Status of PWDs” conducted by Korean health authorities, not only did 64% of employed PWDs experience discomfort within the workplace but also were a significant number of them to face employment instability, including low wages and part-time work [9]. In addition, compared to Japan and the United States, which have similar “Mandatory Employment Allocation Act for Persons with Disabilities”, South Korea has significantly lower employment rates and welfare budgets for the PWDs [10]. Furthermore, according to a report from the International Labor Organization [11], PWDs naturally experience psychological distress and worsened health outcomes globally due to difficulties in their work environment and interpersonal relationships within the workplace, leading to a decrease in job satisfaction [12].

Job satisfaction is a crucial determinant of mental health, particularly for groups with lower levels of mental health, such as PWDs. High job satisfaction can significantly contribute to the promotion of stress or depressive symptoms [13,14]. However, as previously reported, low job satisfaction can lead to the deterioration of mental health, especially stress, anxiety, and depressive symptoms, in PWDs [13,14]. According to a study that analyzed the association between job satisfaction and self-rated health (SRH) or happiness among 1637 employed Korean PWDs, those in the group with lower job satisfaction reported lower levels of SRH and happiness [15]. Additionally, research conducted in Canada and Denmark reported that PWDs experience lower job satisfaction compared to PWODs, primarily due to factors such as discrimination, harassment, and job security concerns [16,17]. This decreased job satisfaction in PWDs was strongly associated with worsening stress or depressive symptoms [17].

While previous studies have investigated the association between job satisfaction and mental health in the general population [18], there is a paucity of research on the relationship between job satisfaction and mental health specifically targeting the PWDs group. Furthermore, in Korea, there is an active research effort to identify the factors influencing job satisfaction among PWDs [19,20]. However, there is a lack of studies that investigate the influence of low job satisfaction on stress or depressive symptom [15,21]. Therefore, considering the lack of research on the association between job satisfaction and

mental health among PWDs in South Korea, this study focuses on globally high prevalent stress or depressive symptom [22].

Therefore, in this study, we developed a research framework for understanding the association between job satisfaction and mental health among PWDs by referencing the previous literature on job satisfaction for PWDs and other research frameworks [19,23]. Also, this study utilized cohort data that was followed up for eight years, and the research was conducted using a job satisfaction index that can demonstrate reliability and validity [24]. Accordingly, we established a research hypothesis suggesting a strong association between low job satisfaction scores and worsened stress and depressive symptom. Ultimately, this study utilizes data from the Panel Survey of Employment for the Disabled (PSED), spanning from 2016 to 2023. Based on the research findings, we aim to provide foundational data for policy and institutional measures to prevent the deterioration of mental health among employed PWDs who report low job satisfaction.

Methods

Study sample and design

In this study, we utilized the 1st to 8th wave (2016–2023) data from the Second PSED [25]. The second wave of the PSED was started in 2016 by selecting new panel survey targets conducted by Korea Employment Agency for the Disabled/ Employment Development Institute (KEAD EDI). Among the registered PWD according to the Welfare of Persons with Disabilities Act, 4577 people were selected using two-phase sampling from the working-age range of 15–64 as of 15 May 2016, considering the region, age, disability type, disability grade, economic activity status, etc. The PSED is the nationally representative longitudinal survey of individuals with registered disabilities in South Korea, and nationwide data were collected using a computer-assisted personal interviewing program [21].

The first survey was collected from 4577 individuals with disabilities residing in Korea for the second wave of PSED. The second survey, conducted in 2017, followed up with 4214 participants, representing 92.1% of the original panel. The third survey, conducted in 2018, followed up with 4104 participants, representing 89.7% of the original panel. The fourth survey, conducted in 2019, followed with 3995 participants, representing 87.3% of the original panel. The fifth survey, conducted in 2020, followed with 3907 participants, representing 85.4% of the original panel. The sixth survey, conducted in 2021, followed with 3848 participants, representing 84.1% of the original panel. The Seventh survey, conducted in 2022, followed with 3763 participants, representing 82.2% of the original panel. Finally, the eighth survey, conducted in 2023, followed with 3736 participants, representing 81.6% of the original panel.

To investigate the association between job satisfaction and stress or depressive symptoms, among 4577 individuals who were registered in the PSED, we first excluded 2307 participants who responded as a non-economically productive population. Second, we excluded 652 individuals

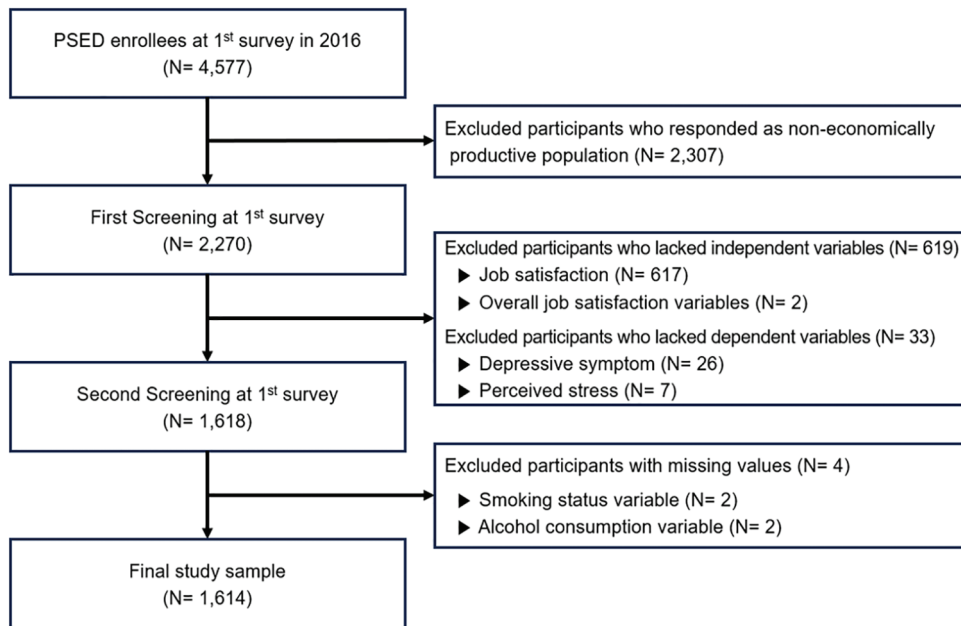


FIGURE 1. Flowchart for sample selection

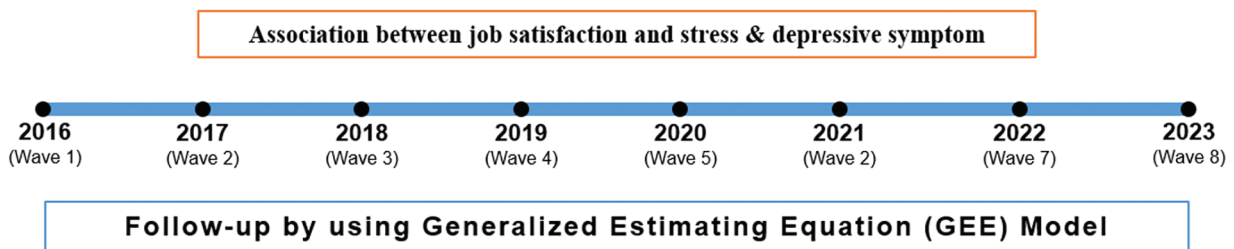


FIGURE 2. Study timeline

without information on dependent or independent variables. Third, we excluded 4 participants who lacked information on control variables. Finally, we included 1614 participants at baseline. Fig. 1 shows the flow chart for sample selection. Also, Fig. 2 displays the timeline and procedure of this study. The PSED database is released to the public for scientific use, ethical approval was not required for the present study.

Independent variables

Job satisfaction

In this study, job satisfaction refers to a state of contentment and enjoyment in one's current occupation, characterized by a sense of fulfillment, passion, and continued dedication. To measure job satisfaction, we utilized a Job Satisfaction Index [24], comprised of a total of 10 indicators. Each indicator was assigned a range of 1 to 5 points (1 represents very dissatisfied, 2 indicates dissatisfied, 3 stands for neutral, 4 signifies satisfied, and 5 represents very satisfied.), resulting in a score range from 10 to 50. The higher the score, the better the job satisfaction.

The content of the 10 indicators is as follows:

- (1) Wage or income (Question 1: How satisfied are you with your job's wages and income?)
- (2) Job security (Question 2: How satisfied are you with your job's security)

(3) Satisfaction with tasks and responsibilities (Question 3: How satisfied are you with your job's task and responsibilities?)

(4) Working environment (Question 4: How satisfied are you with your job's working environment)

(5) Working hours (Question 5: How satisfied are you with your job's working hours?)

(6) Potential for personal development (Question 6: How satisfied are you with your job's potential for personal development?)

(7) Communication and interpersonal relationships (Question 7: How satisfied are you with your communication and interpersonal relationships in job?)

(8) Fairness of personnel evaluation (Question 8: How satisfied are you with your job's fairness of personnel evaluation)

(9) Welfare benefits (Question 9: How satisfied are you with your job's welfare benefits)

(10) Accessibility and accommodations for individuals with disabilities (Question 10: How satisfied are you with your job's accessibility and accommodations for PWDs)

Finally, the scores for job satisfaction (range from 0 to 50) were categorized into four groups: <20 for low job satisfaction, 20–29 for medium job satisfaction, 30–39 for high job satisfaction, and >39 for very high job satisfaction [15]. In this study, the reliability analysis for job satisfaction yielded a Cronbach's alpha of 0.925.

Overall satisfaction with the current job

Overall satisfaction was measured in only one question; In the case of overall satisfaction, it is divided into three groups: unsatisfied (responded “very dissatisfied” or “dissatisfied”), usually (responded “moderate”) and satisfied (responded “satisfied” or “very satisfied”) [15].

Dependent variables

The dependent variables were stress and depressive symptoms of wage working PWDS. Stress and depressive symptoms were measured by single questions in PSED. Stress was assessed by a question, “How much stress do you typically feel in your daily life?”, on a Likert scale. 1 for “Not at all”, 2 for “Not very much”, 3 for “Insignificant”, 4 for “Moderate”, and 5 for “High”. 1~3 was categorized as “No”, and 4~5 was categorized as “Yes”. The depressive symptom was measured by the question, “Over the past year, have you felt sad or hopeless to the extent that it interfered with your daily life for more than two weeks?”, possible responses were “Yes” and “No”. Participants’ responses were used as a depressive symptom variable.

Control variables

This study reviewed previous research that examined the relationship between employment and mental health among PWDs, and accordingly, adopted socioeconomic variables, health status variables, and health risk behavior variables [15,19,21,23,26–28]. Gender was classified into male and female, and age groups were segmented into five categories: 15–29, 30–39, 40–49, 50–59, and ≥ 60 years. Residential areas were categorized as metropolitan, urban, and rural. Income level was divided into four categories: <100 (Monthly, 10,000), 100–199, 200–299, and >300. The educational level was divided into four groups: elementary school, middle school, high school, and college. Marital status was divided into three categories: Single, Married, and Separated or Divorced. Smoking habits (never smoked, former smoker, and current smoker) and alcohol consumption (never drank, former drinker, and current drinker) were also grouped into three categories, respectively. Stress levels were assessed as hardly felt, moderate, and almost felt a lot. Regarding disability, it was classified into two levels: severe (Level 1 to Level 3) and mild (Level 4 to Level 6), and disability types were further categorized into physical disabilities and other disabilities based on the available sample data.

Analytical approach and statistics

t-test, Analysis of variance (ANOVA), chi-square test, and generalized estimating equation (GEE) model were used to analyze the relationship between job satisfaction and stress or depressive symptoms of PWD. Participants who responded repeatedly eight times were included in the study, and all variables (independent, dependent, and control variables) were measured eight times. For the analysis using the GEE model, the SAS procedure “PROC GENMOD” was used, and the best model was selected by checking the working correlation structure. Using logistic regression via

GEE [29], this study calculated all variables’ odds ratio (OR) and 95% confidence interval (CI) of the risk towards job satisfaction or overall job satisfaction. Also, using linear regression via GEE [30], for each variable beta (*B*) and 95% CI were presented. For all analyses, the criterion for statistical significance was a two-tailed *p*-value < 0.05. We conducted all analyses using SAS (version 9.4; SAS Institute Inc., Cary, NC, USA).

Results

Prevalence of perceived stress and depressive symptom

Table 1 displays the descriptive statistics at baseline (2016). Of the 1614 research subjects included in our study, the prevalence of perceived stress was 55.9% (902 participants). Of the total sample, 65.4% (17 participants) of those with low job satisfaction (<20) had perceived stress, and 50.4% (139 participants) of those with very high job satisfaction (>39) had perceived stress (*p*-value: 0.023). Also, 65.9% (85 participants) of those with unsatisfied with overall satisfaction for current job had perceived stress, and 52.1% (404 participants) of those with satisfied had perceived stress (*p*-value < 0.0001).

In addition, the mean of continuous values for stress measured by a Likert scale was identified. Low job satisfaction (<20) had a mean of 3.69 (SD: 1.09), while very high job satisfaction (>39) had a mean of 3.70 (SD: 0.89). Also, unsatisfied with overall satisfaction for current job had a mean of 3.70 (SD: 0.89), meanwhile satisfied had a 3.41 (SD: 0.86). Furthermore, effect sizes were estimated using eta square to assess the differences in stress score within job satisfaction and overall satisfaction for current job. The eta squared value for stress score within the job satisfaction was found to be 0.01 (η^2 : 0.01, 95% CI: 0.00–0.02), indicating a moderate effect size [31]. Also, the eta squared value within the overall satisfaction was 0.01 (η^2 : 0.01, 95% CI: 0.00–0.03), indicating a moderate effect size [31].

In terms of depressive symptoms, 34.6% (9 participants) of those with low job satisfaction (<20) had depressive symptoms, and 6.2% (17 participants) of those with very high job satisfaction (>39) had depressive symptoms (*p*-value < 0.0001). Also, 22.5% (29 participants) of those with unsatisfied with overall satisfaction had depressive symptoms, and 7.0% (54 participants) of those with satisfied had a depressive symptom (*p*-value < 0.0001).

General characteristics of socioeconomic status (gender, age, residential region, income level, educational level and marital status) and health status and risk behavior (smoking status, alcohol consumption, self-rated health, disability grade and disability type) variables are also listed in Table 1 or Table A1.

Association between job satisfaction or overall job satisfaction and perceived stress

Table 2 shows the results of the panel data analysis using the GEE model, which investigates the association between job satisfaction or overall job satisfaction and perceived stress. First, it was found that for each one-unit increase in the job

TABLE 1

General characteristics of subjects included for analysis at baseline

Variables	Total		Stress score		<i>p</i> -value	Effect size	Perceived stress		Depressive symptom		<i>p</i> -value
	N	%	M	SD			Yes		Yes		
							N	%	N	%	
Total	1614	100.0	3.50	(0.83)			902	(55.9)	173	(10.7)	
Job satisfaction					0.756	0.01 ^a (0.00–0.02)			0.023		<0.0001
<20	26	1.6	3.69	(1.09)			17	(65.4)	9	(34.6)	
20–29	408	25.3	3.62	(0.81)			250	(61.3)	73	(17.9)	
30–39	904	56.0	3.48	(0.81)			496	(54.9)	74	(8.2)	
>39	276	17.1	3.38	(0.88)			139	(50.4)	17	(6.2)	
Overall satisfaction for current job					0.183	0.01 ^a (0.00–0.03)			0.003		<0.0001
Unsatisfied	129	8.0	3.70	(0.89)			85	(65.9)	29	(22.5)	
Usually	709	43.9	3.56	(0.78)			413	(58.3)	90	(12.7)	
Satisfied	776	48.1	3.41	(0.86)			404	(52.1)	54	(7.0)	
Gender					0.157	0.02 ^a (0.02–0.08)			0.620		0.383
Male	1,219	75.5	3.51	(0.82)			677	(55.5)	126	(10.3)	
Female	395	24.5	3.49	(0.87)			225	(57.0)	47	(11.9)	
Age					0.013	0.00 ^a (0.00–0.00)			0.134		0.668
15–29	240	14.9	3.38	(0.90)			118	(49.2)	26	(10.8)	
30–39	505	31.3	3.55	(0.76)			289	(57.2)	46	(9.1)	
40–49	519	32.2	3.54	(0.83)			304	(58.6)	60	(11.6)	
50–59	242	15.0	3.44	(0.87)			129	(53.3)	27	(11.2)	
>59	108	6.7	3.43	(0.92)			62	(57.4)	14	(13.0)	
Residential region					0.226	0.00 ^a (0.00–0.00)			0.201		0.000
Metropolitan	338	20.9	3.52	(0.91)			189	(55.9)	48	(14.2)	
Urban	415	25.7	3.44	(0.78)			217	(52.3)	23	(5.5)	
Rural	861	53.3	3.52	(0.83)			496	(57.6)	102	(11.8)	
Income level (Monthly, 10,000KRW)					0.396	0.00 ^a (0.00–0.01)			0.907		0.001
<100	296	18.3	3.47	(0.85)			168	(56.8)	36	(12.2)	
100–199	583	36.1	3.50	(0.86)			321	(55.1)	82	(14.1)	
200–299	412	25.5	3.49	(0.81)			228	(55.3)	36	(8.7)	
>300	323	20.0	3.54	(0.81)			185	(57.3)	19	(5.9)	
Education level					0.666	0.00 ^a (0.00–0.00)			0.319		0.140
≤Elementary school	102	6.3	3.60	(0.86)			63	(61.8)	14	(13.7)	
Middle school	131	8.1	3.42	(0.89)			68	(51.9)	20	(15.3)	
High school	786	48.7	3.52	(0.82)			449	(57.1)	85	(10.8)	
≥College	595	36.9	3.48	(0.83)			322	(54.1)	54	(9.1)	
Marital status					0.689	0.00 ^a (0.00–0.01)			0.133		0.000
Single	540	33.5	3.46	(0.85)			284	(52.6)	61	(11.3)	
Married	893	55.3	3.52	(0.82)			518	(58.0)	77	(8.6)	
Divorced, separated	181	11.2	3.51	(0.89)			100	(55.2)	35	(19.3)	
Smoking status					0.053	0.01 ^a (0.00–0.02)			0.056		0.036
Current smoker	465	28.8	3.61	(0.83)			280	(60.2)	63	(13.5)	
Former smoker	362	22.4	3.52	(0.80)			203	(56.1)	40	(11.0)	

(Continued)

Table 1 (continued)

Variables	Total		Stress score		p-value	Effect size	Perceived stress		p-value	Depressive symptom		p-value
	N	%	M	SD			Yes			Yes		
							N	%		N	%	
Non smoker	787	48.8	3.43	(0.84)			419	(53.2)		70	(8.9)	
Alcohol consumption					0.502	0.00 ^a (0.00–0.01)			0.100			0.480
Drinker	941	58.3	3.53	(0.83)			546	(58.0)		101	(10.7)	
Former drinker	255	15.8	3.53	(0.80)			139	(54.5)		32	(12.5)	
Non drinker	418	25.9	3.42	(0.87)			217	(51.9)		40	(9.6)	
Self-rated health					<0.0001	0.46 ^b (0.45–0.46)			<0.0001			<0.0001
Bad	460	28.5	3.77	(0.77)			321	(69.8)		82	(17.8)	
Good	1,154	71.5	3.40	(0.84)			581	(50.3)		91	(7.9)	
Disability grade					0.443	0.07 ^b (0.03–0.12)			0.625			0.148
Severe grade (Levels 1–3)	412	25.5	3.46	(0.85)			226	(54.9)		52	(12.6)	
Light grade (Levels 4–6)	1,202	74.5	3.52	(0.83)			676	(56.2)		121	(10.1)	
Disability type					0.302	0.06 ^b (0.02–0.10)			0.974			0.488
Physical disability	1101	68.2	3.52	(0.81)			615	(55.9)		114	(10.4)	
Other	513	31.8	3.47	(0.89)			287	(55.9)		59	(11.5)	

Note: ^a Effect Size Using Eta-Square; ^b Effect Size Using Cohen's d.

TABLE 2

Association between job satisfaction and stress score or perceived stress

Variables	Stress score			Perceived stress					
	B	95% CI	p-value	AOR	95% CI	p-value	AOR	95% CI	p-value
Job satisfaction score	-0.004	(-0.006--0.002)	<0.0001						
Job satisfaction									
<20	N/A			2.127	(1.348–3.356)	0.001	N/A		
20–29				1.348	(1.169–1.555)	<0.0001			
30–39				1.116	(0.996–1.250)	0.058			
>39				1.000					
Overall satisfaction for current job									
Unsatisfied	N/A			N/A			1.593	(1.294–1.960)	<0.0001
Usually							1.034	(0.950–1.125)	0.436
Satisfied							1.000		
Gender									
Male	Ref			1.000			1.000		
Female	0.049	(0.012–0.086)	0.009	1.224	(1.053–1.424)	0.009	1.209	(1.039–1.406)	0.014
Age									
15–29	0.060	(-0.002–0.122)	0.057	1.290	(0.999–1.665)	0.051	1.271	(0.984–1.641)	0.066
30–39	0.044	(-0.008–0.095)	0.097	1.206	(0.975–1.492)	0.084	1.193	(0.965–1.477)	0.104
40–49	0.051	(0.004–0.098)	0.032	1.244	(1.024–1.510)	0.028	1.240	(1.021–1.505)	0.030
50–59	0.017	(-0.027–0.061)	0.445	1.080	(0.901–1.295)	0.406	1.077	(0.898–1.292)	0.423
>59	Ref			1.000			1.000		
Residential region									
Metropolitan	-0.007	(-0.040–0.026)	0.665	0.966	(0.843–1.106)	0.618	0.960	(0.838–1.100)	0.558
Urban	-0.006	(-0.038–0.025)	0.691	0.974	(0.856–1.110)	0.696	0.972	(0.854–1.106)	0.668

(Continued)

Table 2 (continued)

Variables	Stress score			Perceived stress					
	B	95% CI	p-value	AOR	95% CI	p-value	AOR	95% CI	p-value
Rural	Ref			1.000			1.000		
Income level (Monthly, 10,000KRW)									
<100	-0.057	(-0.102--0.013)	0.011	0.795	(0.662-0.954)	0.014	0.822	(0.684-0.986)	0.035
100-199	-0.045	(-0.080--0.010)	0.011	0.834	(0.723-0.963)	0.013	0.856	(0.741-0.989)	0.035
200-299	-0.041	(-0.071--0.011)	0.008	0.850	(0.751-0.961)	0.010	0.867	(0.767-0.980)	0.023
>300	Ref			1.000			1.000		
Education level									
≤Elementary school	-0.016	(-0.077-0.046)	0.618	0.944	(0.730-1.220)	0.658	0.967	(0.748-1.249)	0.797
Middle school	-0.003	(-0.053-0.048)	0.922	1.009	(0.817-1.245)	0.934	1.028	(0.833-1.269)	0.794
High school	-0.033	(-0.063--0.004)	0.029	0.878	(0.778-0.992)	0.036	0.891	(0.790-1.006)	0.063
≥College	Ref			1.000			1.000		
Marital status									
Single	-0.040	(-0.089-0.008)	0.104	0.846	(0.691-1.035)	0.103	0.840	(0.687-1.027)	0.088
Married	-0.011	(-0.053-0.030)	0.593	0.953	(0.802-1.132)	0.581	0.947	(0.797-1.125)	0.537
Divorced, separated	Ref			1.000			1.000		
Smoking status									
Current smoker	0.047	(0.009-0.085)	0.015	1.213	(1.037-1.419)	0.016	1.223	(1.046-1.429)	0.012
Former smoker	0.010	(-0.027-0.048)	0.582	1.041	(0.894-1.212)	0.605	1.047	(0.899-1.219)	0.553
Non smoker	Ref			1.000			1.000		
Alcohol consumption									
Drinker	0.031	(-0.003-0.066)	0.075	1.140	(0.990-1.313)	0.068	1.142	(0.992-1.315)	0.065
Former drinker	0.040	(0.001-0.078)	0.043	1.179	(1.005-1.382)	0.043	1.176	(1.003-1.379)	0.045
Non drinker	Ref			1.000			1.000		
Self-rated health									
Bad	0.122	(0.101-0.144)	<0.0001	1.663	(1.516-1.825)	<0.0001	1.671	(1.522-1.834)	<0.0001
Good	Ref			1.000			1.000		
Disability grade									
Severe grade (Levels 1-3)	0.009	(-0.022-0.041)	0.554	1.038	(0.912-1.181)	0.572	1.035	(0.909-1.178)	0.602
Light grade (Levels 4-6)	Ref			1.000			1.000		
Disability type									
Physical disability	0.007	(-0.022-0.036)	0.642	1.031	(0.914-1.163)	0.618	1.026	(0.910-1.157)	0.671
Other	Ref			1.000			1.000		
Year									
2016	0.068	(0.033-0.103)	0.000	1.313	(1.137-1.515)	0.000	1.291	(1.119-1.489)	0.001
2017	0.064	(0.030-0.098)	0.000	1.293	(1.124-1.486)	0.000	1.274	(1.108-1.464)	0.001
2018	0.055	(0.021-0.089)	0.001	1.242	(1.082-1.427)	0.002	1.226	(1.068-1.408)	0.004
2019	0.081	(0.049-0.112)	<0.0001	1.386	(1.217-1.578)	<0.0001	1.376	(1.209-1.567)	<0.0001
2020	0.052	(0.020-0.084)	0.002	1.226	(1.075-1.397)	0.002	1.222	(1.073-1.393)	0.003
2021	0.065	(0.035-0.094)	<0.0001	1.294	(1.145-1.463)	<0.0001	1.291	(1.142-1.459)	<0.0001
2022	0.055	(0.026-0.085)	0.000	1.249	(1.108-1.409)	0.000	1.249	(1.108-1.409)	0.000
2023	Ref			1.000			1.000		

satisfaction score, the stress scale decreased by 0.004 ($B: -0.004$, 95% CI: $-0.006--0.002$, p -value: <0.0001). Second, the OR of the perceived stress of those with low job satisfaction (<20) was 2.127 times (OR: 2.127, 95% [CI:

1.348-3.356, p -value: 0.001), medium job satisfaction (20-29) was 1.348 times (OR: 1.348, 95% CI: 1.169-1.555, p -value: <0.0001), and high job satisfaction (30-39) was 1.116 times (OR: 1.116, 95% CI: 0.996-1.250, p -value: 0.058)

higher compared with those with very high job satisfaction (>39).

In terms of overall satisfaction with current job, the OR of perceived stress for the “Unsatisfied” group was 1.593 times (OR: 1.593, 95% CI: 1.294–1.960, p -value: <0.0001), while the “Usually” group was 1.034 times (OR: 1.034, 95% CI: 0.950–1.125, p -value: 0.436), higher compared with those for the “Satisfied” group.

Association between job satisfaction or overall job satisfaction and depressive symptom

Table 3 shows the results of the panel data analysis using the GEE model, which investigates the association between job satisfaction or overall job satisfaction and depressive

symptom. After adjusting for all of these confounders, the OR of the depressive symptom of those with low job satisfaction (<20) was 3.557 times (OR: 3.557, 95% CI: 1.890–6.693, p -value < 0.0001), medium job satisfaction (20–29) was 2.004 times (OR: 2.004, 95% CI: 1.493–2.690, p -value < 0.0001), and high job satisfaction (30–39) was 1.183 times (OR: 1.183, 95% CI: 0.911–1.537, p -value: 0.208) higher compared with those with very high job satisfaction (>39). In terms of overall satisfaction with current job, the OR of depressive symptom for the “Unsatisfied” group was 2.688 times (OR: 2.688, 95% CI: 2.024–3.571, p -value < 0.0001), while the “Usually” group was 1.369 times (OR: 1.369, 95% CI: 1.154–1.624, p -value: 0.000), higher compared with those for the “Satisfied” group.

TABLE 3

Association between job satisfaction and depressive symptom

Variables	Depressive symptom					
	AOR	95% CI	p -value	AOR	95% CI	p -value
Job satisfaction						
<20	3.557	(1.890–6.693)	<0.0001	N/A		
20–29	2.004	(1.493–2.690)	<0.0001			
30–39	1.183	(0.911–1.537)	0.208			
>39	1.000					
Overall satisfaction for current job						
Unsatisfied	N/A			2.688	(2.024–3.571)	<0.0001
Usually				1.369	(1.154–1.624)	0.000
Satisfied				1.000		
Gender						
Male	1.000			1.000		
Female	1.380	(1.036–1.838)	0.028	1.360	(1.021–1.812)	0.036
Age						
15–29	1.491	(0.912–2.437)	0.111	1.419	(0.872–2.310)	0.159
30–39	1.683	(1.109–2.554)	0.014	1.612	(1.066–2.438)	0.024
40–49	1.612	(1.104–2.353)	0.013	1.577	(1.086–2.291)	0.017
50–59	1.726	(1.218–2.447)	0.002	1.719	(1.211–2.440)	0.002
>59	1.000			1.000		
Residential region						
Metropolitan	0.882	(0.699–1.113)	0.290	0.877	(0.696–1.105)	0.266
Urban	0.454	(0.349–0.590)	<0.0001	0.455	(0.350–0.591)	<0.0001
Rural	1.000			1.000		
Income level (Monthly, 10,000KRW)						
<100	1.209	(0.852–1.716)	0.288	1.239	(0.872–1.760)	0.231
100–199	1.289	(0.975–1.705)	0.075	1.315	(0.992–1.744)	0.057
200–299	1.050	(0.809–1.364)	0.713	1.072	(0.827–1.390)	0.598
>300	1.000			1.000		
Education level						
≤Elementary school	0.959	(0.610–1.508)	0.856	0.968	(0.618–1.516)	0.887
Middle school	0.983	(0.664–1.455)	0.932	1.008	(0.684–1.484)	0.969

(Continued)

Table 3 (continued)

Variables	Depressive symptom					
	AOR	95% CI	p-value	AOR	95% CI	p-value
High school	0.984	(0.787–1.231)	0.887	0.981	(0.786–1.224)	0.864
≥College	1.000			1.000		
Marital status						
Single	0.804	(0.587–1.100)	0.172	0.823	(0.602–1.124)	0.220
Married	0.492	(0.372–0.649)	<0.0001	0.494	(0.375–0.651)	<0.0001
Divorced, separated	1.000			1.000		
Smoking status						
Current smoker	1.411	(1.060–1.879)	0.018	1.430	(1.075–1.903)	0.014
Former smoker	1.224	(0.914–1.640)	0.175	1.238	(0.924–1.660)	0.153
Non smoker	1.000			1.000		
Alcohol consumption						
Drinker	1.108	(0.837–1.467)	0.473	1.114	(0.843–1.472)	0.447
Former drinker	1.432	(1.066–1.923)	0.017	1.425	(1.061–1.914)	0.019
Non drinker	1.000			1.000		
Self rated health						
Bad	2.493	(2.096–2.964)	<0.0001	2.493	(2.098–2.962)	<0.0001
Good	1.000			1.000		
Disability grade						
Severe grade (Levels 1–3)	1.292	(1.017–1.641)	0.036	1.303	(1.028–1.651)	0.029
Light grade (Levels 4–6)	1.000			1.000		
Disability type						
Physical disability	0.923	(0.734–1.160)	0.490	0.920	(0.733–1.154)	0.469
Other	1.000			1.000		
Year						
2016	2.408	(1.782–3.253)	<0.0001	2.381	(1.761–3.219)	<0.0001
2017	1.679	(1.249–2.257)	0.001	1.655	(1.231–2.225)	0.001
2018	1.525	(1.122–2.073)	0.007	1.516	(1.115–2.061)	0.008
2019	1.533	(1.130–2.080)	0.006	1.554	(1.147–2.106)	0.005
2020	1.080	(0.789–1.477)	0.632	1.107	(0.809–1.515)	0.526
2021	1.616	(1.199–2.178)	0.002	1.633	(1.214–2.196)	0.001
2022	1.011	(0.719–1.421)	0.951	1.023	(0.728–1.438)	0.897
2023	1.000			1.000		

Discussion

This study aimed to investigate the effects of job satisfaction on the stress or depressive symptom of PWDs working in South Korea. We conducted a longitudinal analysis using data obtained between 2016 and 2023, the second wave of the PSED. The summarized research findings are presented as follows: as overall job satisfaction decreases, there is an increased tendency to experience stress and depressive symptom. In particular, as the job satisfaction scores, assessed through various factors, including wage level, employment stability, and work environment, decrease, there is a higher incidence of stress and depressive symptom among PWDs.

According to a study analyzing the relationship between workplace discrimination and stress or depression among 1566 employed Korean PWDs, it found that the PWDS group experiencing workplace discrimination had a 3.16-times higher OR of experiencing stress and 6.02-times higher OR of experiencing depressive symptom compared to the group without discrimination experiences. Specifically, mental health deteriorated even further as the frequency of workplace discrimination increased [26]. For PWDs, lower educational attainment and economic status compared to PWODs often result in disadvantages in the job market. Moreover, employed PWDs tend to experience significantly lower job satisfaction than PWODs due to inferior treatment, heightened perception of discrimination, and

poor working environments [32]. Employed PWDs with low job satisfaction experience a decrease in overall life satisfaction, and this diminished life satisfaction adversely affects both mental health (daily life stress and depressive symptom) and physical health [15,33]. The increase in stress and depression as job satisfaction decreases among can be explained by several mechanisms. According to a previous study conducted in Europe [34], low job satisfaction leads to the development of negative relationships among colleagues, increased time pressure during work hours, and heightened role ambiguity, which in turn cause psychological distress such as everyday stress and depressive symptoms. Another study also reported that low job satisfaction could trigger feelings of social defeat, and for PWDs, this persistent sense of social defeat can eventually lead to stress and chronic depression [35,36].

Recently, various legislations have been enacted in Korea to address issues related to PWDs, aiming to promote their employment rate and job satisfaction, thereby establishing a series of safeguards to eliminate discrimination against PWDs [15]. However, most of these measures exhibit mandatory enforcement within public institutions. Overall, the employment rate of PWDs and the rate of improvement in their working environments remain considerably low within the broader corporate culture of Korea [32]. Notably, Korea's "Mandatory Employment Allocation Act for Persons with Disabilities" mandates a minimum of 3% employment of PWDs per company. However, as of 2022, the actual employment rate of PWDs in private companies stands at 2%, falling short of the legal requirement. Additionally, it is found that 70% of the private companies surveyed have not implemented the employment of PWDs at all [10]. Moreover, even if PWDs secure employment, they often find themselves in unsatisfactory work environments characterized by inadequate guarantees of a conducive work setting and issues such as simplistic task assignments and exclusion from performance evaluations. This highlights the need for more effective policies and institutional measures to prevent mental health deterioration in PWDs, employed or otherwise [37].

Meanwhile, in Japan, there have been cases in which the government and businesses have worked together to provide PWDs management programs to improve job satisfaction and mental health rather than a top-down policy from the government to businesses [38]. The program has been shown to improve job satisfaction and the physical and mental health of employed PWDs, while reducing the cost of managing PWDs in the workplace. Hence, it can be seen that the program is effective vis-à-vis the management of the mental health of PWDs [38].

Therefore, based on the identified association between job satisfaction and stress or depressive symptoms among PWDs, it is anticipated that providing programs aimed at enhancing job satisfaction and alleviating stress or depressive symptoms within the work environment for employed PWDs could help prevent the deterioration of stress or depressive symptoms caused by low job satisfaction in this population. In addition, given the current lack of research on the association between job satisfaction and mental health among PWDs in South Korea and Asia, the

identification of common mental issues, such as stress and depressive symptoms, among employed PWDs is expected to provide foundational data for future research aimed at identifying severe mental disorders. Additionally, considering prior studies that indicate increased job satisfaction among Japanese PWDs (Persons with Disabilities) has led to a reduction in the prevalence of stress and depression amidst the global rise in stress and depression risks for PWDs, the findings of this study could be used as evidence to improve the mental health of PWDs in Asia [39].

The limitations of this study are as follows: first, although GEE models are applied, it remains challenging to establish a complete causal relationship between job satisfaction and stress or depressive symptoms. Second, the factors influencing the increase in stress and depressive symptoms due to decreased job satisfaction in PWDs are complex and multidimensional, making direct assessment difficult [40]. Third, this study had a bias due to the PSED used in the analysis, mixed with the respondents' opinions. In addition, the use of panel data may introduce bias because the participants are the same across different years. Fourth, this study focused on employed PWDs to ascertain job satisfaction, thus limiting the generalizability of the findings to the entire PWD population. Also, since PSED data is limited to South Korea, generalizing the findings to other ethnicities and geographic locations is challenging. Fifth, although the research model was developed through a review of various preceding studies, there may be potential confounding variables present. Finally, Due to limitations in the PSED variables, stress, and depressive symptoms were measured using a single scale. Future research should utilize scales that can demonstrate reliability and validity.

Conclusion

This study used PSED from 2016 to 2023 to examine the association between job satisfaction and stress or depressive symptoms in employed PWDs. The findings showed that PWDs with lower job satisfaction had a higher prevalence of stress and depressive symptoms. Therefore, we emphasize the need for policy and institutional measures to promote mental health. In particular, we expect that if a series of programs for employed PWDs are provided by the government and businesses based on the policy cases that have been implemented to promote job satisfaction and stress or depressive symptoms for PWDs, the mental health deterioration of vulnerable groups can be prevented. Meanwhile, in the context of limited research on the relationship between job satisfaction and stress or depressive symptoms among employed PWDs in Korea, this study's findings may serve as foundational research to support the improvement of mental health in this population. In addition, it is anticipated that these findings can be used as evidence to improve the work environment for PWDs within the context of Korean corporate culture.

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Availability of Data and Materials: Publicly accessible data were analyzed in this study. This data can be found here: <https://www.kead.or.kr/en/> (accessed on 23 September 2024).

Ethics Approval: The PSED database is released to the public for scientific use, ethical approval was not required for the present study.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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Appendix A

TABLE A1

General characteristics of job satisfaction and overall satisfaction for current job

Variables	Total		Job satisfaction								p-value	Overall satisfaction for current Job						p-value
			<20		20–29		30–39		>39			Unsatisfied		Usually		Satisfied		
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
Total	1614	100.0	26	1.6	408	25.3	904	56.0	276	17.1		129	8.0	709	43.9	776	48.1	
Perceived stress											0.023							0.003
No	712	44.1	9	1.3	158	22.2	408	57.3	137	19.2		44	6.2	296	41.6	372	52.2	
Yes	902	55.9	17	1.9	250	27.7	496	55.0	139	15.4		85	9.4	413	45.8	404	44.8	
Depressive symptoms											<0.0001							<0.0001
No	1,441	89.3	17	1.2	335	23.2	830	57.6	259	18.0		100	6.9	619	43.0	722	50.1	
Yes	173	10.7	9	5.2	73	42.2	74	42.8	17	9.8		29	16.8	90	52.0	54	31.2	
Gender											0.055							0.366
Male	1,219	75.5	20	1.6	328	26.9	663	54.4	208	17.1		104	8.5	534	43.8	581	47.7	
Female	395	24.5	6	1.5	80	20.3	241	61.0	68	17.2		25	6.3	175	44.3	195	49.4	
Age											<0.0001							<0.0001
15–29	240	14.9	3	1.3	45	18.8	147	61.3	45	18.8		18	7.5	84	35.0	138	57.5	
30–39	505	31.3	6	1.2	97	19.2	298	59.0	104	20.6		32	6.3	216	42.8	257	50.9	
40–49	519	32.2	7	1.3	143	27.6	280	53.9	89	17.1		38	7.3	233	44.9	248	47.8	
50–59	242	15.0	7	2.9	78	32.2	124	51.2	33	13.6		23	9.5	125	51.7	94	38.8	
>59	108	6.7	3	2.8	45	41.7	55	50.9	5	4.6		18	16.7	51	47.2	39	36.1	
Residential region											0.046							0.300
Metropolitan	338	20.9	3	0.9	82	24.3	184	54.4	69	20.4		27	8.0	134	39.6	177	52.4	
Urban	415	25.7	2	0.5	113	27.2	239	57.6	61	14.7		35	8.4	177	42.7	203	48.9	
Rural	861	53.3	21	2.4	213	24.7	481	55.9	146	17.0		67	7.8	398	46.2	396	46.0	

(Continued)

Table A1 (continued)

Variables	Total		Job satisfaction								p-value	Overall satisfaction for current Job						p-value	
			<20		20-29		30-39		>39			Unsatisfied		Usually		Satisfied			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
Income level (Monthly, 10,000KRW)											<0.0001								<0.0001
<100	296	18.3	7	2.4	116	39.2	152	51.4	21	7.1		43	14.5	159	53.7	94	31.8		
100-199	583	36.1	15	2.6	181	31.0	316	54.2	71	12.2		53	9.1	290	49.7	240	41.2		
200-299	412	25.5	3	0.7	82	19.9	251	60.9	76	18.4		24	5.8	169	41.0	219	53.2		
>300	323	20.0	1	0.3	29	9.0	185	57.3	108	33.4		9	2.8	91	28.2	223	69.0		
Education level											<0.0001								<0.0001
≤Elementary school	102	6.3	6	5.9	45	44.1	45	44.1	6	5.9		16	15.7	55	53.9	31	30.4		
Middle school	131	8.1	2	1.5	52	39.7	71	54.2	6	4.6		12	9.2	78	59.5	41	31.3		
High school	786	48.7	14	1.8	221	28.1	459	58.4	92	11.7		72	9.2	385	49.0	329	41.9		
≥College	595	36.9	4	0.7	90	15.1	329	55.3	172	28.9		29	4.9	191	32.1	375	63.0		
Marital status											0.007								0.002
Single	540	33.5	6	1.1	126	23.3	302	55.9	106	19.6		40	7.4	217	40.2	283	52.4		
Married	893	55.3	17	1.9	221	24.7	500	56.0	155	17.4		70	7.8	393	44.0	430	48.2		
Divorced, separated	181	11.2	3	1.7	61	33.7	102	56.4	15	8.3		19	10.5	99	54.7	63	34.8		
Smoking status											<0.0001								0.000
Current smoker	465	28.8	14	3.0	145	31.2	240	51.6	66	14.2		56	12.0	214	46.0	195	41.9		
Former smoker	362	22.4	3	0.8	104	28.7	197	54.4	58	16.0		26	7.2	166	45.9	170	47.0		
Non smoker	787	48.8	9	1.1	159	20.2	467	59.3	152	19.3		47	6.0	329	41.8	411	52.2		
Alcohol consumption											0.452								0.780
Drinker	941	58.3	17	1.8	238	25.3	533	56.6	153	16.3		74	7.9	420	44.6	447	47.5		
Former drinker	255	15.8	5	2.0	72	28.2	138	54.1	40	15.7		24	9.4	112	43.9	119	46.7		
Non drinker	418	25.9	4	1.0	98	23.4	233	55.7	83	19.9		31	7.4	177	42.3	210	50.2		
Self-rated health											<0.0001								<0.0001
Bad	460	28.5	13	2.8	178	38.7	225	48.9	44	9.6		70	15.2	232	50.4	158	34.3		
Good	1,154	71.5	13	1.1	230	19.9	679	58.8	232	20.1		59	5.1	477	41.3	618	53.6		
Disability grade											0.354								0.226
Severe grade (Levels 1-3)	412	25.5	6	1.5	107	26.0	218	52.9	81	19.7		35	8.5	166	40.3	211	51.2		
Light grade (Levels 4-6)	1,202	74.5	20	1.7	301	25.0	686	57.1	195	16.2		94	7.8	543	45.2	565	47.0		
Disability type											0.030								0.126
Physical disability	1,101	68.2	17	1.5	262	23.8	615	55.9	207	18.8		89	8.1	465	42.2	547	49.7		
Other	513	31.8	9	1.8	146	28.5	289	56.3	69	13.5		40	7.8	244	47.6	229	44.6		

Note: ^aEffect Size Using Eta-Square; ^bEffect Size Using Cohen's d.