

# Prevalence of depressive symptoms and psychological distress in Japanese university-enrolled students before and during the coronavirus disease 2019 pandemic

doi:10.1111/pcn.13287

This study is intended to ascertain whether a difference exists in depressive symptoms and psychological distresses among first-year university students before and during the influence of the coronavirus disease 2019 (COVID-19) pandemic.

New students at Hokkaido University participated before COVID-19: 1935 students from 2016 and 1717 students from 2017. During COVID-19, 1087 students were included from 2020. As part of their entrance orientation,

participants were administered the Patient Health Questionnaire-9 (PHQ-9) to measure depressive symptoms<sup>1,2</sup> and the Kessler Psychological Distress Scale-10 (K-10) to measure psychological distress based on their responses to questions about anxiety and depressive symptoms.<sup>3,4</sup> Age at admission, sex, hometown, and residence after enrollment were also elicited.

All participants gave consent for the use of anonymized data and for the use of results for research activities aimed at improving health activities. Ethical approval for collection of these data was obtained from the ethical committee of Hokkaido University Graduate School of Medicine (approval number: 12-002).

Analyses were conducted using SPSS version 23 for Mac OS (IBM). Significance was inferred for  $P < 0.05$  (two-tailed).

Demographic characteristics of participants are presented in Table S1. No significant difference was found among new students of the 2016, 2017, and 2020 academic years in terms of the ratio of men to women, whether they lived with family members, or whether they were from Hokkaido. However, a significantly higher rate of students who were 18 years old at the time of enrollment was found for new students in the 2020 academic year.

Considering moderate or more depressive symptoms (10 points or more on PHQ-9), 127 of 3652 students (3.5%) had depressive symptoms before COVID-19, and 114 of 1087 students (10.5%) had depressive symptoms during COVID-19. The prevalence of depressive symptoms among students was higher for every category during COVID-19 than before COVID-19 (Table 1).

**Table 1.** Prevalence of depressive symptoms and psychological distress in Japanese university-enrolled students before and during the COVID-19 pandemic

Depressive symptoms	% (95%CI)		Difference	
	Before COVID-19 Mean (SD); 2.5 (3.1)	During COVID-19 Mean (SD); 4.4(4.2)	Absolute, %	Relative
None	81.1 (79.8–82.4)	61.5 (58.5–64.4)	-19.6	0.8 **
Mild	15.4 (14.2–16.6)	28.1 (25.4–30.8)	12.7	1.8 **
Moderate	2.9 (2.4–3.5)	6.8 (5.4–8.5)	3.9	2.3 **
Moderately severe	0.4 (0.2–0.6)	2.7 (1.8–3.8)	2.3	6.8 **
Severe	0.2 (0.1–0.4)	1.0 (0.5–1.8)	0.8	5.0 *
Above moderate	3.5 (2.9–4.1)	10.5 (8.7–12.5)	7.0	3.0 **
Psychological distresses	Mean (SD); 6.1 (6.2)	Mean (SD); 5.3 (6.3)		
Low	77.1 (75.7–78.4)	80.5 (78.0–82.8)	3.4	1.0
Mild	12.5 (11.4–13.6)	11.1 (9.3–13.2)	-1.4	0.9
Moderate	6.1 (5.3–6.9)	4.0 (2.9–5.3)	-2.1	0.7 *
Severe	4.4 (3.7–5.1)	4.4 (3.3–5.8)	0.0	1.0
Above moderate	10.4 (9.4–11.4)	8.4 (6.8–10.2)	-2.0	0.8
Depressive symptoms (none or mild) and psychological distress (low or mild)	88.5 (87.4–89.5)	87.4 (85.3–89.3)	-1.1	1.0

CI, confidence interval; COVID-19, coronavirus disease 2019.

Percentages represent the number of the total number of participants.

Depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9) and categorized as none (score, 0–4), mild (score, 5–9), moderate (score, 10–14), moderately severe (score, 15–19), and severe (score, ≥20). Depressive symptoms defined as PHQ-9 score not less than 10. Psychological distresses were assessed using the Kessler Psychological Distress Scale-10 (K-10) and categorized as low (score, 0–9), mild (10–14), moderate (score 15–19), and severe (score, ≥20). Psychological distresses were defined as a K-10 score not less than 15. Depressive symptoms (none or mild) and psychological distress (low or mild) indicate that the participant is unlikely to have clinical problems.

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

However, regarding moderate or greater psychological distress (score of 15 or higher on K-10), students with psychological distress comprised 380 of 3652 (10.4%) before COVID-19 and 91 of 1087 (8.4%) during COVID-19. The relative degrees of psychological distress before and during COVID-19 did not significantly differ, but responses of the moderate category were fewer.

Results of multiple logistic regression analysis for all 4739 participants are presented in Table S2. When the presence of depressive symptoms was the dependent variable, the odds ratio (OR) for before and during COVID-19 was significant at 3.35, but the ORs for sex and age were not significant, although the OR for life circumstances was significant at 1.39. When the presence of psychological distress was used as the dependent variable, the ORs before and during COVID-19 and for sex were not significant. However, the OR for age was 1.46 and for living environment was 1.37.

Results of this study indicate that while depressive symptoms show greater prevalence in university-enrolled students during the COVID-19 pandemic compared with those before COVID-19, psychological distress is not greater, even after controlling for sex, age at enrollment, and living with family or not. Greater prevalence of depressive symptoms among the general population has been reported, which is consistent with findings obtained from the current study.<sup>5,6</sup> However, overall psychological distress did not increase—a result seemingly contradictory to the increase in depressive symptoms.

According to a systematic review of reports from the early stages of the COVID-19 pandemic, the risk factor for depression include being female while the risk factors for depression and anxiety include being in one's 20s or 30s, having a high school education and having a chronic illness. However, protective factors for depression and anxiety include correct information about the pandemic, resources for necessary medical supplies, positive and optimistic thinking, and supply of counseling applications.<sup>7</sup> The present results might reflect the strong role of exacerbating factors for depressive symptoms, whereas protective factors are strong for anxiety symptoms.

Depressive and anxiety symptoms might differ depending on the time of measurement: anxiety became more intense during the first 4 weeks of the COVID-19 pandemic, but it gradually reverted to the level prevailing before the pandemic during the following 8 weeks, consistent with the peak of the pandemic.<sup>8</sup> The timing of the survey of 2020 in this study coincided with the time when the first wave of the COVID-19 pandemic tended to subside, which might have been a factor in lowering anxiety symptoms.

This study is based on data obtained from students enrolled in a single university in Japan. One must be cautious about generalizing the results to university students and young adults.

### Acknowledgments

This study was supported by Japan Society for Promotion of Science KAKENHI grant number JP18K07583 (SA). The authors are grateful to Hiroko Takeda and Kaai Ishihara, staff members at the Health Care Center of Hokkaido University, for assistance with data collection.

### Disclosure statement

The authors declare that they have no conflicts of interest.

### References

1. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: Validity of a brief depression severity measure. *J. Gen. Intern. Med.* 2001; **16**: 606–613.
2. Muramatsu K, Miyaoka H, Kamijima K *et al.* The patient health questionnaire, Japanese version: Validity according to the mini-international neuropsychiatric interview-plus. *Psychol. Rep.* 2007; **101**: 952–960.
3. Kessler RC, Andrews G, Colpe LJ *et al.* Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol. Med.* 2002; **32**: 959–976.
4. Furukawa TA, Kawakami N, Saitoh M *et al.* The performance of the Japanese version of the K6 and K10 in the world mental health survey Japan. *Int. J. Methods Psychiatr. Res.* 2008; **17**: 152–158.
5. Ettman CK, Abdalla SM, Cohen GH, Sampson L, Vivier PM, Galea S. Prevalence of depressive symptoms in US adults before and during the COVID-19 pandemic. *JAMA Netw. Open* 2020; **3**: e2019686.
6. Vizard T, Davis J, White E, Beynon B. Coronavirus and depression in adults, Great Britain: June 2020. In: UK OfNSo, editor. 2020.







7. Salari N, Khazaie H, Hosseini-Far A *et al.* The prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients: A systematic review and meta-regression. *Hum. Resour. Health* 2020; **18**: 100.
8. Staples L, Nielssen O, Kayrouz R *et al.* Rapid report 2: Symptoms of anxiety and depression during the first 12 weeks of the coronavirus (COVID-19) pandemic in Australia. *Internet Interv.* 2020; **22**: 100351.

### Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

**Table S1** Demographic characteristics of Japanese university enrolled students before and during COVID-19 Pandemic

**Table S2** Odds of Depressive Symptoms and Psychological distresses by Demographic characteristic and Exposure to COVID-19

Yutaka Fujii, MD, PhD <sup>1,2</sup> Satoshi Asakura, MD, PhD,<sup>1,2</sup> Keisuke Takanobu, MD, PhD <sup>1</sup> Shinya Watanabe, MD, PhD <sup>1</sup> Kuniyoshi Toyoshima, MD, PhD <sup>1</sup> Nobuyuki Mitsui, MD, PhD <sup>1</sup> Yuki Kako, MD, PhD <sup>1</sup> Satoshi Hashino, MD, PhD<sup>2</sup> and Ichiro Kusumi, MD, PhD<sup>1</sup>

<sup>1</sup>Department of Psychiatry, Hokkaido University Graduate School of Medicine, Sapporo, and <sup>2</sup>Health Care Center of Hokkaido University, Sapporo, Japan

Email: taiebi@med.hokudai.ac.jp

Received 17 May 2021; revised 21 June 2021; accepted 30 June 2021.

## A new approach for the diagnosis of respiratory dyskinesia using chest and abdominal band sensors

doi:10.1111/pcn.13281

Respiratory dyskinesia (RD) is a form of tardive dyskinesia (TD) that affects the respiratory muscles and may mimic other respiratory disorders,<sup>1</sup> manifesting as dyspnea, irregular respiration, and grunting or gasping.<sup>2</sup> RD is an under-recognized side effect of neuroleptics, which is often misdiagnosed as respiratory or psychogenic dyspnea.<sup>2–5</sup> Although adequate diagnosis of RD is critical, an objective assessment of RD has not yet been established.

This letter presents the case of a patient with RD who had been receiving prolonged neuroleptic therapy. The patient was a 40-year-old Japanese woman with mental retardation (IQ of 51). She developed RD after receiving prolonged olanzapine; however, she recovered from RD after discontinuation of olanzapine and the addition of clonazepam. The involuntary movements of her chest and abdomen associated with RD could be visualized before and after her treatment using chest and abdominal band sensors. This study was approved by the ethics committee of the University of Fukui. The patient provided written informed consent.

She first visited our department when she attempted to inflict self-harm. She was administered quetiapine (25 mg/day p.o.). The medication