


Effects of treatment contents on changes in resilience among workers with mood or anxiety disorders: A 3-month longitudinal study

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Abstract

Aim: The aim of this study was to identify factors that influence changes in resilience among workers with mental health disorders, leading to effective treatment and support.

Methods: Among the new patients at an institution, 81 who were working and had the ICD-10 diagnoses F3 and F4 were included. Resilience was measured at the initial visit and 3 months later using the S-H resilience test. Univariate and multiple regression analyses were conducted using the change in resilience between the two measurements as the objective variable, and treatment and attendance at work as explanatory variables.

Results: There were no significant differences in resilience abilities between pre- and postmeasurement for the subjects as a whole. However, tests for the subgroups of diagnostic category, attendance at work, and treatment showed that resilience improved significantly in the mood disorder group, the leaving employment group, and the group receiving additional treatment. The results of the multiple regression analysis showed that treatment type (with or without additional treatment) had an effect on the degree of change in resilience, and among these “inpatient treatment” and “re-work program” were suggested to have an effect.

Conclusion: The resilience of workers with mental health disorders was found to improve even after only 3 months of treatment, depending on the content of the treatment. We believe the significance of this study is the quantitative indication of the transition of resilience, which has not been made concrete until now.

KEYWORDS

longitudinal study, mental health disorder, resilience, worker

Available fields: social psychiatry and epidemiology

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INTRODUCTION

Mental health disorders are a major public health problem worldwide. In Japan, the majority of workers suffer from high levels of stress,¹ and labor losses due to excessive stress in industrial settings are a pressing issue. In recent years, the number of worker suicides in Japan has hovered above 7000,² and economic loss caused by presenteeism and absenteeism (absence from work) is also a significant problem.³ Presenteeism is a condition in which a person goes to work while suffering from an illness that reduces their ability to perform their work and affects their productivity. On the other hand, absenteeism is a term used to describe a condition in which attendance is affected due to physical or mental illness. In addition, maladjustment to work with unstable attendance has become a major problem, such as the inability to return to work after a leave of absence or repeated relapses after returning to work.

There is growing interest in resilience in the field of psychiatric treatment, including mental health disorders. The American Psychological Association defines resilience as “the process of adapting well in the face of adversity, trauma, tragedy, threats, or even significant sources of stress.”⁴ The concept of resilience originally developed closely with developmental psychopathology research on children with a high risk of mental illness, such as children born to mothers with schizophrenia and children living in poverty. This research considers resilience a capacity that can enable good adjustment despite the presence of such developmental inhibitors.⁵ Scholars in psychology and pedagogy are giving more focus to the primary role that resilience can play in preventing such diseases. Moreover, today resilience is generally considered a process of adjustment to new conditions characterized by the acquisition of a growing and broader competence to experience and react to stress, therefore it is also referred to as an aspect that helps recovery and adaptation from mental illness, as in “successful adaptation from mental illness.”⁶

Depression, a major mental health disorder, is considered a chronic disease due to its high recurrence rate,⁷ and workers with mental health disorders like depression are expected to face various challenges and difficulties. It has therefore been pointed out that resilience is an important factor as an indicator that goes beyond mere symptom recovery.⁸ Since there is no resilience approach that is universally effective for all people,⁹ there is a need to examine what interventions are effective for this population. However, quantitative research on resilience among workers with mental health disorders is limited. There are no comprehensive prospective studies on the factors that are associated with resilience focusing on diagnosis, occupation, treatment, and attendance at work, therefore the purpose of this study was to longitudinally measure the resilience of workers with mental health disorders who visited a psychiatric hospital for the first time, to identify associations between changes in resilience and factors between their first visit and 3 months thereafter, and to examine effective treatment methods and the support provided.

METHODS

Subjects

Data for this study were collected at a collaborative research institute. The collaborating institution, Shiranui Hospital, is a private psychiatric hospital located in Fukuoka Prefecture with 219 inpatient beds. It has a dedicated stress care unit for patients in the mood and anxiety disorder spheres with depressive symptoms. New patients at this hospital who met the following criteria were included in the study.

- Patients diagnosed as F3 (Mood Disorder Area) or F4 (Anxiety Disorder Area) according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10) diagnostic criteria.
- Workers (part-time work and other forms of informal employment, self-employment, and workers with disabilities who are employed).

In addition, patients who had been at this hospital for more than 3 months since their last visit were also included as new patients and were therefore included in this study.

Duration of the study and data collection

The enrollment period for the study was from August 28, 2020 to June 30, 2021. During this period, the purpose of the study was explained in writing to the subjects who visited the hospital for the first time, and they were enrolled in the study by filling out a consent form. At the same time, the initial resilience measurement was taken. However, if symptoms were imminent at the time of the first visit, the explanation and initial measurement were conducted at the second and subsequent visits. In principle, the test forms were submitted directly to the staff, but we also accepted submissions by mail. The second time resilience was measured was approximately 3 months after the first visit. The 3-month period was set as a reference to the average length of a hospital stay for depression.¹⁰ In addition to these two measurements of resilience, information on basic characteristics and treatment details were collected from medical records as of October 1, 2021, to complete the study period.

Resilience measurement methods

The resilience scales used worldwide are the RS-14 (Resilience Scale)¹¹ and the Connor–Davidson Resilience Scale.¹² Both are used in resilience intervention studies of workers.^{13,14} However, the Sukemune–Heiw (S-H) Resilience Test was used for this study. This is a self-administered psychological test consisting of two parts: Part 1 measures resilience capacity and Part 2 measures the relationship between the inner mind and behavior. This scale was used in this study because it was created in Japanese. It is a standardized instrument that has undergone a nationwide large-scale study in

Japan, and its validity has been reported.¹⁵ Furthermore, in the development process, the conflict situation that is a prerequisite for resilience was set as stress in the workplace. For this reason, we adopted it as we deemed it to be suitable for this study, which discusses health issues among workers. In the guidance document for this test, data on healthy adults, both college students and working adults nationwide, are presented.¹⁶ The adult health data showed that women had higher resilience capacity and that only the subfactor of self-efficacy was higher in men.

Evaluation

- A) Resilience capacity (S-H Resilience Test Part 1): 27 questions, including the following examples: (1) "Do you value spending time with your family and close friends?," (2) "Do you try not to rely too much on others?," and (3) "Can you get along with anyone?" For each question, a five-point scale from 5 ("completely agree") to 1 ("completely disagree") was used to score each answer. In this test, resilience capacity consists of three subfactors, namely "social support: support and cooperation from family, friends, colleagues, and others around you," "self-efficacy: how well you can solve problems," and "social skills: affinity and cooperation in dealing with others." The total score for each factor (27–135 points) is defined as resilience capacity. The higher the score, the higher the resilience.
- B) Basic characteristics: gender, age, diagnosis, occupation, process of hospital visit, living with family, employment status, and treatment details were checked. The details are as follows:
- Diagnosis: F code according to ICD-10.
 - Occupation: Classification by Japanese Standard Classification of Occupations codes (12 major categories).
 - Employment status: Three categories: regular employment, irregular employment, and self-employment.
 - Attendance for work: Leave of absence and resignation during the observation period. Leave of absence was confirmed mainly by the contents of the medical questionnaire at the time of the initial medical examination and whether or not a medical certificate was prepared. Resignation was checked based on the content of the

medical examination. The terms "leave of absence" and "resignation" are combined hereafter as "separation from work."

- The process of hospital visit: "referral" with a letter of referral from another hospital (including psychiatric and other departments), "return visit" with an existing medical record, and "other" not falling into the first two categories.
- C) Treatment: Treatment received during the observation period.

If the patient only visited as an outpatient, it was classified as "outpatient treatment only" and if another treatment was added, it was classified as "additional treatment." Table 1 shows a summary of the four types of treatment: inpatient treatment, counseling, re-work programs, and mindfulness. If a treatment was provided once or even for 1 day during the period, it was counted as "additional treatment."

Statistical analysis

A paired *t*-test (two-tailed) was used to compare the resilience score that was measured twice. The same test was conducted for the subfactors. In addition, multiple regression analysis was conducted using the amount of change in resilience as the objective variable to examine the influence of various factors. The amount of change in resilience was defined as the resilience capacity measured the second time minus that measured the first time. Age, gender, and the items for which significant differences were found in the pre and post *t*-tests were entered as explanatory variables (Table 3), and then the stepwise method with increasing variables was used for variable selection. The four variables were "process of hospital visit," "occupation code," "employment status," and "living with family." The significance level for all tests was set at $P = 0.05$. The analysis was performed using the commercially available statistical software JMP Pro16 (JMP statistical Discovery LLC, USA).

Ethical considerations

This study was conducted in compliance with the ethical principles of the Declaration of Helsinki and in accordance with the Ethical

TABLE 1 Contents of additional treatment

Classification	Contents
Admission (to hospital)	Admission to the Stress Care Unit, In addition to medical examinations, various treatment programs such as occupational therapy, mindfulness, counseling, and return-to-work support programs are provide (return-to-work support programs: conduct group discussions and Social Skills Trainings that simulate the workplace). These programs are introduced to patients who need them under the direction of a physician.
Counseling	In addition to counseling by clinical psychologists, counseling by nurses is also provided at the collaborating institutions. The frequency is once a week to once a month.
Mindfulness	The training is conducted once a week. Warm-up, stereotactic response, and today's training are combined. The program is implement in one 4-month course.
Re-work (return to work) program	The program is conducted up to three times a week for 6 h a day. The program combines meetings for returning to work, exercise, rudimentary cognitive behavioral therapy, and various other programs.

Guidelines for Medical Research Involving Human Subjects. All the subjects provided written informed consent. In conducting this study, approval was obtained from the Ethics Committee of Kurume University. In addition, this study was conducted after approval by the Ethics Committee of the collaborating institution.

RESULTS

Basic attributes of the subjects

A total of 123 subjects consented to participate in this study. Of these, 82 had their resilience measured for the second time, while the remaining 41 had discontinued treatment (including termination of treatment or transfer to another hospital) within 3 months. There were three cases in which there were missing answers to the resilience measurement. In two of these cases, only one answer item was missing. Therefore, the missing answer in the first test was supplemented with data from the same item in the second test, and the missing answer in the second test was supplemented with data from the same item in the first test. The remaining case in which more than one answer was missing was excluded from the analysis of the results. Finally, 81 subjects were included in the analysis.

The basic characteristics of the subjects are shown in Table 2. The mean age was 39.5 years (standard deviation 11.7, range 19–63). The majority of both men and women were diagnosed with F32 (depressive episodes). The occupational category with the highest percentage was professional (45.6%). This differs from the national trend in Japan, where clerical occupations have the highest percentage (21.0%) and other occupations do not exceed 20%.¹⁷ Regular employment accounted for 91.3% of the total number of subjects. During the observation period, 20 subjects continued to work, less than one-fourth of the total, and 61 subjects experienced a separation from employment, which consisted of both leaves of absence and resignations. There were 20 subjects who continued to be at work during the observation period, 53 were on leave of absence, 15 started their leave before the first medical examination (according to the previous doctor's certificate), and 38 started their leave of absence during the observation period.

Regarding treatment, 54.3% were in the outpatient-only group and 45.6% were in the additional treatment group. The most common type of treatment was inpatient hospitalization (21 patients), and 20 of these were admitted to the Stress Care Unit.

Changes in resilience, basic attributes, and treatment

The average time from the first visit to the first resilience measurement was 4.1 days while the average observation period was 94.4 days. The results of the first and second resilience capacity measurements are shown in Table 3.

TABLE 2 Basic characteristics of the subjects

Entry	Total	%	Male	Female
Number of persons	81	100.0	38	43
Age (years)	39.5	(11.7)	40.1	39.0
<i>Diagnostic category (ICD-10)</i>				
Bipolar affective disorder (F31)	4	4.9	2	2
Depressive episode (F32)	46	56.7	20	26
Recurrent depressive disorder (F33)	6	7.4	3	3
Persistent affective disorder (F34)	1	1.2	1	0
Other anxiety disorders (F41)	13	16.0	8	5
Obsessive-compulsive disorder (F42)	1	1.2	1	0
Adjustment disorder (F43)	10	12.3	3	7
<i>Route of visit hospital</i>				
Referral	32	39.5	16	16
Return visit	10	12.3	4	6
Other	39	48.1	18	21
<i>Occupation classification (Japan standard classification of occupations code)</i>				
Technical specialist (B)	37	45.6	16	21
Clerical worker (C)	14	17.2	6	8
Other	30	37.0	16	14
<i>Type of employment</i>				
Regular employment	74	91.3	35	39
Nonregular employment	5	6.1	1	4
Self-employed	2	2.4	2	0
<i>Attendance at work</i>				
Continuing to work	20	24.6	7	13
Separation from work	61	75.3	31	30
With leave of absence	53	65.4	28	25
Leave of absence before first medical examination	15	28.3	8	7
Leave of absence after first medical	38	71.6	20	18
Resignation without leave	8	9.8	3	5
<i>Living with family</i>				
Yes	68	83.9	31	37
No	13	16.0	7	6
<i>Treatment</i>				

TABLE 2 (Continued)

Entry	Total	%	Male	Female
Outpatient-only treatment	44	54.3	23	21
Other than outpatient treatment	37	45.6	15	22
Admission to hospital	21	25.9	8	13
Counseling	11	13.5	3	8
Re-work program	4	4.9	3	1
Mindfulness	2	2.4	1	1

* $P < 0.05$ age: average (standard deviation).

** $P < 0.01$.

There were no statistically significant differences in the resilience capacity of the subjects as a whole between the first and the second tests. In terms of subfactors, social support increased significantly the second time. By diagnostic category (broad category of F codes), resilience capacity increased significantly for subjects in the mood disorder group. In terms of attendance at work, resilience capacity increased in the group that left employment, and significant differences were also found in the subfactors of social support and self-efficacy. In the treatment group, there was no significant difference in resilience capacity among the outpatient treatment-only group. However, self-efficacy significantly decreased. In contrast, the additional treatment group showed a significant increase in resilience capacity, as well as significant increases in the subfactors of social support and self-efficacy. In the treatment content item, there was a significant difference in resilience capacity for introduction of inpatient treatment and re-work program subjects.

Multiple regression analysis

The overall change in resilience averaged 2.4 (standard deviation 12.0, maximum 45, minimum -26). The resilience capacity score increase group of +0 or greater was 50, and the decrease group of -1 or less was 31. The explanatory variables were age, gender (male = 1, female = 0), diagnostic area (F3 = 1, F4 = 0), treatment (additional treatment = 1, outpatient only = 0), and attendance at work (separation from work = 1, continuing work = 0). The additional treatment group was independently associated with significant increases in resilience capacity and self-efficacy. No other associations with gender, age, diagnosis, or absence from work were found (Table 4-1). Furthermore, inpatient treatment and re-work programs were significantly associated with an increase in resilience capacity (Table 4-2).

DISCUSSION

Through this prospective longitudinal study, we found that diagnosis category, attendance at work, and treatment content affected resilience capacity. Multiple regression analysis revealed that

resilience was influenced by the presence of "additional treatment," among which "inpatient treatment" and "re-work programs" had the greatest impact on resilience. A variety of programs are offered in "inpatient treatment" and "re-work programs." These programs include mindfulness, cognitive behavioral therapy,¹⁸ and exercise,¹⁹ which have been reported to increase resilience. It is therefore suggested that these specific programs may have enhanced the resilience of the subjects. However, even among these two treatment groups, the programs offered varied from individual to individual. In inpatient treatment, the program is mainly determined by the physician and re-work programs differ depending on the day of the week chosen. Therefore, although we did not evaluate the effectiveness of a specific program in this study, we assumed that the combination of various treatment contents improved the resilience of the subjects. The "other than outpatient treatment" group is not significantly different but had a lower resilience value at the first measurement; there is a bias that more intense treatment was needed. It seems obvious that intensive treatment would have a significant impact on resilience. However, so various treatment intervention was necessary for resilience to improve. This can be seen as supporting the attendance problems of workers with mental health disorders. We believe the significance of this study lies in the fact that this trend has been demonstrated once again through comprehensive verification.

Inpatient treatment takes place while subjects are receiving 24-h nursing care. The Stress Care Unit aims to "remove patients from the treatment environment at home (family), where they are prone to loneliness and negative thoughts, and to remove anxiety and provide a sense of security through 24-h support."²⁰ It has already been reported that a sense of trust in physicians and medical institutions may enhance resilience for patients suffering from illness and experiencing vulnerability.²¹ It has been pointed out that the mechanisms of companionship, emotional support, validation, and instrumental support are necessary for caregivers to interact in the process of recovery from mental health disorders.²² In this study, the effect of inpatient treatment on improving social support was observed and it can be inferred that the effect reflects these mechanisms.

In addition, the Stress Care Unit mainly targets mood and anxiety disorders. The aim of the Stress Care Unit is to decrease anxiety by facilitating interaction among homogeneous patients to help them develop a sense of recovery and a picture of healing.¹⁹ In re-work programs, users are limited to workers who are on leave and so the homogeneity of users is higher. Regarding the impact of a highly homogeneous group on self-efficacy, it has been mentioned that the program works effectively in self-recovery for patients with mental health disorders who are hurting and feeling lonely.²³ Previous studies have also reported the effectiveness of group therapy settings, as well as program effectiveness, in the therapeutic effects of re-work programs.²⁴ It is therefore possible that the improvement in self-efficacy observed in the "inpatient treatment" and "re-work program" groups in the present study resulted in the implementation of the aforementioned programs in a highly homogeneous group.

TABLE 3 The changes in resilience by the basic characteristics

	Resilience capacity			Social support			Self-efficacy			Sociability		
	First	Second	P	First	Second	P	First	Second	P	First	Second	P
Total	93.4	95.8	0.071	43.8	45.5	0.033*	33.0	33.2	0.693	16.5	17.0	0.162
<i>Gender</i>												
Male	90.3	91.9	0.349	42.1	43.4	0.215	32.3	32.5	0.770	15.9	15.9	0.952
Female	96.1	99.3	0.125	45.4	47.4	0.086	33.6	33.8	0.790	17.0	18.0	0.102
<i>Diagnostic category</i>												
Mood disorder (F3)	91.5	95.6	0.020*	42.8	45.3	0.015*	32.0	32.8	0.172	16.7	17.4	0.132
Anxiety disorder (F4)	97.9	96.5	0.409	46.3	46.1	0.886	35.5	34.1	0.178	16.1	16.1	0.939
<i>Attendance at work</i>												
Continuing to work	93.2	91.7	0.404	43.4	43.6	0.907	33.5	32.0	0.092	16.2	16.0	0.677
Separation from work	93.5	97.2	0.026	44.0	46.2	0.023*	32.8	33.6	0.2229	16.6	17.3	0.107
<i>Treatment</i>												
Outpatient-only treatment	94.7	93.4	0.459	44.8	44.9	0.901	33.2	31.8	0.020*	16.5	16.6	0.851
Other than outpatient treatment	91.9	98.7	0.001**	42.7	46.3	0.002**	32.7	34.8	0.012*	16.4	17.5	0.128
Admission to hospital	91.6	101.0	0.003**	42.9	47.6	0.012*	32.3	35.0	0.018*	16.3	18.2	0.014*
Counseling	90.5	91.7	0.679	40.7	42.7	0.182	32.4	33.0	0.699	17.3	16.0	0.392
Re-work program	95.7	107.5	0.079	46.7	50.7	0.040*	32.7	38.2	0.089	16.2	18.5	0.266
Mindfulness	100.5	97.0	0.257	45.5	43.0	0.125	39.5	36.0	0.394	15.5	18.0	0.344

*P < 0.05.

**P < 0.01.

Another important result of this study is that resilience tended to decrease in those receiving outpatient treatment only. Since resilience and depression are inversely correlated,²⁵ it is likely that improved resilience is also associated with improved symptoms. The correlation coefficient between resilience ability and the Zung Self-rating Depression Scale (SDS) used in a study test was -0.497 .¹⁶ Although the subjects in this study continued treatment, the effect of symptom improvement was not reflected in the outcome of resilience improvement. Since factors other than resilience were not measured, a clear analysis of this is not possible. However, it has been reported that certain depressed patients are refractory and resistant to treatment,^{26,27} and the presence of subjects whose symptoms did not actually improve may have influenced the results. It is presumed that psychosocial conflicts and anxiety about adjustment persist only with symptom improvement by pharmacotherapy. Although the importance of psychosocial approaches when pharmacotherapy is not successful has already been pointed out,²⁷ the presence of various treatment options is desirable from the viewpoint of resilience.

The relationship between leaving work and resilience has been under-reported. If resilience aids adjustment, it is presumed that the higher the resilience, the more likely the patient is to continue working. In fact, there are reports that the higher the resilience after receiving work-focused treatment, the lower the risk of sick leave.²⁸ However, in the present study, there was no difference in initial

resilience capacity and the course of employment (continued work group vs. leaving work group). It can be assumed that many of the subjects are burdened by their work, therefore we cannot categorize leaving work as a maladaptive behavior, and avoidance behavior from larger problems can be considered as an adaptive behavior. Regarding the relationship between the course of employment and resilience, resilience tended to decrease with continued employment. Although many patients reported anxiety on taking a leave of absence, in fact continuing to work tended to decrease resilience capacity. In contrast, taking a leave of absence tended to increase resilience, as rest is said to be effective in depression. It is believed that once a person avoids a burden, it is easier to adjust resources, including one's physical condition. The results of this study showed no statistically significant difference between a leave of absence and a change in resilience. It is possible that the parallel with a therapeutic approach rather than a leave of absence alone was not sufficient to improve resilience in the 3-month period.

Finally, regarding the resilience of the subjects as a whole, there was no significant difference in resilience ability, but social support was significantly improved. It has already been mentioned that loneliness and social support are associated with health.²⁹ This is the result of appropriate medical care provided to subjects who need an approach to resilience, and this study demonstrates the potential of psychiatric treatment to increase resilience, therefore early psychiatric consultation may help subsequent adjustment and should be

**TABLE 4-1** Multiple regression analysis on changes in resilience (basic characteristics)

Variable	Resilience capacity			Social support			Self-efficacy			Sociability			
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value	
Gender (male)	0.6823	-1.897	3.262	0.556	-1.243	1.904	0.676	-1.138	0.886	0.804	-0.276	1.231	0.210
Age	0.091	-0.132	0.315	0.416	-0.032	0.240	0.133	-0.102	0.072	0.736	-0.276	1.231	0.210
Diagnostic category (F3)	1.997	-0.828	4.822	0.163	-0.702	2.744	0.241	-0.375	1.841	0.191	-0.582	1.068	0.559
Treatment (other)	2.972	0.236	5.707	0.033*	-0.586	2.750	0.200	0.511	2.657	0.004**	-0.493	1.105	0.448
Separation from work (being)	2.005	-1.007	5.018	0.188	-1.118	2.556	0.438	-0.375	1.841	0.191	-0.396	1.364	0.276

Abbreviation: CI, confidence interval.

TABLE 4-2 Multiple regression analysis on changes in resilience (treatment details)

Variable ^a	Resilience capacity			Social support			Self-efficacy			Sociability						
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value				
Admission to hospital	10.61	4.67	16.55	0.0007*	4.523	0.833	8.213	0.01*	4.226	1.934	6.519	0.0004**	1.865	0.203	3.528	0.02*
Counseling	2.27	-5.67	10.22	0.57	1.601	-3.335	6.537	0.52	2.072	-0.993	5.138	0.18	-1.397	-3.622	0.826	0.21
Re-work program	12.98	1.269	24.7	0.03*	3.856	-3.418	11.132	0.29	6.965	2.446	11.484	0.0030**	2.163	-1.114	5.441	0.192
Mindfulness	-3.4	-19.78	12.97	0.68	-3.443	13.62	6.727	0.50	-3.071	-9.388	3.246	0.33	3.112	-1.47	7.695	0.18

Abbreviation: CI, confidence interval.

^a1 if each treatment was introduced, 0 if not.

*P < 0.05.; **P < 0.01.



recommended. However, inpatient treatment and re-work programs, which were shown to affect resilience in the present study, require leaving work and incurring medical expenses. There are cases in which the patient and family cannot accept the need for special treatment. In addition, it is estimated that the rate of taking leave is particularly low in Japan. Promoting the establishment of a support system that enables people to receive necessary treatment through a social understanding of the importance of rest and countering stigma is an important public health issue.

Limitations of the study and future prospects

This study was designed to include new patients from collaborating institutions within a fixed study period and was not conducted based on a rigorous sample size calculation, therefore it may not accurately reflect some statistical treatments. In addition, this study only measured resilience, therefore it does not reflect the effects of symptoms and other factors. Furthermore, to be comprehensive, the study included patients presenting with different symptoms, namely, F3 and F4 regions. Future research should include larger-scale and longer-term observations and relationships with outcomes and symptoms. Nevertheless, this study is significant for the literature in the field because it quantitatively measured resilience, which is important for serious worker health issues, and specifically discussed the trends in resilience. Thus, there is potential for its use in devising appropriate interventions in clinical situations.

AUTHOR CONTRIBUTIONS

K.S. substantially contributed to the study conceptualization and interpretation of the results and wrote the original draft. T.I. supervised the whole process. M.M., L.G., and Y.T. were involved in the design of the study, recruited participants, and preprocessed the data. All authors critically reviewed and revised the manuscript draft and approved the final version for submission.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

ETHICS APPROVAL STATEMENT

This study was approved by the Kurume University Ethics Committee on Medicine (Approval No. 20094).

PATIENT CONSENT STATEMENT

Written informed consent was obtained.

CLINICAL TRIAL REGISTRATION

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REFERENCES

1. Ministry of Health, Labour and Welfare. Occupational safety and health survey (Fact-Finding Survey); 2020. Available from: <https://www.mhlw.go.jp/toukei/list/list46-50.html>
2. Office of Suicide Prevention, Ministry of Health, Labour and Welfare, Community Safety Planning Division, Community Safety Bureau, National Police Agency. Suicides in 2021; 2021. Available from: <https://www.npa.go.jp/safetylife/seianki/jisatsu/RO4/R3jisatsunojoukyou.pdf>
3. Sado M. [The economic burden of depression—study for cost of depression]. *Seishin shinkeigaku zasshi = Psychiatria et neurologia Japonica*. 2014;116:107–15.
4. The American Psychological Association. Resilience. Available from: <https://www.apa.org/topics/resilience>
5. Masten AS, Best KM, Garmezy N. Resilience and development: contributions from the study of children who overcome adversity. *Dev Psychopathol*. 1990;2:425–44.
6. Babić R, Babić M, Rastović P, Ćurlin M, Šimić J, Mandić K, et al. Resilience in health and illness. *Psychiatr Danubina*. 2020;32:226–32.
7. Martin BK. The long-term treatment of depression. *J Clin Psychiatry*. 1999;60(17):41–5.
8. Waugh CE, Koster EHW. A resilience framework for promoting stable remission from depression. *Clin Psychol Rev*. 2015;41:49–60.
9. Liu JJW, Ein N, Gervasio J, Battaion M, Reed M, Vickers K. Comprehensive meta-analysis of resilience interventions. *Clin Psychol Rev*. 2020;82:101919. <https://doi.org/10.1016/j.cpr.2020.101919>
10. National Hospital Organization Clinical Indicator. Clinical Evaluation. Index 2009. Available from: <https://nho.hosp.go.jp/files/000007628.pdf>
11. Wagnild GM, Young HM. Development and psychometric evaluation of the Resilience Scale. *J Nurs Meas*. 1993;1:165–78.
12. CD-RISC The Connor-Davidson Resilience Scale. Available from: <http://www.connordavidson-resiliencescale.com/index.php>
13. Pipe TB, Buchda VL, Launder S, Hudak B, Hulvey L, Karns KE, et al. Building personal and professional resources of resilience and agility in the healthcare workplace. *Stress Health*. 2011;28:11–22.
14. Carr W, Bradley D, Ogle AD, Eonta SE, Pyle BL, Santiago P. Resilience training in a population of deployed personnel. *Mil Psychol*. 2013;25:148–55.
15. Sato T, Sukemune H. A trial for standardization of the resilience scale: development and reliability/validity check of the S-H resilience scale (part 1) (in Japanese). *Kango Kenkyu*. 2009;42:45–52.
16. Sukemune H S-H resilience test inspection guide (in Japanese). Takei Kiki Kogyo Co.



17. Statistics Bureau of Japan. Search statistics surveys and data. Available from: <https://www.stat.go.jp/english/index.html>
18. Joyce S, Shand F, Tighe J, Laurent SJ, Bryant RA, Harvey SB. Road to resilience: a systematic review and meta-analysis of resilience training programmes and interventions. *BMJ Open*. 2018;8:e017858.
19. Silverman MN, Deuster PA. Biological mechanisms underlying the role of physical fitness in health and resilience. *Interface Focus*. 2014;4:20140040. <https://doi.org/10.1098/rsfs.2014.0040>
20. Tokunaga Y. [Inpatient treatment for depression] Utsu jotai ni taisuru nyuin tiryo (in Japanese). *Chiryō*. 2011;93(12):2431–35.
21. Hartley S, Raphael J, Lovell K, Berry K. Effective nurse–patient relationships in mental health care: a systematic review of interventions to improve the therapeutic alliance. *Int J Nurs Stud*. 2020;102:103490.
22. Lauzier-Jobin F, Houle J. Caregiver support in mental health recovery: a critical realist qualitative research. *Qual Health Res*. 2021;31:2440–53.
23. Kitanishi K. Commitment to work and group—a Morita Therapy perspective. *J.Jpn. Group. Psychother*. 2013;29(1):9–16.
24. Arima H, Akiyama T, de Moura PA, Bernick P, Sakai Y, Ozaki Y, et al. Resilience building for mood disorders: theoretical introduction and the achievements of the Re-Work program in Japan. *Asian J Psychiatr*. 2021;58:102580. <https://doi.org/10.1016/j.ajp.2021.102580>
25. Shirotani K, Nakano A, Saito T, Niwa S. The role of resilience in recovery from depression as examined among patients attending to a psychiatric outpatient clinic. *Jap. J. Clin. Psychiatry*. 2013;42:899–907.
26. Fava M, Davidson KG. Definition and epidemiology of treatment-resistant depression. *Psychiatr Clin North Am*. 1996;19:179–200.
27. Pandarakalam JP. Challenges of treatment-resistant depression. *Psychiatr Danubina*. 2018;30:273–84.
28. Sandin K, Anyan F, Osnes K, Gunnarsdatter Hole Gjengedal R, Risberg Leversen JS, Endresen Reme S, et al. Sick leave and return to work for patients with anxiety and depression: a longitudinal study of trajectories before, during and after work-focused treatment. *BMJ Open*. 2021;11:e046336. <https://doi.org/10.1136/bmjopen-2020-046336>
29. Wang J, Mann F, Lloyd-Evans B, Ma R, Johnson S. Associations between loneliness and perceived social support and outcomes of mental health problems: a systematic review. *BMC Psychiatry*. 2018;18:156. <https://doi.org/10.1186/s12888-018-1736-5>

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