

The Effects of Resilience and Related Factors on Burnout in Clinical Nurses, Kagoshima, Japan

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ABSTRACT

Background Burnout, due to extreme mental and physical fatigue, and emotional exhaustion, leads to decreased nursing quality and turnover. However, not all nurses are observed as burnouts in the same work environment, and resilience and related factors may have effects on the development of burnouts. Therefore, we conducted a cross-sectional study to examine the effects of resilience and related factors on the burnout in clinical nurses, Kagoshima, Japan.

Methods Data for this cross-sectional study involving nurses ($n = 98$) was collected using the following questionnaire surveys: the Bidimensional Resilience Scale, The Workplace Social Support Scale, and the Japanese version of the Pine's Burnout Scale. Using burnout as a dependent variable, analyses were conducted using one-way analysis of variance and multiple regression analysis after adjusted for related factors.

Results The prevalence of burnouts was 19.6% on the mainland and 36.1% on remote island. Innate resilience, acquired resilience, workplace social support, and burnout showed no significant difference between nurses on the mainland and remote island. In the mainland participants, innate resilience ($\beta = -0.492$, $P < 0.001$) and acquired resilience ($\beta = -0.325$, $P = 0.007$) showed a negative association with burnout, and similar associations were observed innate resilience ($\beta = -0.520$, $P = 0.004$) and acquired resilience ($\beta = -0.336$, $P = 0.057$) in the remote island participants. For all participants, innate resilience ($\beta = -0.443$, $P = 0.001$) and workplace social support ($\beta = -0.204$, $P = 0.031$) showed a negative association with burnout, and turnover intention was positively associated ($\beta = 0.025$, $P = 0.021$).

Conclusion A negative association between burnout and innate resilience factors was observed in the mainland and remote island. Further evaluation of innate resilience is necessary for burnout prevention in clinical nurses.

Key words burnout; mental health; rural; social support; workplace

Workplace mental health is a growing source of global concern, prompting the World Health Organization to include burnout in its classification of disorders first in International Statistical Classification of Disease and Related Health Problems, Tenth Revision (ICD-10), then in ICD-11 in 2019.¹ The term, “burnout” was first coined by Freudenberg.² It is now regarded as a “modern disease” and frequently appears in the literature concerning “people-work,” professions focused on assisting citizens. Burnout is defined by Maslach and Jackson (1981) as a syndrome characterized by extreme physical exhaustion and emotional depletion owing to psychological demands imposed on serving professionals for prolonged periods in the process of assisting people.³ Those suffering from burnout develop depreciation or antipathy toward their work and lose compassion for people under their service. Initially, burnout studies addressed service-focused industries such as healthcare⁴ or education⁵ but the range is now more diverse.⁶

Burnout imposes detrimental effects on individuals as well as on their workplace. It is known to have a positive relationship with turnover intention⁷ and reduced productivity,⁸ and a negative effect on patient satisfaction,⁹ quality of nursing care,¹⁰ and department tenure.¹¹ The prevalence of burnout in nurses is reported to be 32.9%–54.2% in Europe and America¹² and 23.2%–46.5% in Asia^{13, 14} and its effects are detrimental to both patients and nurses themselves.^{9, 10} While nurse burnout is reported worldwide, some groups of nurses remain unaffected despite sharing the same environment. These groups that seem to be remarkably impervious to adversities in the hospital work environment have caught the attention of scholars and practitioners and led to the introduction of the concept of “resilience”.¹⁵ Since then, resilience, the ability to overcome and adapt to difficult,

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Abbreviation: BRS, Bidimensional Resilience Scale

unfamiliar, or threatening situations without psychological damage and its relationship to burnout has been in the spotlight.

Cross-sectional studies that examine the relationship between nurse resilience and burnout have consistently found a negative relationship.¹⁶ Naturally, a question remains as to whether resilience is an inherently ingrained disposition or an ability acquired through training or environment. This enigma has not been clarified since studies have yielded inconsistent results: innate,¹⁷ acquired,¹⁸ or both.¹⁹ Besides resilience, another critical factor reported to protect nurses from the detrimental effects of burnout is social support.^{20, 21} Although the demands imposed upon a small number of nurses working on remote island is of concern, studies examining the effect of resilience and their social support with regard to burnout are nonexistent. Challenges surrounding remote island nurses include insufficient opportunities for training and development,²² aging patient population,²³ and low salary.²⁴ Nurses working in remote areas may have problems that make it more difficult for them to continue working than in urban areas, and a special kind of indigenous resilience or social support may exist in remote places, although these factors have not been fully elucidated. Systematic research involving a two-dimensional assessment of the relationship between resilience, social support, and burnout of both mainland and remote island nurses should assist in improving the overall quality of healthcare. Healthcare managers will be able to make informed decisions about selection, staffing, and consider an effective program of intervention to enhance the mental health of their nurses. In addition, exploring related factors common to remote island and the mainland is also useful in developing programs to prevent burnout. The purpose of this cross-sectional study was to examine the effects of resilience and related factors on burnout among nurses in different hospitals of mainland and remote island of Kagoshima, Japan.

MATERIALS AND METHODS

Participants and data collection

This cross-sectional study was conducted in the period between April 1 and May 1, 2020. Participants included nurses working in two hospitals: an urban general hospital (tertiary medical facility) on mainland Japan with more than 500 beds and a general hospital (secondary medical facility) on a remote island of Japan with 300–399 beds. This remote island hospital is a core hospital in the surrounding area, and is a facility equivalent to the mainland to some extent even in remote island. Helicopters are used for emergency transfers to the

mainland, and there are hospitals of the same size in other remote island areas of Japan. Participants were recruited through the director of the nursing service department at each hospital in writing and in person. Participants received oral explanation from researchers the following documents: study description, informed consent form, study withdrawal form, research proposal, survey questionnaires, and a return envelope. The self-response questionnaire was completed, signed, and returned in a sealed envelope to the principal researcher. Participants were male or female full-time clinical nurses with 10 years or less of tenure, excluding less than 1 year. Of the 152 (mainland, 82; remote island, 70) questionnaires distributed, 99 were returned (response rate 65.1%). We eliminated one participant whose tenure was one year or less, and the missing values were excluded from the analysis. The final study included 98 nurses from two hospitals (mainland hospital: 7 men; 51 women; 1 missing value; remote hospital: 11 men, 28 women).

Survey items

Participant characteristics

Table 1 illustrates the following information collected for each participant: gender, age, nursing tenure, education attainment, and current work situation. Participants selected an appropriate item from the following: gender (2 choices), male or female; age (5 choices), teen, twenties, thirties, forties, or other; nursing tenure (10 choices), 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 y; education attainment (6 choices), nursing professional school (training school), vocational school, junior college, college or university, graduate school, or other.

The following information about participants' work situation was collected: actual working hours per day, actual working hours during the night shift, hours spent resting per day, hours spent resting per night shift, the number of night shifts, presence of support from work peers, presence of support from older peers, presence of support from family, and whether they had turnover intention. Regarding the work situation, participants selected the most appropriate choice from the following: actual working hours per day (4 choices), < 8, ≥ 8 to < 9, ≥ 9 to < 10, or ≥ 10 h/d; actual working hours during the night shift (4 choices), < 8, ≥ 8 to < 12, ≥ 12 to < 16, ≥ 16 h; hours spent resting per day (4 choices), < 0.5, ≥ 0.5 to < 1, ≥ 1 to < 1.5, ≥ 1.5 h/d; hours spent resting per night shift (4 choices), < 1, ≥ 1 to < 2, ≥ 2 to < 3, ≥ 3 h/d; the number of night shifts (4 choices), none per month, 1–3, 4–6, > 7 times per month. Finally, participants selected either yes or no (2 choices) for the following items: presence of support from work peers, the presence of support

Table 1. Baseline characteristics

	Overall		Mainland		Remote island		<i>P</i> †
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Gender, Female	79	81.4	51	87.9	28	71.8	0.045*
Age							
20–29 years	63	65.0	51	87.9	12	30.8	
30–39 years	29	29.9	6	10.3	23	59.0	< 0.001***
40–years	5	5.2	1	1.7	4	10.3	
Nursing tenure							
1–4 years	37	37.8	29	49.2	8	20.5	
5–6 years	24	24.5	16	27.1	8	20.5	0.001**
7–10 years	37	37.8	14	23.7	23	59.0	
Education attainment							
Non-college graduate	37	40.2	5	9.3	32	84.2	
Undergraduate or graduate degree	55	59.8	49	90.7	6	15.8	< 0.001***
Actual working hours per day							
< 9 hours/day	42	42.9	22	37.3	20	51.3	
≥ 9 to < 10 hours/day	39	39.8	27	45.8	12	30.8	0.299
≥ 10 hours/day	17	17.4	10	17.0	7	18.0	
Actual working hours during night shift							
< 8 hours/day	5	6.0	0	0	5	18.5	
≥ 8 to < 12 hours/day	22	26.5	0	0	22	81.5	< 0.001***
≥ 12 hours/day	56	67.5	56	100	0	0	
Hours spent resting per day							
< 0.5 hours/day	8	8.2	2	3.4	6	15.4	
≥ 0.5 to < 1 hours/day	87	88.8	54	91.5	33	84.6	0.044*
≥ 1 hours/day	3	3.1	3	5.1	0	0	
Hours spent resting per night shift							
< 1 hours/day	24	28.9	0	0	24	88.9	
≥ 1 to < 2 hours/day	26	31.3	23	41.1	3	11.1	< 0.001***
≥ 2 hours/day	33	39.8	33	58.9	0	0	
The number of night shifts							
0 times/month	12	12.5	2	3.4	10	27.0	
1–6 times/month	57	59.4	52	88.1	5	13.5	< 0.001***
7–15 times/month	27	28.1	5	8.5	22	59.5	
Support from work peers, yes	73	74.5	46	78.0	27	69.2	0.332
Support from older peers, yes	94	95.9	56	94.9	38	97.4	0.537
Support from family, yes	78	79.6	44	74.6	34	87.2	0.130
Turnover intention, yes	42	42.9	24	40.7	18	46.2	0.592
Burnout status, burnout	24	26.1	11	19.6	13	36.1	0.079
				<i>n</i> / Mean (SD)			
Burnout score	92	3.43(1.01)	56	3.92(0.84)	36	3.65(1.21)	0.095‡

P* < 0.05. *P* < 0.01. ****P* < 0.001. † χ^2 -test. ‡*t*-test.

from older peers, presence of support from family, and whether they had turnover intention.

Two-dimensional scale of resilience

We employed the Bidimensional Resilience Scale (BRS), a two-dimensional scale of resilience developed by Hirano (2010) based on the Cloninger theory with Temperament Character Inventory (TCI) as the external criterion.^{19, 25} BRS allows measurement of disposition-oriented innate resilience as well as acquired resilience that is more influenced by training and environment; reliability and validity of BRS have been previously confirmed.^{19, 26} In this study, BRS was used for measurement because both innate resilience and required resilience can be evaluated respectively. Innate resilience is comprised of four factors: optimism, control, sociability, and vitality, and acquired resilience is comprised of three factors: attempting to solve a problem, self-understanding, and understanding others. The questionnaire consisted of 21 items; participants were asked to indicate response on a 5-point Likert scale ranging from 1 (“not at all in line with my situation”) to 5 (“completely in line with my situation”). Higher BRS indicated greater resilience (minimum: 21; maximum: 105). The target population was 13 years or older, the reliability coefficient for the entire scale was 0.90 while the reliability coefficient for subscales were as follows: innate resilience, 0.83; acquired resilience, 0.72.²⁷ Researchers are free to use BRS providing that they give credit to Hirano (2010) by clearly citing the source.¹⁹

Workplace social support

Nurse workplace social support was assessed using the Workplace Social Support Scale²⁸ which comprises 15 items built on the following scales: Social Support Questionnaire,²⁹ Interpersonal Support Evaluation List³⁰ and Inventory of Socially Supportive Behaviors³¹ in addition to the social support items developed by Abdel-Halim³² and Wells.³³ Participants chose from a 5-point Likert scale ranging from “strongly disagree” to “strongly agree.” The greater the score on the Workplace Social Support Scale, the more frequent the support (minimum, 15; maximum 75).

One of the largest populations on which the Workplace Social Support Scale has been used is young workers; therefore, this scale considers workplace social support from both superiors, older peers, and peers of similar generations. The reliability coefficient for the specific support was as follows: superiors, 0.94; older peers, 0.95; and peers of the similar generations, 0.93.²⁸ A pilot study revealed a negative correlation

between workplace social support from older peers and burnout¹⁴; thus, we collected information concerning workplace social support from older peers. The reliability and validity of this scale have been previously confirmed, and we received permission for its use from Komaki and Tanaka (1993).²⁸

The Japanese version of the Pine's Burnout Scale

Burnout was measured using the Japanese version of the Pine's Burnout Scale. This version was developed by Inaoka (1988) based on a translation of the Pine's Scale and comprises 21 items; participants indicated their most appropriate response in a 7-point Likert scale ranging from 1 (“not at all”) to 7 (“always”).³⁴ In a previous study of nurses, the reliability coefficient for the Japanese version of the Pine's Burnout Scale was 0.89.³⁵ The final burnout score was derived by subtracting 32 from the sum of the scores obtained in items 3, 6, 19, and 20 and adding that number to the total score and dividing it by 21. The basic interpretation of the scores is determined by the following criteria: < 2.9 points, psychologically stable and healthy; 3.0–3.9 points, warning signs of burnout are noticeable; 4.0–4.9 points, suffering from burnout; > 5.0 points, in a state of clinical depression.³⁴ Here, we considered participants who fell in the range of ≤ 3.9 to be free of burnout while those ≥ 4.0 were deemed to suffer from burnout. The Pine's Burnout Scale has been applied to workers in a wide range of industries.^{35, 36} We received permission from Inaoka (1988) to use the Japanese version of the Pine's Burnout Scale.³⁴

Statistical analyses

Participants were categorized based on age groups (twenties, thirties, forties or over), nursing tenure (1–4, 5–6, 7–10y), education attainment (non-college graduate vs. undergraduate or graduate degree), actual working hours per day (< 9, ≥ 9 to < 10, ≥ 10 h/d), actual working hours during the night shift (< 8, ≥ 8 to < 12, ≥ 12 h/d), hours spent resting (< 0.5, ≥ 0.5 to < 1, ≥ 1 h/d), time spent resting per night shift (< 1, ≥ 1 to < 2, ≥ 2 h/d), and the number of night shifts per month (none, 1–6, and 7–15 times per month). Categorical variable comparisons between the mainland and the remote island were made with the χ^2 test; while t-test and one-way analysis of variance (ANOVA) were used for comparisons of continuous variables, and ANOVA was used after adjusting for age (twenties or over 30) and gender (male or female). Regarding the association between burnout and the variables in Table 1 on the mainland and remote islands, continuous variables were tested for correlation, and ANOVA was also used for

comparison of categorical variables, adjusted for gender and age. The association between burnout and innate resilience and acquired resilience was estimated by multiple regression analysis adjusted by age and gender. The stepwise method (P value of exclusion criteria is 0.1, inclusion criteria is less than 0.05) was used to select the factors related to burnout. Innate resilience, required resilience, gender and age were used for forced entry of variables in the model, and the stepwise method was used for the participants' work situation with a significant difference in Table 1, turnover intention in Table 3, and workplace social support in Table 4. We conducted multiple regression analysis with burnout as the dependent variable, resilience and variables selected by stepwise as independent variables, and adjusted for gender and age, region (mainland or remote island).

Statistical analysis was performed using the Stata software version 15 (Stata Corp, College Station, TX). The threshold of statistical significance was $P < 0.05$.

Ethical considerations

The information the participants provided was kept confidential pursuant to the Declaration of Helsinki, and participation was finalized after receiving signed informed consent. This study was approved by the Clinical Research Ethics Committee of Kagoshima University Medical School (Authorization No.190158) and the participating hospitals.

RESULTS

Background of participants

Burnout was identified in 26.1% of all participants,

19.6% of mainland nurses, and 36.1% of remote island nurses. Significant differences in the presence of burnout rates were not identified between the mainland and remote island, and in addition, no difference in burnout scores was identified (Table 1). Compared to remote island nurses, mainland nurses were significantly more likely to be women, in their twenties, and had an undergraduate or higher degree. Furthermore, a significantly higher proportion of participants fell under the following categories: night shift working hours, > 12 h/d; resting hours, 0.5–1 h; rest time per night shift, > 2 h; the number of night shifts, 1 to 6. Compared to mainland nurses, remote island nurses demonstrated significantly longer nursing tenures of 7–10 y. No significant differences were observed between the mainland and remote island nurses in terms of working hours per day, presence of support from work peers, older peers, or family, and turnover intention.

Comparisons of BRS, workplace social support, and burnout based on region

The reliability coefficient was 0.88 for BRS, and innate resilience was 0.84 and required resilience was 0.77 at BRS subscale. In Workplace social support, the reliability coefficient was 0.93 and the Japanese version of the Pine's Burnout Scale was 0.92.

Mainland nurses were similar to remote island nurses with regard to the following: innate resilience measured with BRS, acquired resilience, optimism, control, sociability, vitality, attempting to solve a problem, self-understanding, understanding others, and workplace social support (Table 2). There was no

Table 2. Comparisons of BRS, workplace social support, and burnout per region

	Overall			Mainland		Remote island		P^\dagger
	n	Mean (SD)		n	Mean (SD)	n	Mean (SD)	
BRS	95	71.62 (10.45)		58	71.21 (9.82)	37	72.27 (11.48)	0.829
Innate resilience	96	39.9 (6.73)		58	39.33 (6.44)	38	40.76 (7.16)	0.832
Optimism	98	10.1 (2.53)		59	10.12 (2.65)	39	10.08 (2.37)	0.344
Control	98	10.29 (2.08)		59	10.17 (1.97)	39	10.46 (2.25)	0.237
Sociability	96	9.11 (2.51)		58	8.78 (2.31)	38	9.63 (2.75)	0.529
Vitality	98	10.49 (2.23)		59	10.37 (2.25)	39	10.67 (2.22)	0.410
Acquired resilience	97	31.8 (4.60)		59	31.95 (4.24)	38	31.58 (5.16)	0.237
Attempting to solve a problem	97	10.11 (2.19)		59	10.15 (2.20)	38	10.05 (2.22)	0.469
Self-understanding	98	10.78 (1.90)		59	10.78 (1.89)	39	10.77 (1.93)	0.270
Understanding others	98	10.89 (1.83)		59	11.02 (1.57)	39	10.69 (2.17)	0.357
Burnout	92	3.43 (1.01)		56	3.29 (0.84)	36	3.65 (1.21)	0.051
Workplace social support	98	56.94 (10.45)		59	57.66 (10.69)	39	55.85 (10.12)	0.336

† ANOVA adjusted for gender and age.

Table 3. Association of burnout with related factors

	Mainland			<i>P</i> †	Remote island			<i>P</i> †
	<i>n</i>	Mean (SD)			<i>n</i>	Mean (SD)		
Gender								
Men	6	3.43	0.68	0.80	9	2.95	0.94	0.10
Female	49	3.28	0.87		27	3.89	1.22	
Age								
20–29 years	48	3.24	0.82	0.80	10	3.44	1.15	0.10
30+ years	7	3.47	0.97		26	3.73	1.25	
Nursing tenure								
1–4 years	27	3.29	0.90	0.52	8	3.90	0.88	0.29
5–6 years	15	3.25	0.66		7	2.96	1.20	
7–10 years	14	3.32	0.95		21	3.78	1.29	
Education attainment								
Non-college graduate	5	2.90	0.92	0.18	29	3.68	1.31	0.21
Undergraduate or graduate degree	46	3.33	0.85		6	3.52	0.79	
Actual working hours per day								
< 9 hours/day	20	3.07	0.92	0.56	18	3.59	1.45	0.31
≥ 9 to < 10 hours/day	26	3.34	0.87		11	3.69	0.81	
≥ 10 hours/day	10	3.58	0.44		7	3.74	1.23	
Actual working hours during night shift								
< 8 hours/day	0	–	–	0.86	5	3.30	2.51	0.13
≥ 8 to < 12 hours/day	0	–	–		19	3.70	0.94	
≥ 12 hours/day	53	3.28	0.86		0	–	–	
Hours spent resting per day								
< 0.5 hours/day	2	3.02	0.98	0.91	6	4.09	1.38	0.19
≥ 0.5 to < 1 hours/day	51	3.28	0.85		30	3.56	1.19	
≥ 1 hours/day	3	3.60	0.88		0	–	–	
Hours spent resting per night shift								
< 1 hours/day	0	–	–	0.95	22	3.63	1.23	0.18
≥ 1 to < 2 hours/day	23	3.35	0.84		2	3.45	3.13	
≥ 2 hours/day	30	3.23	0.89		0	–	–	
The number of night shifts								
0 times/month	2	3.40	0.30	0.92	10	3.77	1.00	0.26
1–6 times/month	49	3.26	0.80		4	3.93	2.48	
7–15 times/month	5	3.49	1.37		20	3.55	1.09	
Support from work peers, yes								
Support from work peers, no	43	3.23	0.79	0.75	24	3.57	1.10	0.18
Support from older peers, yes	13	3.49	1.01		12	3.81	1.46	
Support from older peers, no	53	3.21	0.77	0.02*	35	3.66	1.23	0.19
Support from family, yes	3	4.68	0.95		1	3.38	–	
Support from family, no	41	3.17	0.79	0.19	32	3.59	1.24	0.13
Turnover intention, yes	15	3.63	0.90		4	4.11	0.99	
Turnover intention, no	23	3.55	0.83	0.16	17	4.27	0.89	0.006**
	33	3.11	0.82		19	3.10	1.21	

P* < 0.05. *P* < 0.01. ****P* < 0.001. †ANOVA adjusted for gender and age.

Table 4. Association of burnout with BRS and workplace social support

	Mainland					Remote island				
	<i>n</i>	β	95% CI		<i>P</i> †	<i>n</i>	β †	95% CI		<i>P</i> †
BRS	53	-0.446	-0.667	-0.225	<0.001***	35	-0.471	-0.809	-0.133	0.008**
Innate resilience	53	-0.492	-0.713	0.271	<0.001***	35	-0.520	-0.861	-0.179	0.004**
Optimism	54	-0.270	-0.502	-0.038	0.023*	36	-0.383	-0.836	0.071	0.096
Control	54	-0.259	-0.494	-0.024	0.031*	36	-0.591	-0.914	-0.268	0.001**
Sociability	53	-0.519	-0.748	-0.291	<0.001***	35	-0.034	-0.417	0.349	0.858
Vitality	54	-0.318	-0.555	-0.081	0.010*	36	-0.543	-0.879	-0.206	0.002**
Acquired resilience	54	-0.325	-0.559	-0.092	0.007**	36	-0.336	-0.683	0.010	0.057
Attempting to solve a problem	54	-0.203	-0.424	0.019	0.072	36	-0.253	-0.660	0.155	0.216
Self-understanding	54	-0.347	-0.564	-0.131	0.002**	36	-0.476	-0.829	-0.123	0.010*
Understanding others	54	-0.146	-0.416	0.123	0.281	36	-0.157	-0.495	0.180	0.349
Workplace social support	54	-0.492	-0.693	-0.292	<0.001***	36	-0.142	-0.560	0.277	0.496

* $P < 0.05$. ** $P < 0.01$. *** $P < 0.001$. †Multiple regression analysis adjusted by gender, age. CI, confidence interval.

Table 5. Association of burnout with related factors and resilience

	Overall (<i>n</i> = 67)			
	β †	95% CI		<i>P</i> †
Innate resilience	-0.515	-0.844	-0.186	0.003**
Acquired resilience	0.126	-0.192	0.445	0.431
Age	0.146	-0.144	0.436	0.317
Gender	0.195	-0.038	0.428	0.100
Region	0.186	-0.109	0.481	0.213
Workplace social support	-0.206	-0.433	0.020	0.074
Turnover intention	-0.238	-0.462	-0.014	0.038*

(Adj R-squared 0.402)

* $P < 0.05$. ** $P < 0.01$. *** $P < 0.001$. †Stepwise multiple regression analysis. CI, confidence interval.

significant difference in burnout scores between the mainland and remote island. Regarding the association between burnout and the categorical variables in Table 1, adjusted by gender and age, a significant difference was found in the support from older peers on the mainland and the turnover intention on the remote islands (Table 3).

Multiple regression analyses of BRS and related factors on burnout

For the association between burnout and continuous variables in Table 1, adjusted by gender and age, similar negative associations between resilience and burnout were observed on the mainland and remote islands, and the association between acquired resilience and burnout on remote islands was a marginal negative association (Table 4). In the stepwise multivariate method,

workplace social support and turnover intention were selected as the independent variable as a result of the analysis (Table 5). In the multiple regression analysis adjusted for gender, age, and region, innate resilience and workplace social support were significantly negatively associated with burnout, turnover intention was positively associated, and the effects of innate resilience was large. (Table 6).

DISCUSSION

The present study identified a negative relationship between burnout (dependent variable) and innate resilience (independent variable). We demonstrated the characteristics of resilience, workplace social support, and burnout among mainland and remote nurses while focusing on the relationship between those aforementioned variables and common to both regions.

Table 6. Association of burnout with innate resilience, acquired resilience, workplace social support, and turnover intention

	Overall (<i>n</i> = 88)			
	β	95% CI		<i>P</i> †
Innate resilience	-0.443	-0.696	-0.189	0.001**
Acquired resilience	0.134	-0.109	0.376	0.276
Workplace social support	-0.204	-0.389	-0.019	0.031*
Turnover intention	0.025	0.035	0.414	0.021*

(Adj R-squared 0.319)

P* < 0.05. *P* < 0.01. ****P* < 0.001. †Multiple regression analysis adjusted by gender, age, and region. CI, confidence interval.

The average burnout score for the mainland nurses was 3.29 while for remote island nurses was 3.65. On the other hand, a higher average burnout score (3.84) was reported among nurses in a cross-sectional study previously conducted in Japan.¹⁴ Although it is not reasonable to draw a simple conclusion merely from an average score, the problem of burnout among our participants appeared to be less serious than that reported in previous study. Studies that focus on mainland and remote island in burnout among nurses are scarce. No statistical differences in burnout among psychiatric nurses were observed between the metropolitan and remote areas in Australia.³⁷ In agreement, the current study identified no significant differences in the burnout rates between the mainland nurses (19.6%) and remote island nurses (36.1%). In addition, the nurses on the mainland and remote island showed no significant difference in burnout scores. Provided that the nature of responsibilities and the type of patients are the same and the workplace offers opportunities for support, training, and development, no notable difference in nurse burnout was previously detected between metropolitan and remote areas.³⁷ Moreover, in Japan, it has been reported that nurses in hospitals with more than 300 beds are more likely to suffer from burnout,³⁸ but this was reported 30 years ago, and the turnover of burnout-related factors has changed³⁹ and is on a downward trend.^{40, 41} The effect of the number of beds in the hospital on burnout is likely small.

The average resilience scores obtained by nurses in our study were as follows: BRS, 71.2 (mainland nurses), 72.27 (remote nurses); innate resilience, 39.33 (mainland), 40.76 (remote); acquired resilience, 31.95 (mainland), 31.58 (remote). A recent cross-sectional study conducted in Japan reported similar average scores: BRS, 71.1; innate resilience, 40.2; acquired resilience, 30.9.⁴² Varying conditions may compound differences between previous studies and the current study. Nevertheless, average BRS and acquired resilience scores were high in our study. No differences in resilience of nurses,

measured using the Connor-Davidson Resilience Scale (CD-RISC), were found across cities and remote coastal areas in a cross-sectional study conducted in Australia.⁴³ In line with this finding, a similar cross-sectional study that compared the resilience of nurses, using the Workplace Resilience Instrument, reported no difference in burnout between cities and remote areas.⁴⁴ Consistent with other studies that compared the resilience of nurses in cities and remote places, our study identified no difference in resilience between the mainland and remote nurses. Furthermore, a cross-sectional study conducted in Greece using a 25-item resilience scale found no significant differences among different medical facilities.⁴⁵ Another cross-sectional study conducted in the United States demonstrated that bed numbers across hospitals did not affect nurse resilience.⁴⁶ Consistent with the literature, the current study identified no difference in resilience of nurses working in tertiary hospitals with more than 500 beds and secondary hospitals with 300–390 beds. Therefore, intervention programs intended to enhance resilience among nurses may employ similar strategies regardless of region and medical facilities. However, further studies that closely examine differences across medical facilities and regions are needed to confirm the structure and design of intervention programs that can mitigate burnout in nurses worldwide.

The scores for nurses who reported the presence of workplace social support were as follows: mainland, 57.66 (age twenties, 87.9%); remote, 55.85 (age thirties, 59.0%). Although studies in this area are limited, a cross-sectional study conducted in Japan revealed that nurses aged 20–24 y reported the highest scores in the presence of workplace social support (57.2) and these scores decrease as they age: 25–29 years, 55.8; thirties, 50.6; forties, 47.4; over fifty, 45.4.⁴⁷ The presence of workplace social support in our study was high, although caution must be exercised when making simple comparisons of scores. A cross-sectional study conducted in the United States with the Social Network

Questionnaire did not identify significant regional differences in psychological support from colleagues or managers between metropolitan and remote areas.⁴⁸ Prior to this study workplace social support experienced by nurses working in remote island hospitals, has not been investigated. Consistent with the literature we did not find any regional differences in workplace social support between mainland and remote island nurses. Based on this finding, we speculated that similar strategies could be employed in workplace social support intervention programs for mainland and remote nurses. However, closer examination that focus on the mainland and remote nurses should provide useful information that can help refine intervention programs for nurses.

Regarding background factors for the mainland and remote islands, differences in gender, age, nursing tenure, education attainment, and participants' work situation were observed, but previous studies reported that these were not related to nurse resilience.^{49–52} Also, in the association between burnout and resilience, region had no relation to innate resilience and acquired resilience (data not shown), and standardized partial regression coefficients were similar on the mainland and remote islands. Therefore, we examined the mainland and the remote islands together, assuming that the results of the background factors are systematic differences, and that the association between burnout and resilience is largely consistent. In addition, regarding the association to burnout, there was a difference in support from work peers, turnover intention and workplace social support between the mainland and remote islands. This support from work peers was excluded from the stepwise method in all participants due to the detailed evaluation of workplace social support, and turnover intention was selected as an independent variable along with workplace social support.

A cross-sectional study conducted in China also identified that resilience, measured with CD-RISC, was negatively associated with burnout assessed using Maslach Burnout Inventory-General Survey.⁵³ Another cross-sectional study conducted in remote areas of Japan similarly suggested a negative relationship between resilience and burnout as measured using the Resilience Scale for Nurses.⁵⁴ Similar to previous studies, this study observed a negative association between resilience and burnout, suggesting that nurses on the mainland and remote island have a common association between burnout and innate resilience. There are no previous studies focusing on the relationship between the burnout of nurses working on the mainland and remote island and their innate resilience. Furthermore, regarding the negative association with burnout in this study, innate resilience had the largest partial regression

coefficient, so innate resilience as a predictor of burnout could potentially be utilized as a preventive measure against adversities in the hospital work environment. On the other hand, Workplace social support from older peers also imposed a common negative effect on burnout of both groups of nurses. A cross-sectional study conducted in the United States, using the social support scale developed by House and Wells,⁵⁵ identified that social support negatively affects Maslach Burnout Inventory (MBI) emotional exhaustion.⁵⁶ A systematic literature review also highlighted that social support mitigated nurse burnout.²¹ All of the studies including this one, consistently indicate the negative effect of social support on burnout. In addition, the positive association between nurse turnover intention and burnout is consistent with the results of a previous review.⁵⁷ Thus, in this study, it was suggested that innate resilience has a large effect on burnout prevention in common with nurses on the mainland and remote islands, and that it is possible to contribute to burnout prevention by preparing an environment for support from older peers in the workplace.

To the best of our knowledge, this is the first study to focus on burnout and related factor in resilience and workplace social support for working nurses serving on the mainland and remote island in Japan. While the scarcity of nursing labor is a chronic problem, particularly on remote island, this study sheds novel light on an overlooked yet important area in nursing management. However, the small sample size makes the study susceptible to α errors. Further, this was a cross-sectional study, and causation can only be established by a longitudinal study and larger sample size. It is also possible that not all confounding factors were ruled out. Additionally, the voluntary nature of participation in our study cautions that participants were perhaps less likely to be suffering from burnout than the general nurse population. Although the correlation between the Japanese version of the Pines Burnout Scale and MBI has been confirmed,³⁵ it is wise to exercise caution when generalizing results since this study did not use the original version of the MBI, the more globally accepted scale of burnout.

This cross-sectional study examined the relationship among resilience, workplace social support, and burnout in clinical nurses from both the mainland and remote island in Japan. This study showed the effects of innate resilience that associated with burnout in different hospitals with different regional backgrounds. Resilience, workplace social support, and burnout showed no significant difference between nurses on the mainland and remote island. Innate resilience is an important background factor to prevent burnout in

nurses. Further study of innate resilience is warranted, particularly at this challenging time of the COVID-19 health-crisis. More focused evaluation of innate resilience in nurses is likely to enhance the overall quality of healthcare and maybe a useful parameter for the selection and staffing of nurses, and making decisions about choosing a workplace. Ultimately, the development of a support program that can assist nurses with lower innate resilience would result in substantial benefit to both the healthcare industry and the public for years to come.

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