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Original Article

Ten-year trends in long-term sickness absence among Japanese public servants: 2009–2018

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Abstract: Sickness absences are a significant public health and economic problem worldwide. However, sickness absence diagnoses and trends have not been reported in much detail in Japan. This study was a retrospective cohort study. We examined data on certified diagnoses and the durations of sickness absence lasting over 90 days (long-term sickness absence) from 2009–2018 among city public servants in Japan. We found that 1) "Mental and behavioral disorders" (495.0–780.6 per 100,000 employees) was the most prevalent reason for long-term sickness absence, and "Mood disorders" (318.6–584.3 per 100,000 employees) was the most prevalent mental disorders diagnosis in each study year; 2) the prevalence of long-term sickness absence for mental disorders showed decreasing trends (781/100,000 in 2009 to 622/100,000 in 2018; [p=0.005, for the trend test]); 3) the trends differed by gender (p<0.05) and age (p<0.001); and 4) the duration of long-term sickness absence related to mental disorders (13.2 ± 9.0 months) was longer than long-term sickness absence resulting from all physical disorders except for diseases of the circulatory system (15.1 ± 11.6 months). Increased focus on significant depressive and neurotic disorders is needed when promoting mental health in the workplace.

Key words: Long-term sickness absence, Mental disorder, Mental health in the workplace, Neurotic disorder, Major depressive disorder, Adjustment disorder, Public servants

Introduction

Long-term sickness absences (LTSA) can have both positive and negative impacts on individuals and workplaces. For instance, they can allow for individuals to recover from illness and defer dismissal, but they can negatively impact both quality of life and working life. LTSA can also lead to productivity loss and place a burden on colleagues. As such, sickness absences are a significant public health and economic problem worldwide. Mental disorders in particular are a significant global burden, accounting for 14% of all disease[1)], and these are the most common diagnostic group documented on sickness absence certificates[2)]. In most Western countries, musculoskeletal conditions are the most frequent reason for sickness absence, with mental disorders being the second most common cause[3)]. However, in Sweden, Germany, the United Kingdom, and the Netherlands, sickness absence due to mental disorders has recently increased[3, 4)], with the primary cause being depression, anxiety, or neurotic and stress-related disorders[5, 6)]. This increase has been more significant than that due to non-psychiatric diagnoses[3, 7–10)].

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Meanwhile, in Japan, psychiatric and behavioral morbidities have shown a continually increasing trend[11]. Over 60% of Japanese workers have experienced intense worry or stress related to their employment[11], with 37.6% of Japanese enterprises reporting increases in mental health problems among their employees[12]. Moreover, 59% of Japanese enterprises reported working to reduce and prevent mental disorders among their employees[13].

Furthermore, the duration of sickness absence due to mental disorders tends to be longer relative to other diagnoses that frequently result in absence, such as musculoskeletal diseases[14, 15]. Several studies have found a relationship between common mental disorders related to LTSA and work disability[5, 6, 16–19]. Mental disorders have, thus, become a significant public health problem, as they lead to LTSA from the workplace[17], with mental disorders accounting for over half of all cases of LTSA[20]. In the Netherlands, the reported median number of days lost because of common mental disorders—including depression, anxiety, and stress-related disorders—was 62 days per person[21]. The Japanese Ministry of Health, Labour and Welfare[13, 22] reported that employees took over one month of sickness absence due to mental disorders in around 6.7% of companies. Others quit their jobs due to mental disorders in 5.8% of companies.

However, the mental disorder diagnoses causing LTSA episodes, their durations, and their prevalence trends have not been sufficiently reported. This may result from underestimating the critical impact of mental disorders on LTSA or from the fact that many companies consider these data confidential and are, thus, unwilling to make the data public[23].

Therefore, it is unknown 1) which disease is the most prevalent cause of LTSA; 2) whether the prevalence of LTSA due to mental disorders is increasing or decreasing; 3) whether LTSA trends differ by gender, age, or occupation; and 4) whether the duration of LTSA due to mental disorders is longer than that due to physical disorders. Therefore, this study aimed to investigate the diagnoses causing LTSA episodes, their duration, and trends—comparing the number of spells experienced by city public servants over a ten-year period by gender, occupation, and diagnosis. We chose public servants as participants because public service jobs, which include many typical jobs in various fields, are among the most popular in Japan. We therefore presumed that these represent typical work in the country.

Materials and Methods

Participants

This was a retrospective cohort study. We obtained data on the total number of public servants as well as the gender (male/female), age, and occupational (clerical, technical, professional job, between 2011 and 2018) composition of the workforce at municipal and ward offices in City A between 2009 and 2018. City A is one of the biggest cities in Osaka prefecture in the Kansai region of Japan. We also obtained a list of employees who had one or more episodes of sickness absence longer than 90 days (LTSA) between 2009 and 2018. The list provided the employees' gender, age, and occupation; the reason for sickness absences; the beginning and end dates of the LTSA episode(s); and their retirement dates (if retired). Specific participant information was not obtained because the data were anonymized. The data characteristics are shown in Table 1.

Study variables

Employees are required to produce a medical certificate issued by a doctor for sickness absence episodes lasting over 90 days, as stipulated by the work regulations of City A. The diagnoses on these medical certificates are not necessarily based on the International Classification of Diseases, Tenth Revision (ICD-10)[24]. Therefore, the medical certificate for each LTSA in this study was confirmed by the researchers/issuing doctors with over 10 years of experience. They then classified each LTSA cause according to the relevant ICD-10 codes. The medical certificates occasionally had two or more diagnoses. In these cases, if the multiple diagnoses were from a single ICD-10 category, they were then classified into that category. If the diagnoses belonged to different categories, we classified them according to their primary disease; that is, the one causing the secondary disease (e.g., if the two diagnoses were sleep disorder and major depressive disorder, we considered patients as having major depressive disorder.). The ICD-10 diagnosis classifications and their abbreviations are shown in Table S1. We only considered sickness absence episodes that had begun within the study period (Jan 2009 to Dec 2018). We excluded workers who retired at the end of their sickness absence because we could not predict or specify the duration of their sickness absence. If a worker had multiple episodes of LTSA during the study period, each one was counted. Thus, we totaled the number of LTSA episodes in each ICD-10 category. Major depression (F32), depressive state (F329), or adjustment disorder (F43) were

Table 1. Characteristics of public servants and the number of long-term sickness absence episodes during the study period (2009–2018) in City A

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	p^a	p^b
Total number of employees	21,394	20,708	21,369	21,388	20,403	19,506	18,675	18,517	19,079	18,638		
• **Male**	15358 (71.8%)	14746 (71.2%)	14833 (69.4%)	14701 (68.7%)	13881 (68.0%)	12945 (66.4%)	12208 (65.4%)	11969 (64.6%)	12152 (63.7%)	11871 (63.7%)		
• **Female**	6036 (28.2%)	5962 (28.8%)	6536 (30.6%)	6687 (31.3%)	6522 (32.0%)	6561 (33.6%)	6467 (34.6%)	6548 (35.4%)	6927 (36.3%)	6767 (36.3%)		
Occupation												
• **Clerical**			11431 (53.5%)	11782 (43.0%)	11390 (55.8%)	11457 (58.7%)	11256 (60.3%)	11357 (61.3%)	11593 (60.8%)	11443 (61.4%)		
• **Technical**			6467 (30.3%)	9432 (34.4%)	5570 (27.3%)	4636 (23.8%)	4040 (21.6%)	3828 (20.7%)	3773 (19.8%)	3549 (19.0%)		
• **Professional**			3471 (16.2%)	6166 (22.5%)	3443 (16.9%)	3413 (17.5%)	3379 (18.1%)	3332 (18.0%)	3713 (19.5%)	3646 (19.6%)		
Age												
• **–29**	2007 (9.4%)	1709 (8.3%)	1820 (8.5%)	1575 (7.4%)	1507 (7.4%)	1373 (7.0%)	1243 (6.7%)	1229 (6.6%)	1275 (6.7%)	29 (0.2%)		
• **30–39**	6628 (31.0%)	6377 (30.8%)	6192 (29.0%)	5877 (27.5%)	5449 (26.7%)	4967 (25.5%)	4559 (24.4%)	4187 (22.6%)	4075 (21.4%)	1286 (6.9%)		
• **40–49**	6766 (31.6%)	6838 (33.0%)	6836 (32.0%)	6981 (32.6%)	7071 (34.7%)	6825 (35.0%)	6543 (35.0%)	6503 (35.1%)	6733 (35.3%)	3518 (19.0%)		
• **50–59**	5747 (26.9%)	5597 (27.0%)	5392 (25.2%)	5361 (25.1%)	4936 (24.2%)	4886 (25.0%)	4782 (25.6%)	4937 (26.7%)	5136 (26.9%)	6469 (34.8%)		
• **60–**	246 (1.1%)	187 (0.9%)	1129 (5.3%)	1594 (7.5%)	1440 (7.1%)	1455 (7.5%)	1548 (8.3%)	1661 (9.0%)	1860 (9.7%)	7262 (39.1%)		
Number of LTSA episodes†	232	201	196	179	147	150	183	161	161	169		
(%)	1.1%	1.0%	0.9%	0.8%	0.7%	0.8%	1.0%	0.9%	0.8%	0.9%	**	*
• **Male**	174 (75.0%)	143 (71.1%)	139 (70.9%)	125 (69.8%)	103 (70.1%)	101 (67.3%)	124 (67.8%)	111 (68.9%)	113 (70.2%)	118 (69.8%)	*	
• **Female**	58 (25.0%)	58 (28.9%)	57 (29.1%)	54 (30.2%)	44 (29.9%)	49 (32.7%)	59 (32.2%)	50 (31.1%)	48 (29.8%)	51 (30.2%)		
Occupation												
• **Clerical**	141 (60.8%)	125 (62.2%)	116 (59.2%)	90 (50.3%)	76 (51.7%)	94 (62.7%)	104 (56.8%)	90 (55.9%)	99 (61.5%)	109 (64.5%)		
• **Technical**	68 (29.3%)	54 (26.9%)	56 (28.6%)	53 (29.6%)	54 (36.7%)	37 (24.7%)	55 (30.1%)	52 (32.3%)	48 (29.8%)	43 (25.4%)	**	**
• **Professional**	23 (9.9%)	22 (10.9%)	24 (12.2%)	36 (20.1%)	17 (11.6%)	19 (12.7%)	24 (13.1%)	19 (11.8%)	14 (8.7%)	17 (10.1%)		
Age												
• **–29**	23 (9.9%)	21 (10.4%)	13 (6.6%)	13 (7.3%)	8 (5.4%)	9 (6.0%)	12 (6.6%)	3 (1.9%)	5 (3.1%)	6 (3.6%)	*	**
• **30–39**	52 (22.4%)	65 (32.3%)	53 (27.0%)	39 (21.8%)	41 (27.9%)	28 (18.7%)	40 (21.9%)	34 (21.1%)	31 (19.3%)	35 (20.7%)		
• **40–49**	60 (25.9%)	46 (22.9%)	45 (23.0%)	47 (26.3%)	38 (25.9%)	52 (34.7%)	54 (29.5%)	50 (31.1%)	58 (36.0%)	55 (32.5%)	*	*
• **50–59**	1 (0.4%)	0 (0.0%)	3 (1.5%)	3 (1.7%)	2 (1.4%)	1 (0.7%)	2 (1.1%)	1 (0.6%)	7 (4.3%)	7 (4.1%)		
• **60–**	23 (9.9%)	21 (10.4%)	13 (6.6%)	13 (7.3%)	8 (5.4%)	9 (6.0%)	12 (6.6%)	3 (1.9%)	5 (3.1%)	6 (3.6%)		

LTSA: Long-term sickness absence (> 90 days).

p^a: the differences among LTSA workers during the study period compared using the chi-square test.

P^b: trends in the rate over time among LTSA workers estimated using the Cochran-Armitage test.

*: $p<0.05$, **: $p<0.01$

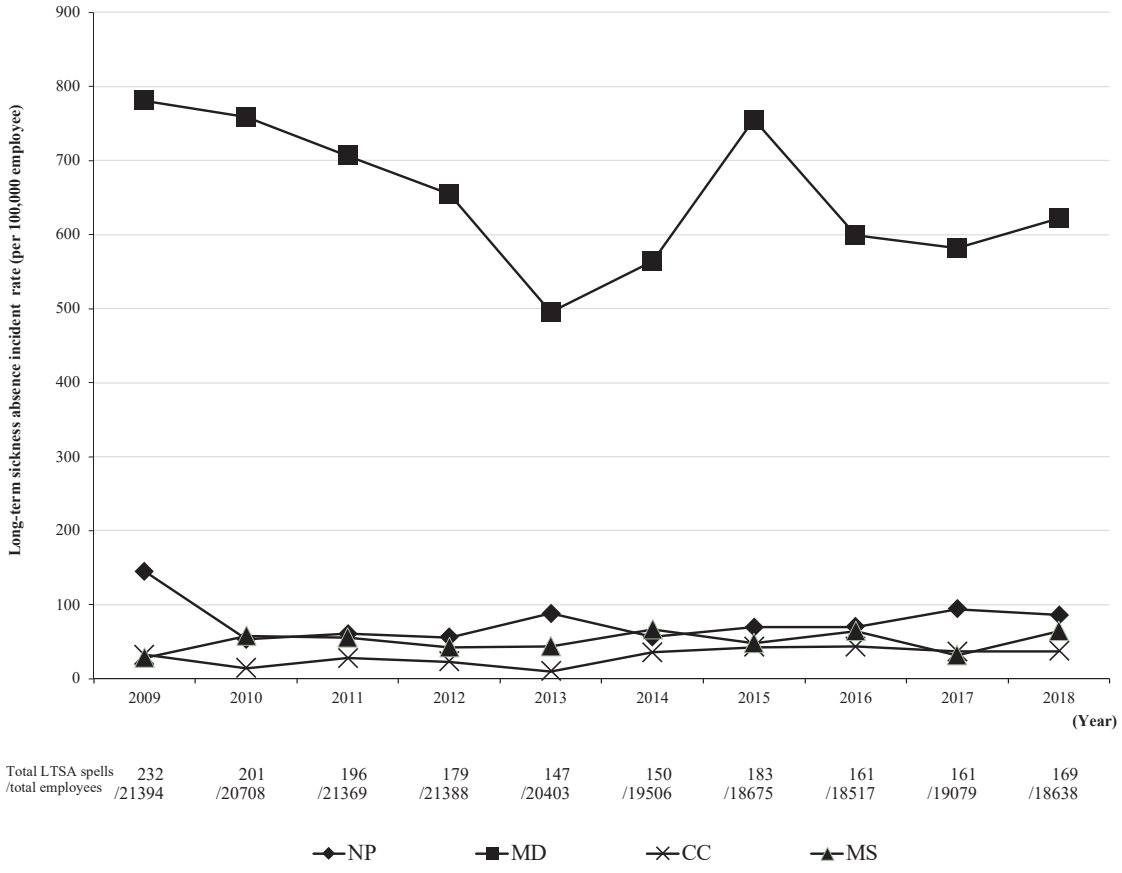

Fig. 1. The annual incident rates for each disease category causing long-term sickness absences during the study period.
Rates of LTSA were expressed as the numbers of incident of LTSA per 100,000 employees of total employees.
Abbreviations: long-term sickness absence (LTSA), neoplasms (NP), mental and behavioral disorders (MD), diseases of the circulatory system (CC), and diseases of the musculoskeletal system and connective tissue (MS).

counted separately, because they are common mental disorders in the workplace. This categorical classification is based on the ICD-10. The rates for each disease category causing LTSA during the study period are shown in Fig. 1. If the rate of a disease-causing LTSA was less than 1.0% during the study period, the disease category was not included in Fig. 1 (all data, including excluded data, are shown in Figs. S1 and S2). Finally, four disease categories—neoplasms (NP), mental and behavioral disorders (MD), diseases of the circulatory system (CC), and diseases of the musculoskeletal system and connective tissue (MS)—were included.

Duration of sickness absences

We calculated the duration (months) of sickness absence by each diagnosis category during the study period. We then compared the duration of sickness absence across diagnoses and gender.

Statistical analysis

The rate is defined as the number of LTSA per 100,000 employees who worked for City A in the same year. The number of LTSA is the number of individual LTSA incidents per year. To reduce the effect of scattering the number of sickness absence episodes, disease categories showing no participants with sickness absence in any year during the study period were excluded from the duration analysis. The differences among diagnoses and gender during the study period were compared using the chi-square test. We also analyzed the differences in the rate of LTSA during the study period stratified by gender, occupation, and age. Trends in the rate over time among diagnoses and gender were estimated using the Cochran-Armitage test for trend. The age differences among those taking LTSA during the study period were compared using the Wilcoxon sum rank test. The differences in LTSA among occupations during

the study period were compared using the chi-square test. Rate trends over time were compared for age and occupation using the Jonckheere-Terpstra test.

The durations of sickness absence were not normally distributed. We used the Kruskal Wallis one-way analysis of variance on ranks with a post hoc Dunn-Bonferroni test to compare the duration of sickness absence between the different diagnoses. The differences in the duration of sickness absences between genders were analyzed using the Wilcoxon rank sum test. All statistical analyses were performed using the Statistical Package for the Social Sciences version 25.0 (SPSS; IBM Software Group; Chicago, IL). Any p-values <0.05 were considered statistically significant.

Ethics statement

The Human Subjects Review Committee of Osaka City University approved this study protocol (authorization number: 2969). Informed consent was obtained from the participants using the opt-out method for the secondary analysis of existing anonymous data. Before we obtained the data, the entire staff from City A anonymized and de-identified the participants' information. We then obtained a list of workers on LTSA during the study period, which City A's healthcare center collected to improve their work environment.

Results

The overall rate of LTSA showed significant differences over the study period (Chi-squared test: p=0.005) and a decreasing trend (1.08% [95%CI: 0.95 to 1.23] in 2009 to 0.91% [0.78 to 1.05], [p=0.048 for the trend test) (Table 1). The male LTSA rate showed neither significant increasing nor decreasing trends (p=0.353), while the female LTSA rate change was not significant (p=0.054). However, only the LTSA rates for male workers showed differences over study period (p=0.034). Although there were no differences in the rate of LTSA during the study period by occupation (p=0.135), technical workers showed an increasing trend in the rate of LTSA (0.87% [95%CI: 0.65 to 1.12] in 2011 to 1.12% [0.88 to 1.63] in 2018, [p<0.001, for the trend test]). There were differences among the rates of LTSA by age during the study period (p<0.001). The trend analysis of the age distribution of LTSA showed that LTSA increase as workers grew older (p<0.001). The analysis stratified by age showed decreasing trends for workers in the 20–29 age group (1.15% [95%CI: 0.73 to 1.71] in 2009 to 0.46% [0.17 to 0.99] in 2018 [p<0.001, for the trend test]) and the 40–49 age group (1.42% [1.15 to 1.73] in 2009 to 1.02% [0.79 to 1.3] in 2018 [p=0.040, for the trend test]) (Table 1).

Fig. 1 shows the rates for each disease category causing LTSA during the study period. The most frequent reason recorded for LTSA was MD in every study year, and it had a much higher rate than any of the other diseases. Additionally, the ranks did not change drastically over the study period. The second most frequent reason was NP (85.9/100,000 [95%CI: 49.1 to 139.4] in 2018), and the third was MS (64.4/100,000 [95%CI: 33.3 to 112.4] in 2018). There were differences during the study years in the rates of NP (p=0.029) and MD (p=0.002) according to the chi-square test. The rate of NP peaked in 2009; however, no statistically significant trend was found (p=0.544). The rate of LTSA due to MD (LTSA-MD) was found to be statistically significantly different in the 2009–2018 period (chi-squared test: p=0.002), with a significant decreasing trend over time (781/100,000 [95%CI: 667.1 to 907.8] in 2009 to 622/100,000 [514.6 to 746.0] in 2018; [p=0.005, for the trend test]). In addition, while the rate of LTSA-MD peaked in 2009, it touched bottom in 2013 (495.0/100,000 [403.4 to 601.2]). It then increased and peaked again in 2015 and decreased again in 2016. Since 2016, the rate has not changed substantially. The rates of CC and MS did not show any differences or decreasing/increasing trends in the study period.

The rates of MD-caused LTSA during the study period are shown by category in Figs. 2A (Categories: SCH, mood disorders [MOD], neurosis, stress-related and somatoform disorders [NEU]) and 2B (Sub-categories: major depressive disorder [MDD], depressive state [DPS], adjustment disorder [ADD]). As before, the rate is defined as the number of LTSA episodes per 100,000 employees. The most frequent mental disorder category reported for LTSA in every study year was MOD. There were significant differences during the study years in the rates of MOD (p<0.001) and DPS (p<0.001) according to the chi-square test. Moreover, the trend test showed a decreasing trend over time (MOD; 584.3/100,000 [95%CI: 486.6 to 695.8] in 2009 to 364.85/100,000 [283.4 to 462.3] in 2018, [p<0.001, for the trend test] and DPS; 201.0/100,000 [145.5 to 270.6] in 2009 to 91.2/100,000 [53.1 to 146] in 2018, [p<0.001, for the trend test]).

The second most frequent mental disorder category reported was NEU. Although the trend test for NEU showed no differences or trends during the study years, ADD—which is its sub-categorical diagnosis—showed an increasing trend (p=0.006). The rates of other mental disorders

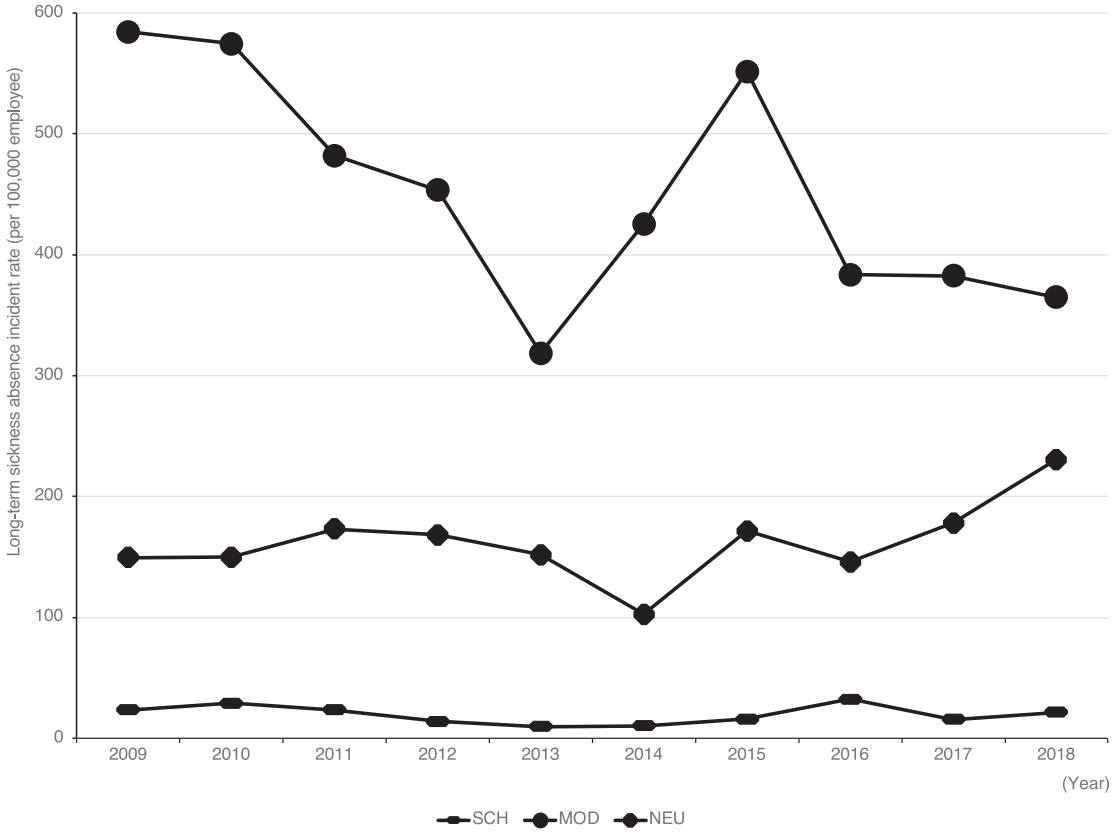

Fig. 2A. The yearly incident rates for the most common mental disorder categories (A) causing long-term sickness absences during the study period.
Rates of LTSA are expressed as the incident of LTSA per 100,000 employees (of total employees).
Abbreviations: schizophrenia, schizotypal, and delusional disorders (SCH), mood disorders (MOD), and neurotic, stressrelated, and somatoform disorders (NEU).

(SCH, MDD) show no significant differences or trends during the study period.

Table 2 shows the duration of LTSA caused by each disease category and duration difference between genders. Only the disease categories of NP, MD, CC, and diseases of the musculoskeletal system and connective tissue (MS) were included in the duration analysis. This is because the other disease categories did not show LTSA episodes in every year, so they were excluded. Differences in the LTSA duration by disease category were assessed using the Kruskal Wallis test. These post-hoc tests revealed the specific differences between the disease categories. For example, the LTSA durations for CC (15.1 ± 11.6 months, mean ± SD) and MD (13.2 ± 9.0 months) were longer than those for NP and MS. The differences in LTSA durations between sub-categories of mental disorders were also examined. Compared with MOD (12.6 ± 8.4 months), the LTSA duration due to NEU (15.0 ± 9.1 months) was significantly longer, according to the post-hoc tests. Gender differences in the duration of LTSA were shown in MD, specifically the sub-categories of MOD, MDD, DPS, and ADD. The duration of LTSA among female workers were longer than those of male workers in these categories.

Discussion

This study examined certified diagnoses and the durations of LTSA lasting over 90 days from 2009–2018 among city public servants in Japan. We found 1) MD was the most prevalent reason for LTSA, and MOD was the most prevalent MD diagnosis; 2) the prevalence of LTSA for MD showed decreasing trends; 3) the trends differed by gender and age; and 4) the duration of MD-related LTSA was longer than LTSA resulting from all physical disorders except for diseases of the circulatory system.

We found that the entire mental disorder category were

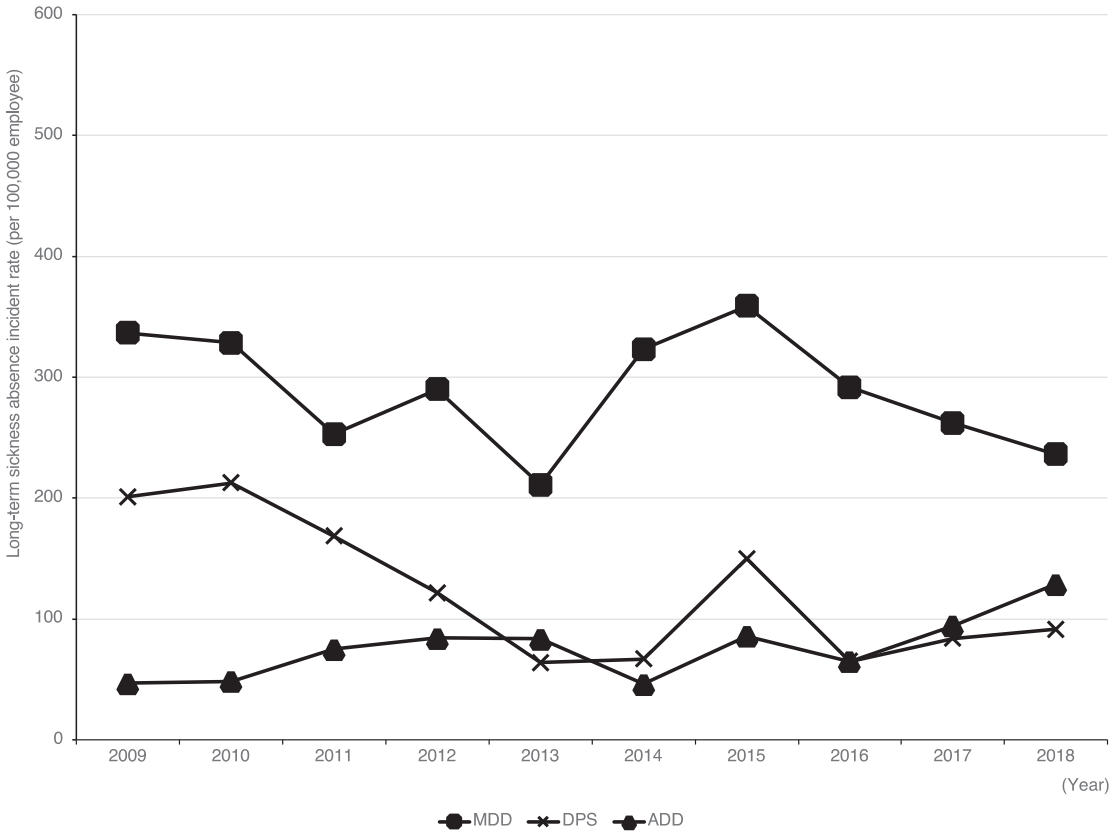

Fig. 2B. The yearly incident rates for the most common mental disorder sub-categories (B) causing long-term sickness absences during the study period.
Rates of LTSA are expressed as the incident of LTSA per 100,000 employees (of total employees).
Abbreviations: major depressive disorder (MDD), depressive state (DPS), and adjustive disorder (ADD).

the most frequently reported causes of LTSA during the study period. Their ranks did not change much over the study period. Many large-scale studies examining the reason for sickness absence in Western countries have been conducted. These studies show that musculoskeletal diseases and mental disorders are the two most common diagnostic causes of sickness absence[25–28].

Some large-scale studies have reported on the prevalence of LTSA due to mental disorders among Japanese workers. In the World Mental Health Japan (WMHJ) survey, Muto *et al.* found that mental disorders represented approximately one-tenth of all diseases in terms of frequencies of absence and prevalence[23]. Depressive disorders were the most frequent causes of sickness absence among the various mental disorders, accounting for approximately half of all psychological illnesses[23]. Endo *et al.*[29] reported that LTSA among Japanese employees often involved episodes of LTSA, with mental and behavioral disorders being more frequent than the three major physical disease categories (NP, MS, and CC) contributing to LTSA. Our results are consistent with these previous studies. Our results suggest that mental disorders are a major reason for LTSA in the Japanese workplace.

Contrary to our expectations, the rate of MD and MOD causing LTSA showed a decreasing trend. Over the whole study period, the rate of MD-caused LTSA slightly decreased. To our knowledge, this is the first study to investigate the yearly trends of MD-related LTSA in Japan. The two WMHJ surveys were conducted to examine the 12-month and lifetime prevalence, severity, treatment, and demographic correlates of mental disorders in 2002 and 2013[30, 31]. Between the periods of these two surveys, the prevalence of common mental disorders and major depressive disorder increased. In contrast to these studies, our results show decreasing trend in sickness absence due to MOD and DPS. However, the participants in these surveys included non-workers, with the prevalence of mental disorders not being consistent with the rate of sickness absence; therefore, we could not directly compare our results with those data.

Table 2. Duration of sickness absence due to physical and mental disorders among public servants between 2009 and 2018 in City A

Diseases	n	LTSA duration (months)	$P^{a,b}$	Male	Female	P^{c}
NP	140	9.0 ± 5.7	***[a]	8.6 ± 4.8	9.5 ± 5.2	
MD	1166	13.2 ± 9.0	Ref. [a]	12.3 ± 7.9	15.2 ± 9.4	***
CC	51	15.1 ± 11.6	n.s.[a]	11.0 ± 8.3	10.6 ± 9.7	
MS	13	9.5 ± 8.2	***[a]	10.0 ± 9.2	8.6 ± 6.4	
SCH	26	11.8 ± 6.1	n.s.[b]	12.1 ± 6.6	11.0 ± 4.9	
MOD	647	12.6 ± 8.4	Ref. [b]	11.7 ± 7.7	15.0 ± 9.7	***
• MDD	414	12.2 ± 8.3	n.s.[b]	11.5 ± 7.6	14.5 ± 9.7	**
• DPS	177	13.4 ± 9.1	n.s.[b]	12.3 ± 8.5	16.1 ± 9.8	***
NEU	222	15.0 ± 9.1	***[b]	14.3 ± 9.0	16.2 ± 9.3	
• ADD	99	13.7 ± 7.7	n.s.[b]	12.6 ± 7.0	16.0 ± 8.7	*

* $p< 0.05$, ** $p< 0.01$, *** $p< 0.001$.

Values are expressed as mean ± standard deviations. *P* values were adjusted by Bonferroni correction. The duration of sickness absences between the different diagnoses was compared using the Kruskal Wallis one-way analysis of variance on ranks with a post hoc Dunn-Bonferroni test.

[a]: Compared with mental and behavioral disorders (Ref. [a]); [b]: compared with mood disorders (Ref. [b]); [c]: compared by gender.

MDD, DPS, ADD are sub-categories. MDD and DPS belong to MOD. ADD belongs to NEU.

Abbreviations: long-term sickness absence (LTSA), neoplasms (NP), mental and behavioral disorders (MD), diseases of the circulatory system (CC), diseases of the musculoskeletal system and connective tissue (MS), schizophrenia, schizotypal and delusional disorders (SCH), mood disorders (MOD), neurotic, stress-related and somatoform disorders (NEU), major depressive disorder (MDD), depressive state (DPS), adjustive disorder (ADD), and not significant (n.s.).

The trend analysis of age distribution showed that LTSA incidents increased as workers became older ($p<0.001$). The analysis stratified by age revealed that both workers aged 20–29 and 40–49 showed decreasing trends. The Patient Survey also demonstrated that patients in Japan aged 45–54 exhibited an increasing trend, while those aged 25–44 had a decreasing trend[32]. These results are consistent with our findings, and we posit that mental health promotion activities such as stress checks may prevent incidences of LTSA.

In our study, the average duration of sickness absence for MD (13.2 ± 9.0 months) was much longer than that for MS (9.5 ± 8.2 months) and NP (9.0 ± 5.7 months). However, there were no significant difference between MD and CC. In Japan, Muto *et al.*[23] reported that the duration of LTSA for mental disorders was more than twice that for non-mental disorders[23]. We were unable to find a study on the duration of sickness absences for MD and CC. Diagnoses of CC may be more severe, causing workers to take longer to return to work than other physical diseases.

This study focused on LTSA among Japanese public servants. Public service jobs—including many typical jobs in various fields such as general affairs, accounting, personnel affairs, and taxes—are among the most popular occupations in Japan. Japanese public servants who take LTSA seem to be provided with sufficient welfare benefits, such as receiving a part of their wages as remuneration. Additionally, in comparison to private sector workers, public servants often work under uniform conditions, possess high levels of education, earn stable wages, and seem to be guaranteed job stability with no threat of unemployment until retirement[33, 34]. Some surveys examining LTSA among Japanese public servants have been conducted. In 2017, the Japan National Personnel Authority[35] reported that the most frequent reason given (65.5%) for LTSA lasting over one month (taken by 1.94% of government officials) was MD, followed by NP (9.7%). Another survey, conducted by the Japan Local Government Employee Safety and Health Association[36], examined 760,000 local public servants in 2018 and found that 2,551 per 100,000 public servants took more than one month of sickness absence. The most frequent reason for LTSA was MD, which accounted for 57.7% of absences lasting more than one month, with this rate continually increasing. The second most frequent reason given was NP (9.4%), and the third was "Injury, poisoning, and certain other consequences of external causes" (6.6%). Those findings were similar to our results in terms of the prevalence of MD as a reason for LTSA.

This study has several strengths. First, the defined LTSA period was relatively long. There are relatively few studies focusing on LTSA of over 90 days. Second, the participants were part of a large population, with the number of participants being comparatively high for the organization. Third, the study period was 10 years, which is a relatively long time, allowing us to analyze the trends in the number of LTSA episodes.

Conversely, this study also has several limitations. First, the participants were public servants from a single city in Japan. Therefore, it may be difficult to generalize our findings to other job categories, regions, or countries. Second, we could not collect data on employees with sickness absences under 90 days, as these employees (public servants in City A) were not required to have a medical certificate for absences under 90 days. A total of 90 days is a much longer definition of LTSA than used by other studies, which usually define it as over 7, 21, or 30 days. Accordingly, we presumably recruited participants with more severe diseases than those in other studies. Thus, the results are likely to change depending on the definition of LTSA periods utilized. Third, medical certificates do not always reflect the proper diagnosis. Medical certificates, in these circumstances, are needed for employees to gain permission to take sickness absences, with different clinics and hospitals providing them. As such, the validity and reliability of the diagnoses in this study were not high. Fourth, we were only able to obtain occupational data for all public servants between 2011 and 2018. Thus, we analyzed the 2008 and 2009 trends and difference in LTSA workers by occupation using speculated data. The results of the speculative data did not change compared to the results for 2011 to 2018. Finally, public servants are provided with welfare benefits by their city, making it relatively easy to take sickness absences in Japan. This may explain the higher rate of sickness absence among public servants than among other job types.

Conclusion

This study found that mental disorders as a general category, mood disorders within that category, and major depressive disorder were the most frequently reported causes of LTSA, and they maintained their high frequency between 2009 and 2018 among city public servants in Japan. Further, the prevalence of LTSA for MD and MOD showed decreasing trends. Sickness absence periods due to NEU were longer than those due to mood disorders, with the prevalence rate of ADD increased with time. The proportion of neurotic disorders as the reason for LTSA may increase more than that of mood disorders in the future. It is likely that the rate of whole mental disorders, as the reason for LTSA, will remain much higher than other physical diseases. Therefore, more significant efforts aimed at mental health promotion and preventing LTSA are still needed.

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