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# Recovery from a depressive episode during postgraduate residency training is associated with senior doctors' support

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## Abstract

**Background:** Depression among doctors in residency training can have significant impacts on the health of the residents and on patient safety. This study aimed to investigate factors associated with recovery from a depressive episode experienced during postgraduate residency training.

**Methods:** A questionnaire was administered to 2935 first-year residents at the beginning of residency training in 2011; follow-up surveys were conducted after 3 months and at the end of the training in 2013. The questionnaire included the Center for Epidemiologic Studies Depression Scale and the Senior Doctor's Support Scale (SDSS). Logistic regression was used to identify associations between factors that may have been related to recovery from depressive episodes.

**Results:** A total 182 residents experienced a depressive episode in the 3 months after starting residency training. When reassessed at the end of the 2-year training, 102 (56%) residents had recovered from the episode and 80 (44%) had not. Increased odds of recovery were associated with a middle or high score on the SDSS (middle score odds ratios [OR] 4.45, 95% confidence interval [CI] 1.0-18.0,  $P = .04$ ; and high score OR 5.70, 95% CI 1.4-23.4,  $P = .02$ ).

**Conclusions:** Support from senior doctors should be enhanced to optimize recovery from depressive episodes experienced after the start of residency training.

## KEYWORDS

depressive episode, occupational health, postgraduate training, recovery, resident, senior doctor's support

## 1 | INTRODUCTION

Previous studies, conducted in Europe, the United States, and Japan, have shown that residents are prone to depression during postgraduate residency training.<sup>1-6</sup> Depression among residents is a serious problem from 2 viewpoints: first, the potential negative impacts on residents, for example, burnout, binge drinking, suicide/suicide attempts, or drug use, or residents having to extend their training or

dropping out of the program<sup>7,8</sup> and second, the potential negative impacts on patients, that is, residents neglecting necessary medical care.<sup>9,10</sup> It is therefore absolutely necessary to minimize the incidence of depressive episodes in residents.

To take adequate measures to counter these depressive episodes, knowledge of the factors related to their onset is essential. In previously reported qualitative work, we showed that depressive episodes in Japanese residents that started during residency training were in

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**TABLE 1** Senior Doctor's Support Scale

Instructions: These questions are about your own senior doctor. If you have multiple senior doctors, please answer with regard to the senior doctor who is most involved in your training.

1. I can sense the senior doctor's eagerness for education
2. The senior doctor consulted with me any time when I was in trouble
3. The senior doctor gives me understandable guidance about what I want to know
4. The senior doctor periodically observes my patients and backs up when needed
5. The senior doctor trusts me
6. The personal chemistry between the senior doctor and me is good
7. The senior doctor is respectable and a good role model for me

line with the occupational stress model of the National Institute for Occupational Safety and Health.<sup>11–13</sup> Specifically, in addition to personal factors such as character and capability, a depressive episode was often a reaction to stress encountered during residency training, particularly when stress-relieving factors are absent. Examples of stress factors included long working hours; both good sleep and adequate support from senior doctors were stress-relieving factors.<sup>12</sup>

Prevention and early detection are crucial to reduce the risk of depression, but knowledge of the factors that aid recovery from a depressive episode is also crucial.<sup>14–16</sup> It is, however, still unclear exactly which factors are associated with recovery from depressive episodes experienced during residency training. Better defining these factors, it may contribute to the development of effective countermeasures for depression among residents. We therefore investigated the factors associated with recovery from a depressive episode among individuals who experienced depression after starting residency training.

## 2 | MATERIALS AND METHODS

### 2.1 | Study subjects

A questionnaire was administered to first-year residents at 250 teaching hospitals registered with the Clinical Training Program of the Ministry of Health, Labour and Welfare of Japan.<sup>17</sup> The survey was conducted 3 times: in April 2011 (at the beginning of residency training); in July 2011 (after 3 months of training); and in March 2013 (the end of training).

### 2.2 | Ethical considerations

Approval for the study was obtained from the ethical committee of Tsukuba University. Each hospital gave their permission for their residents to be surveyed, and each participant gave written informed consent to the survey.

Before starting the survey, the residents were informed in writing that the answers to the questionnaires would never be disclosed to the senior doctors and/or the person responsible for the residency training. Furthermore, taking into consideration that residents could be identified in hospitals where the number of residents is small,

only overall survey results were reported to each teaching hospital without providing individual hospital's data and individual resident's information.

### 2.3 | Data collection

Questionnaires asked about basic characteristics such as age; gender; estimated average working hours on weekdays and weekends; the number of monthly night-duty days and out-of-hour on-calls; estimated average daily sleeping hours; call-free intervals (during which the resident is guaranteed of no phone calls from the hospital); and opportunities to talk about training with a senior doctor. Residents' anxiety about their future careers ("quite anxious," "anxious," "a little anxious," "less anxious," or "hardly anxious") and the progress of decisions concerning posttraining courses ("definitely decided," "almost decided," "options focused," or "not yet decided") were also surveyed. Questions were selected through discussions between study team members, with reference to previous studies.<sup>1,2,4,12–16,18–21</sup>

Three scales were included: the Center for Epidemiologic Studies Depression Scale (CES-D), to assess for depressive symptoms; the Senior Doctor's Support Scale (SDSS), to assess the degree of support from senior doctors; and the Sense of Coherence Scale (SOCs), to assess residents' ability to cope with stress.<sup>13,21–23</sup> All scales have previously been validated; Japanese versions of the CES-D and SOCS were used. A depressive episode was defined as a total CES-D score of  $\geq 16$  points.<sup>22</sup> The SDSS consists of 7 questions, each employing Likert-scale rankings of 4 possible grades; the higher the score, the better the support provided by the senior doctor (Table 1).<sup>13,21</sup> The SOCS consists of 3 subsections: a "feeling of comprehensibility"; a "feeling of coping-feasibility"; and a "feeling of meaningfulness." A higher score suggests an increased ability to cope with stress.<sup>23</sup> The CES-D was included in the questionnaire for all 3 surveys, the SDSS in the second and third surveys only, and the SOCS in the first survey only.

### 2.4 | Data analysis

Residents who were judged to be experiencing a depressive episode at the time of the second survey, but not at the time of the first survey (ie, individuals who became depressed after starting residency training), were included in the analysis.

### 2.5 | Statistical analysis

To estimate the actual working hours of residents, we devised a "weekly working time" variable using the answers to 3 questions: "estimated average working hours on weekdays" ( $\alpha$ ), "estimated average working hours on weekends" ( $\beta$ ), and "the number of monthly night-duty days" ( $\delta$ )

$$\text{Weekly working time} = \left( (5\alpha) + (2\beta) + \left( 7 \left( \frac{\delta}{30} \right) \right) \right) \times (24 - \alpha)$$

Sense of Coherence Scale and SDSS scores were categorized into 3 groups: low score ( $[(\text{mean}-\text{SD}) < 1]$ ); middle score ( $[(\text{mean} \pm \text{SD}) \leq 1]$ ); or high score ( $[(\text{mean} + \text{SD}) < 1]$ ). Associations were evaluated between SOCS and SDSS scores and recovery from a depressive episode. Group differences were assessed using the *t* test for continuous variables, Wilcoxon rank-sum test for ordinal variables, and Fisher's exact test for binomial variables.

Factors associated with recovery from a depressive episode were assessed using multivariate logistic regression analysis ("Recovered"=1 vs "Not recovered"=0); adjusted odds ratios (OR) were calculated with 95% confidence intervals (CI). Variables included in the model were age, gender, weekly working time, daily mean sleeping hours, monthly off-hour calls, opportunities to talk about training with a senior doctor, and inclusion in the SOCS or SDSS middle or high score group. The model was devised through discussions between study team members with reference to previous studies.<sup>1,2,4,12-16,18-21</sup>

Two hypotheses were tested: (i) that reduced stress factors, such as the weekly working time, increase the chances of recovery from a depressive episode<sup>2,20</sup> and (ii) that increased duration or frequency of stress-relieving factors, such as sleeping hours, call-free intervals, or opportunities to talk about residency training, or higher SOCS or SDSS scores increase the chances of recovery from a depressive episode.<sup>1,2,4,12-14,16,18-21</sup>

Data on weekly working time, sleeping hours, call-free intervals, opportunities to talk about residency training, and SDSS scores from the third survey were used to evaluate the characteristics of residents who recovered from depressive episodes. Data on SOCS scores from the first survey were included in the model as individual factors related to the onset of a depressive episode.

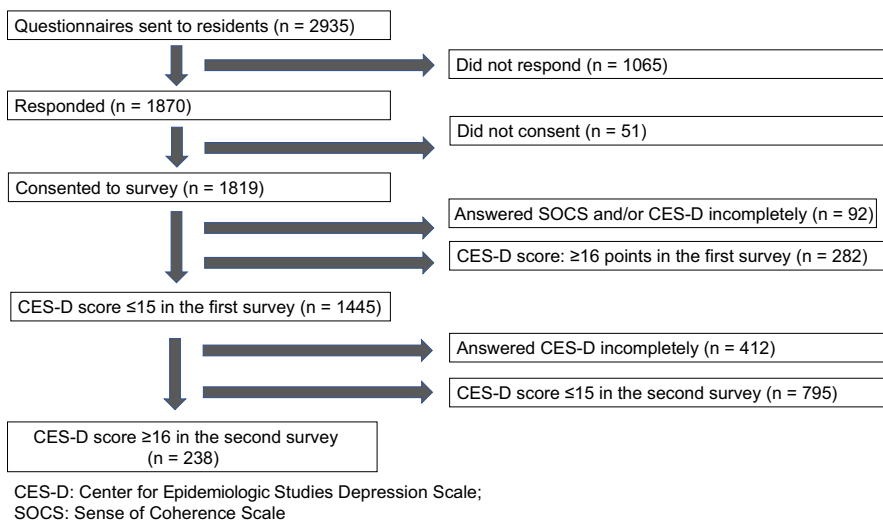
Analyses were performed using IBM SPSS Statistics for Windows, version 16 (IBM Corp., Armonk, NY, USA). All *P*-values were 2-sided; *P*-values < .05 were considered statistically significant. The Hosmer-Lemeshow test was used to assess goodness-of-fit of the final model.

### 3 | RESULTS

Questionnaires were sent to 2935 residents; 1870 (63.7%) responded. Of these, residents who did not consent to the survey (*n* = 51 [2.7%]), whose answers to the SOCS and/or CES-D questions in the first survey were incomplete (*n* = 92 [4.9%]), or whose CES-D scores were  $\geq 16$  at the time of the first survey (*n* = 282 [15.1%]) were excluded. Of the 1445 residents whose CES-D scores in the first survey were  $\leq 15$ , individuals with incomplete answers to the CES-D questions in the second survey (*n* = 412 [28.5%]) were excluded, as were those with CES-D scores  $\leq 15$  in the second survey (*n* = 795 [55.0%]). Thus, 238 residents who were experiencing a depressive episode at the time of the second survey, but not the first, were included in the analysis (Figure 1).

#### 3.1 | Basic characteristics

Among the 238 individuals included in the analysis, the mean age was  $26 \pm 3.0$  years (mean  $\pm$  standard deviation [SD]) and 69 (37.9%) were female (Table 2). The mean working time on weekdays was  $11.2 \pm 2.3$  hours, the mean working time on weekends  $3.4 \pm 3.2$  hours, the mean number of monthly night-duty days  $3.6 \pm 2.0$  days, and the mean weekly working time  $73.4 \pm 16.9$  hours. The mean monthly off-hour calls was  $3.2 \pm 6.3$  times, and the mean daily sleeping time was  $5.9 \pm 1.0$  hours. One hundred and twenty-four (70.1%) residents were allowed a call-free interval, and 74 (43.0%) had opportunities to talk about residency training with a senior doctor. Asked about anxiety regarding future careers, 59 (32.8%) residents were "quite anxious," 59 (32.8%) "anxious," 41 (22.8%) "a little anxious," 18 (10.8%) "less anxious," and 3 (1.3%) "hardly anxious." Regarding the progress of their decisions around posttraining courses, 124 (69.3%) residents had "definitely decided," 41 (22.9%) "almost decided," 7 (3.9%) had "options focused," and 7 (3.9%) had "not yet decided." The mean SDSS score of the third survey was  $14.96 \pm 4.48$  points, and the mean SOCS score of the first survey was  $41.91 \pm 5.96$  points.



**FIGURE 1** Flow diagram for residents who were experiencing a depressive episode at the time of the first and second survey (process and exclusion reasons)

**TABLE 2** Basic characteristics of residents assessed to be experiencing a depressive episode at the time of the second survey (n = 238)

Category	Sub-category	n (%) or mean $\pm$ SD
Age (years)		26 $\pm$ 3.0
Gender	Male	113 (62.1)
	Female	69 (37.9)
Working hours on weekdays (h)		11.2 $\pm$ 2.3
Working hours on weekends (h)		3.4 $\pm$ 3.2
Monthly night-duty days (d)		3.6 $\pm$ 2.0
Weekly working time (h)		73.4 $\pm$ 16.9
Monthly off-hour calls (d)		3.2 $\pm$ 6.3
Daily sleeping hours (h)		5.9 $\pm$ 1.0
Call-free interval (s)	Present	124 (70.1)
	Absent	53 (29.9)
Opportunity/ies to talk about training with a senior doctor	Present	74 (43.0)
	Absent	98 (57.0)
Anxiety about career	Quite anxious	59 (32.8)
	Anxious	59 (32.8)
	A little anxious	41 (22.8)
	Less anxious	18 (10.0)
	Hardly anxious	3 (1.7)
Progress of decision regarding posttraining course	Definitely decided	124 (69.3)
	Almost decided	41 (22.9)
	Options focused	7 (3.9)
	Not yet decided	7 (3.9)
SDSS score at third survey		14.96 $\pm$ 4.48
SOCS score at first survey		41.91 $\pm$ 5.96

SD, standard deviation; SDSS, Senior Doctor's Support Scale; SOCS, Sense of Coherence Scale.

For missing values in each item, the total number is lower than the number of respondents (n = 238).

### 3.2 | Residents who recovered from a depressive episode

Of the 238 residents with depressive episodes at the time of the second survey, 56 (23.5%) incompletely answered the questions of the third survey and were therefore excluded from further analyses. Of the remaining 182 residents, 102 (56.0%) had a CES-D score, in the third survey, of  $\leq 15$  and 80 (44.0%) had a score of  $\geq 16$ . Therefore, at the time of the third survey, 102 residents had recovered from their depressive episodes and 80 had not. In the first survey, the mean SOCS score of these 182 residents was  $41.85 \pm 6.25$ ; 25 (13.7%) residents were in the low score group, 125 (68.7%) in the middle score group, and 32 (17.6%) in the high score group. The mean SDSS score from the third survey was  $14.96 \pm 4.48$ ; 17 (9.6%) residents were in

the low score group, 74 (41.8%) in the middle score group, and 86 (48.6%) in the high score group.

### 3.3 | Differences between residents who had recovered from a depressive episode and those who had not

The mean working times on weekdays were  $10.8 \pm 2.1$  vs  $11.6 \pm 2.6$  hours and the mean weekly working times  $71.1 \pm 14.0$  vs  $76.5 \pm 19.7$  hours in the "recovered" vs the "not recovered" group ( $P = .06$  and  $P = .013$ , respectively; Table 3). Individuals in the "recovered" group were significantly more likely to have call-free intervals (n = 79 [78.2%] vs n = 45 [59.2%]; "recovered" vs "not recovered";  $P < .01$ ) and less likely to have had opportunities to talk about residency training with a senior doctor (n = 36 [37.1%] vs n = 38 [50.7%]; "recovered" vs "not recovered";  $P = .09$ ). Mean SOCS scores were  $42.7 \pm 6.5$  vs  $40.7 \pm 5.8$  and mean SDSS scores  $15.9 \pm 4.1$  vs  $13.8 \pm 4.7$  in the "recovered" vs "not recovered" group ( $P = .01$  and  $P = .005$ , respectively). No statistical difference was observed in the age, gender, mean working hours on weekends, night-duty days, or sleeping hours between the 2 groups.

### 3.4 | Adjusted OR for multivariate model of residents who recovered from a depressive episode

Table 4 shows adjusted OR for the variables included in the multivariate model of the residents who recovered from depressive episodes. Significant associations were found for the SDSS middle score group (OR 4.45, 95% CI 1.0-18.0,  $P = .04$ ) and the SDSS high score group (OR 5.70, 95% CI 1.4-23.4,  $P = .02$ ). No association was observed with age, gender, weekly working time, daily sleeping hours, availability of call-free intervals, opportunities to talk about training with a senior doctor, or SOCS middle and high score groups. The goodness-of-fit was not rejected in the Hosmer-Lemeshow test ( $P = .462$ ), so the present model was employed.

## 4 | DISCUSSION

This study showed that support for residents from senior doctors, signified by higher SDSS scores, is associated with recovery from depressive episodes experienced after starting residency training. To effectively counter against depressive episodes in residents, it is necessary to care for the individuals themselves in addition to implementing strategies for prevention and early detection.

Previous studies have shown that support from superiors is important in the education of residents.<sup>21</sup> We have previously reported that support from a senior doctor is associated with a lower risk of a resident developing a depressive episode.<sup>21</sup> This study shows that support from senior doctors is also important for recovery from such an episode. However, the reason why the support from senior doctors prevents residents' depressive episodes is still unknown in this study. As for senior doctors' support, it may be suggested to appropriately

**TABLE 3** Comparison between residents who recovered from depressive episodes and those who did not (n = 182)

Category	Sub-category	Recovered (n = 102) n (%) or mean ± SD	Did not recover (n = 80) n (%) or mean ± SD	P
Age (y)		26 ± 2.8	26 ± 2.4	.92 <sup>a</sup>
Gender	Male	65 (63.7)	48 (60.0)	.65 <sup>b</sup>
	Female	37 (36.3)	32 (40.0)	
Working hours on weekdays (h)		10.8 ± 2.1	11.6 ± 2.6	.06 <sup>c</sup>
Working hours on weekends (h)		3.0 ± 2.6	3.9 ± 3.8	.08 <sup>c</sup>
Monthly night-duty days (d)		3.5 ± 1.9	3.8 ± 2.1	.39 <sup>c</sup>
Weekly working time (h)		71.1 ± 14.0	76.5 ± 19.7	.013 <sup>c</sup>
Daily sleeping hours (h)		6.0 ± 0.9	5.8 ± 1.2	.14 <sup>c</sup>
Call-free interval (s)	Present	79 (78.2)	45 (59.2)	<.01 <sup>b</sup>
	Absent	22 (21.8)	31 (40.8)	
Opportunity/ies to talk about training with a senior doctor	Present	36 (37.1)	38 (50.7)	.09 <sup>b</sup>
	Absent	61 (21.8)	37 (40.8)	
SOCS score at first survey		42.7 ± 6.5	40.7 ± 5.8	.01 <sup>c</sup>
SDSS score at third survey		15.9 ± 4.1	13.8 ± 4.7	.005 <sup>c</sup>

SD, standard deviation; SDSS, Senior Doctor's Support Scale; SOCS, Sense of Coherence Scale.

<sup>a</sup>t test.

<sup>b</sup>Fisher's exact test.

<sup>c</sup>Wilcoxon rank-sum test.

For missing values in each item, the total number is lower than the number of respondents (n = 182).

Category	Sub-category	Adjusted OR	95% CI	P
Age		0.99	0.87-1.13	.93
Gender		0.67	0.32-1.34	.27
Weekly working time		0.98	0.96-1.00	.11
Daily sleeping hours		0.91	0.59-1.38	.64
Availability of a call-free interval (s)		1.68	0.78-3.61	.19
Opportunity/ies to talk about training with a senior doctor		0.78	0.40-1.55	.47
SOCS score	High	1.74	0.50-6.10	.39
	Middle	0.97	0.36-2.61	.96
	Low	1		
SDSS score	High	5.70	1.39-23.4	.02
	Middle	4.45	1.01-18.0	.04
	Low	1		

CI, confidence interval; OR, odds ratio; SDSS, Senior Doctor's Support Scale; SOCS, Sense of Coherence Scale.

An OR ≥1 indicates that recovery from depressive states is more frequent.

communicate with residents including their mental-health status and well arrange the training circumstances by adjusting their qualitative and quantitative coverage of patients in charge. It is necessary for senior doctors in many medical institutions to exchange and share information on practical support for residents developing depressive episodes. Then, it is necessary to clarify the support that is effective for recovery from such depressive episodes.

**TABLE 4** Adjusted OR from a multivariate model of residents who recovered from depressive episodes that began after the start of residency training

Weekly working time was associated with recovery from a depressive episode developed during postgraduate residency training in the univariable analysis, but not in the multivariate analysis. Associations between weekday working hours and depressive episodes in residents have previously been described in Japan; decreases in working hours resulted in reductions in the numbers of residents who experienced a depressive episode after starting residency training.<sup>1,20</sup> Further study

is needed as to whether the weekly working time is associated with recovery from depressive episodes and to clarify whether or not a decrease in daily working hours is needed for residents who experience depressive episodes.

Support from a senior doctor was related to recovery from a depressive episode regardless of the SOCS score, which has previously been reported to predict the risk of depressive episodes in these individuals.<sup>16</sup> In other words, the SOCS score is useful for detecting residents who may be likely to experience depressive episodes, but is not useful in predicting whether or not the resident will recover. It is therefore suggested that intensive support from senior doctors is indispensable for residents who experience depressive episodes after starting residency training, regardless of their SOCS scores.

The present study has several limitations. The answers to the questionnaire were based on the respondents' subjective views and may not reflect the actual training circumstances, and it is possible that the SDSS scores of the residents who remained in a depressive episode may have been lower than those of the residents who recovered. In addition, it is possible that the results of this study may have been influenced depending on whether or not the residents had been fully explained at the residency training starting guidance that depressive episodes could happen during the training and, when happened, they should ask for support from senior doctors. There are also limitations inherent in the reliability and validity of the questionnaire used. In this study, the depressive episode was assessed by the CES-D, the Japanese version of which has previously been reported to have a sensitivity and specificity of 88.2% and 84.8%, respectively.<sup>22</sup> In addition, as the model used was dependent on the validity of the data included, further studies are required to further investigate factors contributing to recovery from depressive episodes among residents, for example, family support and family history of depression. The final response rate was low, at 63.7%, and only teaching hospitals were included, so our results may not be generalizable. However, the present study was a multicenter investigation involving as many as 250 hospitals in all regions of Japan and is therefore considered to be reasonably representative.

Despite the above-mentioned limitations, the results of this study may be used to better understand the actual status of recovery from depressive episodes encountered after commencement of residency training among Japanese residents.

## 5 | CONCLUSION

Support for residents from senior doctors, represented by higher scores on the SDSS, was associated with recovery from depressive episodes that began after starting residency training. Sufficient support from senior doctors should be ensured to aid recovery among residents with depressive episodes.

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## CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

## AUTHOR CONTRIBUTION

Takuma Kimura and Shinji Matsumura participated in designing the study, and analyzed the data, carried out the statistical analysis, interpreted the results, and drafted the manuscript. Emiko Seo, Ryoko Ogawa and Tetsuhiro Maeno conceived and designed the study, collected and analyzed the data, and offered practical suggestions for interpreting the results. All authors read and approved the final manuscript.

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