

# Characteristics of mental disorders among information technology workers in 238 compensated cases in Japan

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**Abstract:** This study aimed to investigate the circumstances, characteristics, and background factors of mental disorders within the information technology (IT) industry, which is known for the frequent occurrence of mental disorders from overwork and poor psychosocial work environment. The study analyzed 238 cases of mental disorders and suicides in the IT industry from fiscal years 2010 to 2018 on the database constructed by the Japan Research Center for Overwork-Related Disorders. The results showed a higher number of cases among men (n=178, 74.8%) and an increasing number among women. The data for diagnosis of mental diseases indicated a high number of depressive episodes (150 cases, 63.0%). Regarding work-induced psychological burden, 37 cases (15.5%) reported “extremely long working hours” for “special events” and 65 cases (27.3%) reported “constantly long working hours”. For “specific events”, 87 cases (36.6%) reportedly “caused (major) changes in the content and amount of work”. Among women, 13 cases (21.7%) of “sexual harassment” (SH), which showed an increasing trend. Therefore, in the IT industry, the working hours must be properly managed. Mental health measures should also accompany improved psychosocial environment in the workplace, and prohibition of SH at work in particular.

**Key words:** Information technology (IT) industry, Mental disorders, Mental health, Psychology, Sexual harassment

## Introduction

In 2015, the Ministry of Health, Labour and Welfare of Japan published the General Principles on Measures to Prevent Death from Overwork to eliminate death from overwork and aimed for a society where people can continue to work in good health in a fulfilled manner<sup>1</sup>.

Besides other industries such as transportation, educa-

tion, food service, medical care, construction, and the media, death from overwork, known as “Karoshi”, occurs frequently in the information technology (IT) industry too<sup>1</sup>. Indeed, according to FY 2018 industry (intermediate classification) statistics on death from overwork, the IT industry ranked eighth, with 23 cases of workers’ demanding compensation for mental disorders<sup>2</sup>. Stakeholders have called for measures to improve work environment and safeguard workers’ health in the information and telecommunications industry, including system engineers (SEs) and programmers (PGs)<sup>3–10</sup>.

Previous researches indicate that workers in this indus-

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try are overworked and placed in harsh working environments owing to factors such as strict deadlines, customer service, and sudden changes in specifications<sup>11, 12</sup>). Meanwhile, the demand for human resources in this industry is expected to increase, and estimates indicate a shortage of approximately 300,000 people in 2020 and 450,000 people in 2030 in Japan<sup>13</sup>). Therefore, an urgent issue is the review of and improvement in the excessive workload required of SEs and PGs, along with the implementation of measures for preventing mental disorders.

The analysis of mental disorders, such as death from overwork of workers in the IT industry, can help understand working patterns that anticipate the future working styles of workers, ultimately contributing to the prevention of death by overwork. Furthermore, as the demand for human resources in the IT industry is expected to increase further in the future, it is expected that there will be an analysis of industrial accident certification cases in the IT industry.

The previous report by our research team has analyzed mental disorders among workers in the IT industry for the period 2010–2015<sup>14</sup>); Kan reported that 3/4 of mental disorders were depressive episodes, and suicide was around 30%<sup>14</sup>). However, factors other than their gender and overtime are not clear. In recent years, there has been a growing interest in harassment and mental disorders, and by examining factors other than the amount of overtime, gender differences, and the actual state of suicide, including cases from 2015 onward, we can provide insights that contribute to countermeasures. Focusing on cases of mental disorders that arise due to overwork being recognized as industrial accidents that lead to death in 2010–2018, our study aimed to clarify the actual circumstances and characteristics of mental disorders, such as death by overwork among SEs and PGs, and provide insights to formulate countermeasures.

## Methods

### *Data source and procedures*

From 2010 to 2018, labor bureaus across Japan and the Labor Standards Inspection Office at the Research Center for Overwork-Related Disorders (RECORDs) of the National Institute of Occupational Safety and Health, Japan (JNIOSH), collected the documents of compensation claim reports about occupational accident recognition cases for mental disorders that should be compensated about as defined in the workers' compensation system in Japan and related materials.

We subsequently constructed a database on death by overwork by quantifying the contents of the survey reports that facilitated statistical processing. In this study, we focused on the information and communication industry in the Japan Standard Industrial Classification (major classification), which corresponds to the IT industry. We analyzed a total of 238 cases of mental disorders from the database in a previous five-year period (FY 2010–2014, 124 cases) and in the most recent four years (FY 2015–2018, 114 cases).

We extracted the following work features from the survey reports: SEs were mainly engaged in information processing, system design, software, etc.; and PGs were mainly engaged in the manufacturing process (programming, testing, etc.) in system development after receiving the design from SEs. Mental disorders were classified based on Chapter 5, “Mental and behavioral disorders (F00-F99)” in the International Statistical Classification of Diseases and Related Health Problems (ICD-10) 10th Revision (revised 2003).

This research was conducted with the approval of the Institutional Review Board of the National Institute of Occupational Safety and Health of Japan in the Japan Organization of Occupational Health and Safety (notification number: 2021N26). The database used in this study did not contain any personal information, such as names, addresses, telephone numbers, or other identify information.

### *Analysis method*

We analyzed SEs, PGs, and other occupations in the information and communication industry. Based on the contents of the survey reports, analyses were conducted according to sex, age at onset, size of workplace, occupation, disease, general items (e.g., working conditions), occupational accident recognition factors, and number of overtime hours. The analysis involved the collection of basic data from the database in a previous five-year period (FY 2010–2014, 124 cases) and in the most recent four years (FY 2015–2018, 114 cases), and analysis of the factors contributing to the prevention of death from overwork, and focusing on changes from previous reports<sup>14</sup>). The analysis of psychosocial factors caused to mental disorders was limited to those of cases that were recognized by the “Recognition Criteria for Mental Disorders Caused by Psychological Stress” (henceforth, “Recognition Criteria”), which was established by Japan Ministry of Health, Labour and Welfare in December 2011.

We used the data listed in the survey reports for the information and communications industry and the occupa-

tions of the victims. However, for the SEs and PGs, some data were changed to occupation that were considered appropriate per the analyzer's reading of the survey reports. Moreover, in this study, we adopted the following definition of sexual harassment (SH): physical contact with the chest, waist, etc., and sexual behavior toward workers in the workplace, resulting in disadvantageous working conditions or harm to the working environment. Additionally, rape (sexual coercion) was defined as follows: forcing a woman to commit sexual acts against her will by using violence, threats, or the insanity of the other party<sup>15</sup>).

## Results

### *Overview of the mental disorders cases*

Size of workplace, industry, occupation, and labor management

The cases tended to be employed at workplaces with 100–499 people (69 cases, 29.0%), with the number of cases in relatively large-scale workplaces being prominent. With regards to occupations, 83 cases (34.9%) were SEs and 16 cases (6.7%) were PGs.

For prescribed holidays, 160 cases (67.2%) had complete five-day workweeks. Concerning the status of attendance management, reporting by the employee was the most common at 135 cases (56.7%), followed by confirmation by the manager (81 cases, 34.0%), use of time cards (58 cases, 24.4%), and confirmation using an attendance book (51 cases, 21.4%). Moreover, employment regulations (95%: none, excluding those that had no description) and wage regulations (93.3%: none, excluding those that had no descriptions) were enacted in almost all cases.

Sex, age at onset, life or death, and disease at time of decision

Table 1 shows the sex, age at onset, life or death, and disease at the time of case decision. We observed an increasing number of cases in women (The proportion of women was 19.4% from 2010 to 2014 and 28.9% from 2015 to 2018) and a high occurrence of mental disorders in those aged 30–39 yr. More than one-fifths (21.4%) of the cases ended in death (suicide). The most prevalent disease was mood (affective) disorders, particularly depressive episode. Neurotic, stress-related, and somatoform disorders were also reported, which included cases of adjustment disorders.

Work-related adverse events by sex

Tables 2 and 3 show the occupational accident recogni-

tion factors for men and women, respectively.

When describing work-induced psychological burden of the “special events”, “extremely long working hours” accounted for 30 cases (16.9%) among men and 7 cases (11.7%) among women. As many as 54 cases (30.3%) among men and 11 cases (18.3%) among women were observed for “constantly long working hours”.

For “specific events,” 87 cases (36.6%) reportedly “caused (major) changes in the content and amount of work”. Among women, five (8.3%) cases of “rape” were reported (“rape” is included in the “extreme psychological burden” of Table 3. “Extreme psychological burden” is an occupational illness or injury that is life-threatening, extremely painful or leaves a residual disability that renders one permanently incapable of working. However, from 2010 to 2018, all cases were rapes of women.), as well as 13 cases (21.7%) of “sexual harassment” (SH), which showed an increasing trend (14.8% in 4 cases from 2010 to 2014 and 27.3% in 9 cases from 2015 to 2018).

Sexual harassment and rape

Table 4 shows data on SH<sup>15</sup>). SH cases were reported by women in their 20s and 30s. The perpetrators were direct superiors and business owners. In most cases, the attack occurred during working hours. Among the 13 cases of SH, one case led to counseling by an industrial physician and consultation with a psychiatrist after a stress check, and two cases led to a consultation with a psychiatrist through a women's counseling office (compliance desk). Rape perpetrators were found to be the client in three of the five cases. Many of them progressed by starting with sexual behavior and physical contact and culminating in forced sexual acts. Most of the victims reported developing post-traumatic stress disorder.

## Discussion

This study investigated the picture and background of psychosocial factors causing workers' compensation owing to mental disorders in the IT industry.

The results clarified that cases of mental disorders due to overwork generally involved men employees (74.8%), but the number of cases involving women employees trended upward over time (The proportion of women was 19.4% from 2010 to 2014 and 28.9% from 2015 to 2018). Remote working may continue to increase in the future, depending on the impact of COVID-19. Remote working is said to allow people to spend more time doing chores and other chores by reducing commuting time<sup>16</sup>).

Table 1. Sex, age, life or dead, psychiatric disorders of the mental disorders cases

	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Number of cases (% by year)	22 (100) (9.2)	13 (100) (5.4)	35 (100) (14.7)	22 (100) (9.2)	32 (100) (13.4)	30 (100) (12.6)	27 (100) (11.3)	34 (100) (14.3)	23 (100) (9.7)	238 (100) 100%
Sex										
Men	17 (77.3)	10 (77.0)	29 (82.9)	14 (63.6)	27 (84.3)	25 (83.3)	19 (70.3)	24 (70.6)	13 (56.5)	178 (74.8)
Women	5 (22.7)	3 (23.0)	6 (17.1)	8 (36.4)	5 (15.7)	5 (16.7)	8 (29.7)	10 (29.4)	10 (43.5)	60 (25.2)
Age										
10–19	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)	0 (0.0)	1 (0.4)
20–29	8 (36.4)	4 (30.8)	10 (28.6)	4 (18.2)	12 (37.5)	9 (30.0)	8 (29.6)	7 (20.6)	12 (52.2)	74 (31.1)
30–39	10 (45.4)	5 (38.5)	10 (28.6)	13 (59.1)	9 (28.1)	11 (36.7)	7 (25.9)	9 (26.4)	5 (21.7)	79 (33.2)
40–49	3 (13.6)	2 (15.4)	12 (34.3)	5 (22.7)	6 (18.8)	6 (20.0)	9 (33.3)	13 (38.2)	6 (26.1)	62 (26.1)
50–59	1 (22.7)	2 (15.4)	3 (8.6)	0 (0.0)	5 (15.6)	4 (13.3)	3 (11.1)	4 (11.8)	0 (0.0)	22 (9.2)
Life or dead										
Life	19 (86.4)	9 (69.2)	23 (65.7)	20 (90.9)	22 (68.8)	24 (80.0)	21 (77.8)	30 (88.2)	19 (82.6)	187 (78.6)
Dead	3 (13.6)	4 (30.8)	12 (34.3)	2 (9.1)	10 (31.2)	6 (20.0)	6 (22.2)	4 (11.8)	4 (17.4)	51 (21.4)
Psychiatric disorders										
F30–F39: Mood (affective) disorders	15 (68.1)	11 (84.6)	28 (80.0)	15 (68.1)	21 (65.6)	18 (60.0)	18 (66.7)	20 (58.8)	11 (47.8)	157 (66.0)
F31 Bipolar affective disorder	0 (0.0)	0 (0.0)	1 (2.9)	1 (4.5)	0 (0.0)	1 (3.3)	0 (0.0)	1 (2.9)	0 (0.0)	4 (1.7)
F32 Depressive episode	15 (68.1)	10 (76.9)	27 (77.1)	14 (63.6)	20 (62.5)	17 (56.7)	17 (63.0)	19 (55.9)	11 (47.8)	150 (63.0)
F40–F48: Neurotic, stress-related and somatoform disorders	7 (31.8)	2 (15.4)	6 (17.1)	7 (31.8)	11 (57.9)	12 (40.0)	9 (33.3)	14 (41.2)	12 (52.1)	80 (33.6)
F43.0 Acute stress reaction	4 (18.1)	1 (7.7)	0 (0.0)	1 (4.5)	2 (6.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.3)	9 (3.8)
F43.1 Post-traumatic stress disorder	0 (0.0)	1 (7.7)	0 (0.0)	0 (0.0)	1 (3.1)	0 (0.0)	1 (3.7)	1 (2.9)	3 (13.0)	7 (2.9)
F43.2 Adjustment disorders	3 (13.6)	0 (0.0)	2 (5.8)	5 (22.7)	6 (18.6)	7 (23.3)	4 (14.8)	9 (26.5)	6 (26.1)	42 (17.6)
F43.9 Reaction to severe stress, unspecified	0 (0.0)	0 (0.0)	2 (5.8)	1 (4.5)	1 (3.1)	1 (3.3)	0 (0.0)	0 (0.0)	1 (4.3)	6 (2.5)
F45 Somatoform disorders	0 (0.0)	0 (0.0)	1 (2.9)	0 (0.0)	1 (3.1)	1 (3.3)	1 (3.7)	2 (5.8)	1 (4.3)	7 (2.9)
F48 Other neurotic disorders	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (6.6)	3 (11.1)	1 (2.9)	0 (0.0)	6 (2.5)
F2 Schizophrenia	0 (0.0)	0 (0.0)	1 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)

\*F3 and F4 diseases with a total of less than 1% are excluded.

Table 2. Labor accident recognition factors (men)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Number of cases (% by year)	22 (100) (9.2)	13 (100) (5.4)	35 (100) (14.7)	22 (100) (9.2)	32 (100) (13.4)	30 (100) (12.6)	27 (100) (11.3)	34 (100) (14.3)	23 (100) (9.7)	238 (100) 100%
Sex										
Men	17 (77.3)	10 (77.0)	29 (82.9)	14 (63.6)	27 (84.3)	25 (83.3)	19 (70.3)	24 (70.6)	13 (56.5)	178 (74.8)
Women	5 (22.7)	3 (23.0)	6 (17.1)	8 (36.4)	5 (15.7)	5 (16.7)	8 (29.7)	10 (29.4)	10 (43.5)	60 (25.2)
Evaluation of a particular event										
Extreme psychological burden	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Extreme long hours*1	Not stated	1 (10.0)	6 (20.7)	2 (14.3)	3 (11.1)	10 (40.0)	5 (26.3)	2 (8.3)	1 (7.7)	30 (16.9)
Constant long working hours	Not stated	Not stated	15 (51.7)	8 (57.1)	9 (33.3)	6 (24.0)	5 (26.3)	7 (29.2)	4 (30.8)	54 (30.3)
Specific events (No incidents in total are omitted.)										
2. Experienced and witnessed tragic accidents and disasters	1 (5.9)	0 (0.0)	0 (0.0)	1 (7.1)	2 (7.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.2)
3. Caused a serious accident resulting in injury or death or serious accident related to work	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.7)	1 (0.6)
4. Made a serious business mistake, such as affecting the management of the company	0 (0.0)	1 (10.0)	3 (10.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.2)
5. Being held responsible for accidents and incidents that occurred at the company	0 (0.0)	0 (0.0)	1 (3.4)	0 (0.0)	0 (0.0)	1 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.1)
6. I lost a lot of money on the work I was involved in	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
9. The quota was not met	0 (0.0)	1 (10.0)	1 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.1)
11. To receive unreasonable orders from customers and business partners	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.0)	0 (0.0)	1 (4.2)	0 (0.0)	2 (1.1)
12. Receipt of complaints from customers and business partners	1 (5.9)	0 (0.0)	1 (3.4)	1 (7.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.2)	0 (0.0)	4 (2.2)
15. There was an event that caused a (large) change in work content and workload.	6 (35.3)	4 (40.0)	8 (27.6)	6 (42.9)	8 (29.6)	9 (36.0)	7 (36.8)	12 (50.0)	9 (69.2)	69 (38.8)
16. Working more than 80 h of overtime a month*2	0 (0.0)	0 (0.0)	4 (13.8)	1 (7.1)	2 (7.4)	1 (4.0)	2 (10.5)	0 (0.0)	0 (0.0)	10 (5.6)
17. Worked continuously for more than two weeks	0 (0.0)	1 (10.0)	2 (6.8)	1 (7.1)	3 (11.1)	2 (8.0)	1 (5.3)	4 (16.7)	0 (0.0)	14 (7.9)
19. Change in pace of work and activity	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	1 (0.6)
20. Forced retirement	0 (0.0)	0 (0.0)	1 (3.4)	0 (0.0)	1 (3.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.1)
21. There was a reassignment.	1 (5.9)	1 (10.0)	2 (6.8)	1 (7.1)	2 (7.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (3.9)
22. Relocation	0 (0.0)	0 (0.0)	2 (6.8)	1 (7.1)	1 (3.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.7)	5 (2.8)
24. Being discriminated against or treated disadvantageously in the course of employment for reasons such as being a non-regular employee	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
25. One's own promotion	0 (0.0)	0 (0.0)	1 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
29. (Severely) harassed, bullied, or assaulted	2 (11.8)	0 (0.0)	0 (0.0)	0 (0.0)	4 (14.8)	1 (4.0)	2 (10.5)	4 (16.7)	2 (15.4)	15 (8.4)
30. Trouble with one's boss	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.7)	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	3 (1.7)
31. Trouble with colleagues	0 (0.0)	0 (0.0)	1 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
36. Subjected to sexual harassment	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.3)	0 (0.0)	0 (0.0)	1 (0.6)

\*1 Extreme long hours: to exceed approximately 160 h in the month or 120 h in three weeks immediately preceding the onset of illness, or to a similar extent during a period of less than this for the intensity of the psychological load becomes "strong".

\*2 Working more than 80 h of overtime a month: over 120 h in nearest two months or over 100 h in nearest three months are criterias for the intensity of the psychological load assumes to "strong".

**Table 3. Labor accident recognition factors (women)**

Sex	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Men	17 (77.3)	10 (77.0)	29 (82.9)	14 (63.6)	27 (84.3)	25 (83.3)	19 (70.3)	24 (70.6)	13 (56.5)	178 (74.8)
Women	5 (22.7)	3 (23.0)	6 (17.1)	8 (36.4)	5 (15.7)	5 (16.7)	8 (29.7)	10 (29.4)	10 (43.5)	60 (25.2)
Evaluation of a particular event										
Extreme psychological burden	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (12.5)	1 (10.0)	3 (30.0)	5 (8.3)
Extreme long hours*1	Not stated	0 (0.0)	1 (16.7)	1 (12.5)	0 (0.0)	2 (40.0)	1 (12.5)	2 (20.0)	0 (0.0)	7 (11.7)
Constant long working hours	Not stated	Not stated	3 (50.0)	2 (25.0)	1 (3.1)	0 (0.0)	1 (12.5)	3 (30.0)	1 (10.0)	11 (18.3)
Specific events (No incidents in total are omitted)										
2. Experienced and witnessed tragic accidents and disasters	0 (0.0)	1 (33.3)	0 (0.0)	0 (0.0)	1 (3.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (3.3)
3. Caused a serious accident resulting in injury or death or serious accident related to work	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
4. Made a serious business mistake, such as affecting the management of the company	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
5. Being held responsible for accidents and incidents that occurred at the company	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
8. Hard-to-achieve quota	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
9. The quota was not met	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
11. To receive unreasonable orders from customers and business partners	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
12. Receipt of complaints from customers and business partners	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
15. There was an event that caused a (large) change in work content and workload	1 (20.0)	1 (33.3)	1 (16.7)	6 (75.0)	2 (6.3)	0 (0.0)	3 (37.5)	4 (40.0)	0 (0.0)	18 (30.0)
16. Working more than 80 h of overtime a month*2	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.7)
17. Worked continuously for more than two weeks	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (10.0)	0 (0.0)	2 (3.3)
19. Change in pace of work and activity	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
20. Forced retirement	0 (0.0)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.7)
21. There was a reassignment	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (12.5)	0 (0.0)	0 (0.0)	1 (1.7)
22. Relocation	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
24. Being discriminated against or treated disadvantageously in the course of employment for reasons such as being a non-regular employee	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
25. One's own promotion	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
29. (Severely) harassed, bullied, or assaulted	3 (60.0)	0 (0.0)	0 (0.0)	1 (12.5)	0 (0.0)	1 (20.0)	2 (25.0)	1 (10.0)	1 (10.0)	9 (15.0)
30. Trouble with one's boss	0 (0.0)	0 (0.0)	1 (16.7)	0 (0.0)	1 (3.1)	0 (0.0)	1 (12.5)	0 (0.0)	0 (0.0)	3 (5.0)
31. Trouble with colleagues	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
36. Subjected to sexual harassment	1 (20.0)	0 (0.0)	1 (16.7)	1 (12.5)	1 (3.1)	2 (40.0)	1 (12.5)	2 (20.0)	4 (40.0)	13 (21.7)

\*1) Extreme long hours: to exceed approximately 160 h in the month or 120 h in three weeks immediately preceding the onset of illness, or to a similar extent during a period of less than this for the intensity of the psychological load becomes "strong".

\*2) Working more than 80 h of overtime a month: over 120 h in nearest two months or over 100 h in nearest three months are criterias for the intensity of the psychological load assumes to "strong".

**Table 4. Sexual harassment and rape**

		Sexual harassment (n=13)	Rape (n=5)	Total (N=18)
		n (%)	n (%)	n (%)
Age	10–19	0 (0.0)	0 (0.0)	0 (0.0)
	20–29	9 (69.2)	4 (80.0)	13 (72.2)
	30–39	4 (30.8)	1 (20.0)	5 (27.8)
	40–49	0 (0.0)	0 (0.0)	0 (0.0)
	50–59	0 (0.0)	0 (0.0)	0 (0.0)
Job type	SEs·PGs	4 (30.8)	2 (40.0)	6 (33.3)
	Sales force	5 (38.5)	1 (20.0)	6 (33.3)
	HP Production director	0 (0.0)	1 (20.0)	1 (5.6)
	Clerical position	2 (15.4)	0 (0.0)	2 (11.1)
	News business	0 (0.0)	1 (20.0)	1 (5.6)
	Web designer	2 (15.4)	0 (0.0)	2 (11.1)
	Opponent	Boss	8 (61.5)	1 (20.0)
Employer		2 (15.4)	1 (20.0)	3 (16.7)
Client		0 (0.0)	3 (60.0)	3 (16.7)
Colleague		2 (15.4)	0 (0.0)	2 (11.1)
Unknown		1 (7.7)	0 (0.0)	1 (5.6)
Contents*	Sexual behavior	12 (92.3)	3 (60.0)	15 (83.3)
	Physical contact	6 (46.2)	5 (100.0)	11 (61.1)
	Secret filming	2 (15.4)	0 (0.0)	2 (11.1)
	Others (e-mail, telephone, stalking, etc.)	2 (15.4)	0 (0.0)	2 (11.1)
Psychiatric disorders	Depressive episode	6 (46.2)	0 (0.0)	6 (33.3)
	Post-traumatic stress disorder	2 (15.4)	4 (80.0)	6 (33.3)
	Adjustment disorders	4 (30.8)	1 (20.0)	5 (27.8)
	Reaction to severe stress	1 (7.7)	0 (0.0)	1 (5.6)
Work place scale	Less than 10	0 (0.0)	1 (20.0)	1 (5.6)
	10–49	3 (23.1)	1 (20.0)	4 (22.2)
	50–99	1 (7.7)	1 (20.0)	2 (11.1)
	100–499	3 (23.1)	1 (20.0)	4 (22.2)
	500–999	3 (23.1)	0 (0.0)	3 (16.7)
	More than 1,000	3 (23.1)	1 (20.0)	4 (22.2)
	No description/Unknown	0 (0.0)	0 (0.0)	0 (0.0)
	Other event	More than 80 h of overtime per month	1 (7.7)	0 (0.0)
Major changes in work content and workload		2 (15.4)	0 (0.0)	2 (11.1)
Trouble with colleagues		1 (7.7)	0 (0.0)	1 (5.6)
Trouble with one’s boss		1 (7.7)	0 (0.0)	1 (5.6)
Sexual harassment		0 (0.0)	1 (20.0)	1 (5.6)
None		8 (61.5)	4 (80.0)	12 (66.7)
During and outside business hours	In time	10 (76.9)	2 (40.0)	12 (66.7)
	Out of time	3 (23.1)	3 (60.0)	6 (33.3)

Some of the contents overlap. For example, if sexual behavior and physical contact are found in one case, both are described.

Therefore, the number of women workers may increase in the future. The age of onset was high among those in their 30s. More than one-fifths (21.4%) of the cases ended in death (suicide). In the study sample, there were 150 cases of depressive episodes (63.0% of victims) and 42 cases of adjustment disorder. The number of adjustment disorder cases showed an upward trend, which may be attributed

to the widespread use of terms such as developmental disorders (e.g., autism spectrum disorder<sup>17</sup>) and attention-deficit/hyperactivity disorder<sup>18, 19</sup>) and adjustment disorder<sup>20, 21</sup>). With the spread of these terms, the threshold for consultation with psychiatrists is lower than before, and early visits are increasing. Many of the cases included in this study are thought to be diagnosed with adjustment

disorder because of obvious stressors such as changes in the content and quantity of work and long working hours.

In terms of work-related adverse events for the current cases in IT industry, “extremely long working hours” in “special events” and “events that caused (major) changes in the content and amount of work” in “specific events”, are the main factor. Also, “rape” of women and especially “SH”, which is on the rise every year, is an issue that can’t be overlooked.

These results suggest the importance of the following two actions for SEs and PGs. The first action prioritizes, reduction and strict management of working hours. Compliance with the Labor Standards Act and Industrial Safety and Health Act and implementation of measures against heavy workload are required<sup>22</sup>). Previous reports have also suggested that strict delivery deadlines, customer support, and sudden changes in specifications are relevant factors<sup>9, 10</sup>). Therefore, companies must set delivery deadlines with sufficient time to prevent overwork after discussing with the ordering party, as well as determine the progress of work and implement measures such as extending deadlines and expanding the team when the amount of work is expected to increase owing to sudden changes in specifications. The validity of specifications should be confirmed at the design stage to prevent sudden changes in specifications. Moreover, companies should implement work within the prescribed working hours to the extent possible in the event of a problem.

The second action relates to measures against sexual harassment and rape, cases of which are increasing yearly. The analysis results in Table 4 suggested the following—first, young women workers (particularly those in their 20s) are at a very high risk of SH and rape. Furthermore, workplaces with large operation of more than 500 workers were more prone to SH and rape (SH and rape rates were two out of 29 (6.9%) in workplaces with <10 workers, four out of 52 (7.7%) in workplaces with 10–49 workers, two out of 26 (7.7%) in workplace with 50–99 workers, four out of 69 (5.8%) in workplace with 100–499 workers, and seven out of 56 (12.5%) in workplaces >500 workers). Additionally, perpetrators were overwhelmingly in higher positions, such as superiors or business owners. Many cases occurred among salespeople, whose positional relationship (hierarchical relationship) in the job is thought to have a large impact. More than 2/3 of SH/rape cases occurred during office hours.

Indeed, according to a previous report, SH is more likely to occur in a clear hierarchical relationship (difference in status) and people in a weaker position<sup>23</sup>). SH has

a wide range of effects on workers, including a depressed mood, eating disorders, alcoholism, and damage to self-esteem<sup>24–28</sup>). As such, measures against SH are important. However, there have been cases in which victims could not report such incidents for fear of secondary damage<sup>27, 28</sup>).

Therefore, companies must recognize the following points regarding SH and rape: young women workers are more likely to be at risk of SH/rape in workplace of large business (more than 500 people) during office hours. Furthermore, as reported in previous studies on the effectiveness of measures, companies must strictly deal with SH and rape and disseminate clear policies, such as taking disciplinary action against perpetrators<sup>29</sup>). Stress checks must be enhanced and the system must be strengthened for providing early and immediate relief to victims. Moreover, companies should focus on workers’ interactions during and outside working hours. Other essential measures are the establishment of a system that protects the privacy of victims of SH, a consultation desk for women, and an awareness campaign of the guarantee that consultations will never lead to disadvantages at work.

#### *Limitation*

This study has some limitations. In this study, we used cases that were recognized as occupational accidents from the survey reports created in the process of the Labor Standards Inspection Office determining the presence or absence of work-related causes. We conducted investigations based on the contents of these survey reports. Therefore, our materials lacked information for preventing death from overwork, such as improving the setting of working hours and work environment, identifying problems in the workplace, and establishing a mental and physical health management system (including the presence or absence of treatment). The actual circumstances and characteristics of the cases could not have been fully explained. Furthermore, the analysis covered cases in which workers’ compensation was applied for and approved. As such, data comprising biased—cases that applied for workers’ compensation but not approved (that is, cases that were not recognized as work-related injuries or commuting injuries) were not included in this analysis. Therefore, by not including these cases, we expected to see a decrease in adjustment disorders cases and an increase in disorders, such as depression and anxiety disorders, which occur largely due to personal factors. Additionally, in some cases, detailed descriptions were not included in the reports, leading to insufficiency in data for accurate extraction. Lastly, there was a limited number of cases for SEs



and PGs, which limited comparisons with cases for other occupations. However, to date, no detailed analyses have been conducted in Japan among SEs and PGs in cases that were recognized as occupational accidents. Our study thus proposed points to consider creating a better working environment that could promote the physical and mental health of workers engaged in the information and communication industry—mainly, SEs and PGs.

## Conclusions

Our study clarified some of the actual circumstances and background factors of mental disorders due to overwork and inadequate psychosocial conditions at work in the IT industry, which had not been analyzed with respect to the enactment of the Act Promoting Measures to Prevent Death and Injury from Overwork. Regarding mental disorders in the IT industry, cases among women stood at 25.2% of the total but showed an increasing trend. The age of disease onset was in the 30s to 40s, clarifying that younger individuals are more affected. For both sexes, the mental disorder factors included (major) changes in the content and amount of work, and there were many cases of long working hours (including continuous and overtime work) as well as changes in departments and work locations. Furthermore, for women, the number of SH and rape cases increased yearly. These results suggested that the IT industry needs measures against heavy workloads leading to long working hours and poor mental health. The current data also highlight the effort to improve psychosocial environment at work, which targets the prevention of SH, as well.

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## Conflict of Interest

None declared.

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