

Developing a questionnaire on the quality of working life for female medical and healthcare professionals

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Abstract: This study aimed to develop a questionnaire on the quality of working life among female medical and healthcare professionals and examine its validity and reliability. The questionnaire was developed from an item pool drawing on the literature. The four trait scales included 40 items, covering female-specific stress in continuing a career, stress of lifestyle in maintaining personal values, job satisfaction and social support network. The questionnaire's validity and reliability were assessed using data from 1,784 female doctors, dentists, and nurses. Validity was examined using exploratory factor analysis on each trait for construct validity, and multitrait scaling analysis for convergent and discriminant validity. Reliability was tested using Cronbach's alpha for trait subscales and scales. Exploratory factor analysis on each trait was convergent. One trait derived three subscales, and another two. The remaining two traits were convergent for one factor. Multitrait scaling analysis showed that all scales and subscales were independent. The questionnaire was therefore internally consistent and had construct validity. Cronbach's alpha was 0.85 for the total and between 0.72 and 0.83 for the subscales. These results validate the four-trait combination questionnaire and suggest that it would be suitable for use in future research, perhaps in combination with other existing scales.

Key words: Health personnel, Occupational health, Personal satisfaction, Questionnaire, Working women

Introduction

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Quality of life at work, or quality of working life (QWL), is important for all workers. To ensure people willing to

work can work effectively throughout their careers, the Japanese government has recommended diversification of working styles and implemented new employment and labor policies designed to suit these diversified styles in the current harsh employment situation¹. Medical and healthcare professionals (MHP) often experience high levels of distress because of the nature of their work and working environment^{2,3}. Work stressors experienced by MHP have been reported to adversely affect job performance and the quality of patient care⁴⁻⁶ and are therefore an important issue. Few studies, however, have quantitatively assessed QWL in MHP in a comprehensive way, considering multi-trait factors⁷.

Female workers make up 21.3% of the medical, healthcare and welfare workforce in Japan, the highest proportion seen in any industry sector⁸. In recent years, the number of female doctors and dentists has gradually increased^{1,9}. The majority of nurses are also female. Female workers in Japan have often been forced to suspend or stop their careers because of biological or sociological gender-specific roles^{10,11}. Once they stop working, many women have difficulty returning to full-time work, and instead work fewer hours or switch to part-time working patterns after marrying or having children¹². In the 1970s, Western countries saw changes in gender roles develop, alongside an increasing proportion of women in the workforce^{13,14}. Japanese women, however, continue to be taught that they should be exclusively responsible for domestic affairs¹⁵ as well as being the main provider of care to children and other family members¹⁶.

These demographic and socioeconomic changes in Japanese society have resulted in significant losses of skilled and experienced healthcare professionals when current workers leave their professions or retire^{8-10,15,16}. Women have also come to be expected to continue to work after marriage or having children, because the labor force is shrinking as the result of a falling birth rate and an aging population¹⁷. It is therefore important and urgent to support women to continue to work, especially in professional roles^{15,18}. To assess their QWL and provide appropriate support to female MHP, we need to understand the current situation.

Earlier studies on healthcare workers have generally focused on stress^{19,20} and coping with stress²¹. These two factors have an inverse relationship²². We have been unable to find any assessment tool for the multiple dimensions of QWL, including gender-related stress in female MHP²³. The focus has recently shifted to personal assessment and the multiple factors affecting quality of life²⁴, but there are

still few tools to assess the QWL among female MHP that draw on a sound theoretical structure. The aim of this study was therefore to develop a multitrait-based questionnaire to assess this, which we called the Quality of Working Life for Female Medical and Healthcare Professionals (QWL for female MHP), and to test its reliability and validity psychometrically.

Subjects and Methods

The process of developing and examining the QWL for female MHP questionnaire was carried out in three phases. The first phase was to develop a preliminary version of the questionnaire, the second was a pilot study to assess the pre-final version, and the third phase was field testing to determine and confirm validity and reliability of the final version of the questionnaire in the target population^{24,25}.

Phase 1. Develop a preliminary version of the questionnaire

A literature review was used to develop understanding of the multiple dimensions of QWL for female MHP. The factors relevant to women working in healthcare were extracted by an expert panel, consisting of a social researcher and female medical professionals, to provide comprehensive coverage and content validity.

We assumed that QWL was multidimensional²⁴, and the concepts involved were broad^{26,27}. Changes in social roles related to gender and age could affect workers' health^{20,28}. For female MHP, we thought that gender-related stress linked to continuing to work¹⁰ might be relevant. Life satisfaction has previously been found to have a strong positive correlation with work satisfaction²⁹, so this was also assumed to be an important and fundamental aspect. Job satisfaction included distinct facets such as satisfaction with work, pay, coworkers, supervisor and promotion opportunities³⁰. Social support has been found to have stress-buffering effects³¹, and we thought that a personal social support network might also be an important source of support.

To assess health status, ability to cope with stress and tension management, we used the Japanese versions of the General Health Questionnaire (GHQ)³² and the 13-item Sense of Coherence (SOC) questionnaire³³. GHQ and SOC have been widely used internationally, including in medicine²¹. GHQ is a self-administered screening questionnaire, which was originally developed to assess general health in both the population and specific patients by Goldberg and Hillier³⁴. The SOC questionnaire was developed

based on a theory of salutogenesis and health-promoting ability to mobilize general resistance resources by Antonovsky³⁵. He defined these resources as any characteristic related to a person, group, or environment that can facilitate effective tension management, such as possessing material resources, “knowledge-intelligence” (i.e., information and skills), ego identity, flexibility, evaluative attitude or social support³⁶). Using the Salutogenic Model of Health, we extracted four key traits, female-specific stress, job satisfaction, personal values, and social support network. We then selected 40 items from the potential item pool to cover the four traits (see Table 1).

Female-specific stress in continuing a career had twelve items to measure the stress that participants had experienced arising from gender-related factors at home or at work. Questions were answered using a five-point Likert-type scale ranging from 1 (never) to 5 (frequently). Higher scores indicated higher stress. Stress of lifestyle in maintaining personal values had eight items to measure subjective views on the stress of maintaining their own personal values. Responses were on a five-point Likert-type scale ranging from 1 (never) to 5 (frequently). Higher scores indicated higher stress. Job satisfaction had thirteen items about satisfaction with the quality and quantity of work. Again, it used a five-point Likert-type scale ranging from 1 (not at all satisfied) to 5 (extremely satisfied). Higher scores indicated a higher level of fulfillment at work. Social support network had seven items relating to personal support resources, covering both practical and emotional issues. Responses were on a six-point Likert-type scale ranging from 1 (completely unsatisfied) to 6 (completely satisfied). Higher scores indicated a higher level of satisfaction with personal support resources.

A critical review of the four trait scales was used to confirm whether the scale would cover the intended topics clearly and unambiguously. It was assessed by experts including a medical doctor and a social scientist²⁴). Based on their opinions, the scale was confirmed to have appropriate face validity, and was adopted as the pre-final version of QWL for female MHP.

Phase 2: Pilot study to assess the pre-final version of QWL for female MHP

A pilot study was conducted to evaluate the content and face validity of the preliminary four-trait 40-item questionnaire in a sample of 26 female MHPs working in a university hospital. The group consisted of 15 medical doctors, eight dentists, and three nurses, each of whom returned a completed questionnaire. After testing, we revised the

words and phrases of the questionnaire to reflect feedback and the expert panel re-examined the content validity to check the extent to which a specific set of items reflected each content domain²⁵). The panel considered any items regarded as inappropriate or incomprehensible by the test subjects, and revised the questionnaire accordingly.

Phase 3: Field testing for cross-sectional validation study of the new scale

Participants and data collection

We distributed the questionnaire to 3,366 female MHP including 1,301 medical doctors and dentists and 2,065 nurses working in three university hospitals and affiliated hospitals around the southwestern part of Japan between February and August 2008. The final version of the questionnaire included questions about the participants' background and their professional category, GHQ, and SOC. Each participant received a questionnaire and a pre-paid envelope for postal return of the completed questionnaire. Participation in this study was anonymous and voluntary, and a completed questionnaire was considered to demonstrate consent to participate.

Methods of analyses

To verify the psychometric validity and reliability of the final version of the QWL for female MHP questionnaire, we used item analysis, factor analysis, and multitrait scaling analysis.

For item analysis, responses were evaluated using the following criteria: the completeness of the data for each item, the distribution of item responses, which was examined for each item using the range and distribution of responses²⁴), and Item–Total analysis (i.e., the correlation between the item and sum of the remaining $n-1$ items in the scale)³⁷).

To determine the internal factor structure³⁸), exploratory factor analysis was applied to a new set of items after we had checked correlations between the items by the trait respectively. We used common factor analysis with principal axis factoring and promax rotation. Factors with an eigenvalue greater than 1 were retained. The parallel analysis³⁹) using R version 3.4.0 (2017-04-21)⁴⁰) were followed to determine the appropriate number of factors. The threshold level of factor loading was set at >0.40 .

To check whether each item belonged to the assigned scale and had satisfactory construct validity²⁴), we used multitrait scaling analyses with discriminant and convergent validity⁴¹). This was based on the hypothesis that each item was more closely correlated to other items within its

Table 1. Response rate, mean, SD, interquartile range, and item-total correlation by item in the Quality of Working Life for Female Medical and Healthcare Professionals questionnaire

	Response Rate	Mean	SD	25%	Median	75%	Item-Total Correlation*
Female-Specific Stress in Continuing a Career: FSS (5-Point Likert Scale)							
FSS1	99.6	2.11	1.16	1.0	2.00	3.0	FSS
FSS2	99.6	2.18	1.19	1.0	2.00	3.0	0.65
FSS3	99.4	1.97	1.16	1.0	2.00	3.0	0.69
FSS4	99.6	2.28	1.25	1.0	2.00	3.0	0.63
FSS5	99.6	2.16	1.17	1.0	2.00	3.0	0.73
FSS6	99.5	2.05	1.08	1.0	2.00	3.0	0.72
FSS7	99.0	2.01	1.21	1.0	2.00	3.0	0.73
FSS8	98.9	2.28	1.42	1.0	2.00	3.0	0.74
FSS9	98.7	1.73	0.99	1.0	1.00	2.0	0.69
FSS10	98.7	1.68	1.05	1.0	1.00	2.0	0.65
FSS11	98.5	2.15	1.34	1.0	2.00	3.0	0.62
FSS12	98.7	2.54	1.52	1.0	2.00	4.0	0.67
							0.63
Stress of Lifestyle in Maintaining Personal Values: SL (5-Point Likert Scale)							
SL1	99.6	3.66	1.26	3.0	4.00	5.0	SL
SL2	99.6	3.51	1.29	2.0	4.00	5.0	0.80
SL3	99.6	3.61	1.30	3.0	4.00	5.0	0.83
SL4	99.6	3.61	1.28	3.0	4.00	5.0	0.87
SL5	99.4	3.31	1.27	2.0	4.00	4.0	0.80
SL6	99.4	3.41	1.29	2.0	4.00	4.0	0.85
SL7	99.5	3.65	1.28	3.0	4.00	5.0	0.86
SL8	99.6	3.56	1.31	2.0	4.00	5.0	0.82
							0.83
Job Satisfaction: JS (5-Point Likert Scale)							
JS1	99.5	2.66	1.19	2.0	3.00	3.0	JS
JS2	99.5	2.89	1.00	2.0	3.00	4.0	0.57
JS3	99.4	2.74	1.01	2.0	3.00	3.0	0.69
JS4	99.4	2.45	1.25	1.0	2.00	3.0	0.70
JS5	99.4	2.43	1.17	1.0	2.00	3.0	0.61
JS6	99.3	3.31	0.99	3.0	3.00	4.0	0.61
JS7	98.5	3.11	0.80	3.0	3.00	3.0	0.65
JS8	98.5	3.27	1.13	3.0	3.00	4.0	0.55
JS9	98.6	3.82	1.03	3.0	4.00	5.0	0.67
JS10	98.8	3.39	0.96	3.0	3.00	4.0	0.53
JS11	98.8	3.22	0.96	3.0	3.00	4.0	0.65
JS12	98.7	3.10	0.92	3.0	3.00	4.0	0.69
JS13	98.7	2.69	1.03	2.0	3.00	3.0	0.67
							0.58
Social Support Network: SSN (6-Point Likert Scale)							
SSN1	99.0	4.53	1.04	4.0	5.00	5.0	SSN
SSN2	98.9	4.46	1.03	4.0	5.00	5.0	0.80
SSN3	98.9	4.30	1.10	4.0	4.00	5.0	0.85
SSN4	98.8	4.25	1.07	4.0	4.00	5.0	0.81
SSN5	97.9	4.06	1.07	3.0	4.00	5.0	0.85
SSN6	98.1	4.52	1.01	4.0	5.00	5.0	0.82
SSN7	98.7	4.21	1.20	4.0	4.00	5.0	0.77
							0.83

*Correlation between each item score and the remainder score from the scale.

own scale/subscale than with other scales/subscales. Scaling was considered successful if the item's correlation with its own scale was significantly higher than its correlation to other scales^{24, 42}. Convergent validity was considered to be present if an item correlated at least moderately ($r=0.4$ or greater) to its own scale.

The criterion-related validity was reviewed by assessing the correlation between the total scores for GHQ, SOC and each scale/subscale as the external criteria. The validity was considered acceptable if the domain in the questionnaire was correlated⁴³ to GHQ or SOC. For example, a stress-related domain such as gender-related stress in continuing career should have a positive correlation to GHQ and an inverse correlation to SOC.

The reliability was analyzed by testing internal consistency of the total scale and subscales with Cronbach's alpha coefficient. An alpha of >0.7 ⁴⁴ was considered acceptable, and the optimal level of mean internal correlation was set as lower than 0.5 ⁴⁵. Mean inter-item correlation was also calculated to estimate item homogeneity, because its reliability is not influenced by scale length⁴⁵.

Statistical analyses used JMP[®] Pro12.0.1 (SAS Institute Inc., Cary, NC, USA) and R version 3.4.0 (R Core Team, Vienna, Austria, <http://www.R-project.org/>). A p -value <0.05 was considered to be statistically significant.

Ethical approval

We obtained ethical approval for the study from Kyushu University Institutional Review Board for Clinical Research in Fukuoka, Japan. The front page of every questionnaire included a written explanation of the study object, risks, and benefits to the respondent and how the study would ensure confidentiality for all participants. Informed consent was inferred by return of a completed questionnaire.

Results

Item generation and pilot study

Four traits and 40 items were drawn from the question pool for the preliminary questionnaire, and all remained after piloting as the final version of QWL for female MHP.

Field testing

Participants

In total, 1,784 out of the 3,366 potential participants returned their questionnaires (response rate 53.0%). The response rate was 65.4% for nurses and 33.2% for doctors and dentists. One participant, who did not provide informa-

tion on professional category, was excluded from the analysis. Data for the remaining 1,783 participants were analyzed. The majority of the participants (1,351; 75.8%) were nurses, with 326 (18.3%) doctors and 106 (5.9%) dentists. The mean age of the participants was 33.1 yrs (SD=9.7, range 20–73).

Descriptive statistics for scale

Table 1 shows the response rate (97.9% to 99.6%) for the whole sample and each item. The Item–Total analysis gave no r -values of <0.4 , and correlations ranged from 0.55–0.87 ($p<0.0001$). All items were therefore used for analysis.

Factor analysis

Factor analysis revealed the presence of two subscales in “Female-specific stress in continuing a career”, which we identified as “Gender-related stress at work” and “Gender-related stress in balancing work and family”. There were three subscales in “Job satisfaction”, described as “Self-fulfillment”, “Work conditions”, and “Career progress”. “Stress of lifestyle in maintaining personal values” and “Social support network” were each convergent in only one category (Table 2). The scree plot and parallel analysis supported a two-subscale solution explaining 62.2% of the variance in “Female-specific stress in continuing a career”, and a three-subscale solution explaining 59.4% of the variance in “Job satisfaction”. No item had a pattern coefficient of less than 0.4. These scales and subscales were therefore adopted as a latent component among the four traits.

Validity

The results of item discriminant validity and scaling success rates are shown in Table 3 and summarized in Table 4. Table 3 shows the item–scale correlation for internal consistency⁴². Within each scale, item–scale correlations were higher than correlations with the other scales. Scaling success was achieved across all four scales, including the five subscales. For each scale and subscale, the correlation between each item and its hypothesized scale exceeded correlations with all other scales and subscales⁴². Scaling success rates were therefore 100%. Table 5 shows criterion-related validity. The stress-related traits, such as “Female-specific stress” and “Stress of lifestyle”, showed positive correlations with GHQ and negative ones with SOC. “Job satisfaction” and “Social support network” showed negative correlations with GHQ and positive correlations with SOC.

Table 2. Pattern and structure coefficients from exploratory factor analysis

Sub-scale	Item No.	Item Wording	Promax structure coefficients		Subscale score (SD)
			I	II	
Female-Specific Stress in Continuing a Career: FSS					
Gender-related stress at work: GSW	FSS2	Feel uneasy hearing "women lack a certain attitude toward work"	0.82	0.35	2.21 (0.94)
	FSS4	Feel less appreciated on the job because you are a woman	0.84	0.41	
	FSS6	Feel not trusted to do the same job as a man because you are a woman	0.85	0.43	
	FSS1	Feel uneasy hearing "women quit their jobs easily"	0.79	0.32	
	FSS5	Feel receiving slower promotion because you are a woman	0.82	0.43	
	FSS3	Feel uneasy hearing "women should quit their jobs and take care of the home"	0.70	0.38	
	FSS8	Feel difficulty in inability to attend training (conferences, seminars) for family reasons	0.34	0.83	
	FSS11	Feel uneasy about leaving office early for family reasons	0.36	0.79	
	FSS10	Family members don't help you to balance work and family	0.33	0.76	
Gender-related stress in balancing work and family: G	FSS12	Feel difficulty taking holidays for family reasons	0.33	0.72	2.06 (0.97)
	FSS7	Feel uneasy about having your work interrupted for a family reason	0.50	0.78	
	FSS9	Colleagues don't help you to balance work and family	0.41	0.72	
	% Variance		46.5	15.73	
	Correlation		I	II	
		0.4952			
Stress of Lifestyle in Maintaining Personal Values: SL					
	SL6	Cannot maintain a balanced lifestyle	I		3.54 (1.07)
	SL3	Have no personal free time	0.88		
	SL8	Feel difficulty live a life at your own desired pace	0.87		
	SL5	Lack emotional capacity to consider your future	0.84		
	SL2	Have no time to talk with your family and friends properly	0.83		
	SL7	Feel difficulty setting your own schedule	0.82		
	SL4	Cannot do personally healthy activities	0.82		
	SL1	Have no time for your hobbies	0.82		
% Variance		69.75			

Table 2. Continued

	Promax structure coefficients			Subscale score (SD)
	I	II	III	
Job Satisfaction: JS				
Self-fulfillment: SF				
JS11	0.88	0.33	0.26	
JS10	0.84	0.23	0.33	
JS12	0.76	0.41	0.29	3.27
JS2	0.69	0.57	0.17	(0.74)
JS9	0.55	0.13	0.52	
JS8	0.62	0.35	0.54	
Work conditions: WC				
JS5	0.27	0.80	0.20	
JS4	0.28	0.76	0.22	2.60
JS3	0.56	0.71	0.18	(0.81)
JS1	0.22	0.60	0.44	
JS13	0.32	0.60	0.34	
Career progress: CP				
JS7	0.31	0.31	0.83	3.21
JS6	0.39	0.44	0.80	(0.80)
	39.96	10.92	8.53	
	% Variance			
	Correlation I			
	0.5477			
	II			
	0.4929			
	III			
		0.4725		
Social Support Network: SSN				
SSN2	I			
	0.87			
SSN4	0.87			
SSN5	0.83			4.33
SSN7	0.83			(0.89)
SSN1	0.82			
SSN3	0.82			
SSN6	0.78			
	% Variance			
	69.14			

Note: N=1,783. The highest pattern and structure in each factor are shown in bold.

Table 3. Correlations between items and subscales in the whole sample

Item	FSS		SL	JS			SSN
	GSW	GSB		SF	WC	CP	
FSS2	0.83	0.39	0.14	-0.0273	-0.0544	-0.1075	-0.0828
FSS4	0.86	0.44	0.17	-0.126	-0.1461	-0.1785	-0.1343
FSS6	0.84	0.45	0.14	-0.1227	-0.1182	-0.1913	-0.1284
FSS1	0.79	0.37	0.12	-0.002	-0.043	-0.0825	-0.0633
FSS5	0.84	0.46	0.16	-0.1356	-0.1537	-0.2189	-0.132
FSS3	0.73	0.39	0.09	-0.0204	-0.0523	-0.0772	-0.0771
FSS8	0.38	0.84	0.21	-0.0663	-0.0427	-0.0975	-0.1096
FSS11	0.40	0.80	0.20	-0.0617	-0.0513	-0.1164	-0.0749
FSS10	0.38	0.72	0.17	-0.0759	-0.0306	-0.1134	-0.2182
FSS12	0.36	0.79	0.31	-0.1358	-0.2519	-0.1485	-0.1197
FSS7	0.53	0.78	0.15	-0.0413	0.01	-0.1098	-0.1117
FSS9	0.44	0.72	0.23	-0.1596	-0.1493	-0.1947	-0.1961
SL6	0.14	0.21	0.87	-0.3063	-0.4576	-0.2074	-0.2136
SL3	0.16	0.31	0.86	-0.253	-0.4055	-0.1858	-0.2175
SL8	0.15	0.24	0.84	-0.2561	-0.4123	-0.1847	-0.2229
SL5	0.16	0.23	0.83	-0.2979	-0.4178	-0.1874	-0.2344
SL2	0.16	0.26	0.82	-0.2159	-0.3742	-0.1597	-0.1967
SL7	0.10	0.17	0.80	-0.2568	-0.4539	-0.2069	-0.1782
SL4	0.13	0.22	0.80	-0.2347	-0.3958	-0.1898	-0.1698
SL1	0.14	0.26	0.79	-0.2026	-0.3646	-0.1336	-0.1464
JS11	-0.0446	-0.0579	-0.2346	0.79	0.37	0.32	0.28
JS10	-0.065	-0.0716	-0.2005	0.78	0.32	0.33	0.31
JS12	-0.0237	-0.0619	-0.2269	0.69	0.40	0.38	0.25
JS2	-0.0765	-0.0522	-0.3087	0.66	0.51	0.33	0.21
JS9	-0.1291	-0.1628	-0.1584	0.62	0.24	0.32	0.36
JS8	-0.03	-0.0735	-0.2408	0.72	0.42	0.41	0.25
JS5	-0.0322	-0.018	-0.4349	0.33	0.76	0.31	0.11
JS4	-0.0849	-0.1325	-0.4165	0.34	0.76	0.29	0.15
JS3	-0.0693	-0.089	-0.3773	0.51	0.69	0.35	0.18
JS1	-0.1458	-0.1275	-0.233	0.31	0.66	0.36	0.15
JS13	-0.1045	-0.0705	-0.2813	0.35	0.63	0.32	0.21
JS7	-0.148	-0.1222	-0.1369	0.37	0.34	0.77	0.11
JS6	-0.1591	-0.1408	-0.2188	0.47	0.44	0.94	0.22
SSN2	-0.1066	-0.1178	-0.1759	0.29	0.13	0.16	0.85
SSN4	-0.09	-0.1557	-0.2099	0.37	0.20	0.18	0.85
SSN5	-0.1085	-0.1631	-0.2219	0.32	0.20	0.18	0.82
SSN7	-0.0862	-0.1461	-0.2202	0.29	0.17	0.15	0.83
SSN1	-0.116	-0.1024	-0.1566	0.28	0.11	0.16	0.81
SSN3	-0.1062	-0.1271	-0.2168	0.32	0.21	0.17	0.82
SSN6	-0.123	-0.1254	-0.2008	0.33	0.21	0.18	0.77

FSS: Female—specific stress in continuing career, SL: Stress of lifestyle in maintaining personal values, JS: Job satisfaction, SSN: Social support network; GSW: Gender—related stress at work, GSB: Gender—related stress in balancing work and family, SF: Self—fulfillment, WC: Work conditions, CP: Career progress.

Table 4. Results of item scaling tests and reliability estimates for scales: combined summary

Scale and Subscale	Number of Items	Range of Correlation		Scaling Tests		Reliability	
		Item-Internal Consistency	Item-Discriminant Validity	Success/Total	Scaling Success Rate (%)	Average inter-item correlation	Cronbach's alpha
FSS:							0.88
GSW	6	0.73–0.86	–0.22–0.46	42/42	100	0.58	0.89
GSB	6	0.72–0.84	–0.25–0.53	42/42	100	0.51	0.85
SL	8	0.79–0.87	–0.46–0.31	56/56	100	0.65	0.94
JS:							0.87
SF	6	0.62–0.79	–0.31–0.51	42/42	100	0.46	0.83
WC	5	0.63–0.76	–0.43–0.51	35/35	100	0.39	0.76
CP	2	0.77–0.94	–0.22–0.47	14/14	100	0.59	0.73
SSN	7	0.78–0.85	–0.22–0.37	49/49	100	0.64	0.92

Item-internal consistency: correlations between items and subscales for overlap.

Item-discriminant validity: correlations between items and other subscales.

FSS: Female-specific stress in continuing a career, SL: Stress of lifestyle in maintaining personal values, JS: Job satisfaction, SSN: Social support network. Subscales—GSW: Gender-related stress at work, GSB: Gender-related stress in balancing work and family, SF: Self-fulfillment, WC: Work conditions, CP: Career progress.

Table 5. Correlation between scales of the Quality of Working Life for Female Medical and Healthcare Professionals scale, GHQ, and SOC

	FSS	SL	JS	SSN	GHQ	SOC
FSS	—	0.2658 ‡	–0.1596 ‡	–0.1644 ‡	0.0542 *	–0.0562 *
SL		—	–0.4391 ‡	–0.2407 ‡	0.3919 ‡	–0.3386 ‡
JS			—	0.3326 ‡	–0.3542 ‡	0.4037 ‡
SSN				—	–0.2390 ‡	0.3773 ‡
GHQ					—	–0.5609 ‡
SOC						—

* $p < 0.05$, † $p < 0.01$, ‡ $p < 0.001$

FSS: Female-specific stress in continuing a career, SL: Stress of lifestyle in maintaining personal values, JS: Job satisfaction, SSN: Social support network, GHQ: General Health Questionnaire, SOC: Sense of Coherence questionnaire.

Reliability

Table 4 lists Cronbach’s alpha and average inter-item correlations to examine the reliability by scale/subscale scores. Cronbach’s alpha, used as a measure of internal consistency and reliability, ranged from 0.73 for “Career progress” to 0.94 for “Stress of lifestyle”. Mean internal correlation ranged from 0.39–0.65.

Discussion

The aim of this study was to develop and test the QWL female MHP questionnaire, using the multitrait concept. To assess the multitrait data on quality of life, we used a multitrait scaling approach that has previously been validated^{46, 47}. The proposed scales were female-specific stress, lifestyle stress, job satisfaction and social support network. Our results provide preliminary proof of the reliability and validity of the scale, supporting overall acceptability of the new instrument among a sample of more than 1,000, the size recommended²⁴) for the analysis. A scale score cannot

be confidently estimated if there are many items with missing data⁴²) and researchers recommend deleting items with more than 3%–4% of values missing²⁴). We confirmed that all item response rates were over 97.9%. Data completeness was an issue in terms of scale scoring and validity⁴²), but our result provided a reasonable sample for analysis.

The scales and subscales extracted by factor analysis were considered reasonable and acceptable to use in examining the quality of working life among female MHP. To assess the multifaceted nature of QWL²⁶), we combined four different concepts at a time from the perspective of the female workers, their individual values and support networks, with each concept scale assessing a single concept adequately. Each scale was shown to be distinct from the others, which met the requirement that a single scale should measure a single construct⁴⁵). The results supported the hypothesis that each different domain can be identified as a different concept, via multitrait scaling analysis. In the process of developing the scales, we drew on an expert social researcher, and also the knowledge of the target popula-

tions. For multitrait scaling analysis, a sample size of more than 100 is recommended²⁴⁾, so our sample size was adequate. By discriminating each scale from the others, we were able to verify that they were independent.

The reliability was confirmed using Cronbach's alpha, with each scale/subscale having an alpha value of more than 0.7⁴⁴⁾. Some of the average inter-item correlations were over 0.5, which Briggs and Cheek⁴⁵⁾ suggested meant that they were too similar. We were, however, unable to omit any items because they all seemed necessary. It may be that the scale could be refined further. Test–retest reliability is an important aspect for development of a scale, but it was not evaluated in this study because of feasibility.

In the Salutogenic Model of Health, Antonovsky³⁶⁾ hypothesized that general resistance resources had a decisive influence on SOC. Any phenomenon, such as money, ego strength, cultural stability or social support, could be effective in combating a wide variety of stressors and had a decisive influence over strong SOC³⁶⁾. In further research, we will examine its relation to the new scales, along with GHQ and SOC.

Limitations and suggestions for further research

The main limitation of our study is that we used convenience sampling to collect data from female doctors, dentists, and nurses working at just three university hospitals in the southwestern part of Japan. Although these hospitals were located in both urban and suburban areas, they do not represent all parts of Japan. Additionally, other MHP, such as radiological technologists or clinical laboratory technicians, were excluded because there were not enough participants in these categories to allow for comparison by professional category. Nurses made up three-fourths of the sample, reflecting the high response rate in this group. The ratio of nurses to doctors/dentists in this study also generally reflects the balance of these professional categories in the Japanese healthcare field. The extent to which our findings may be generalized to other healthcare professionals remains unclear. However, our findings have contributed to the assessment of reliability and validity of QWL for female MHP working in several of the largest healthcare professions in Japan. Further research should focus on assessing its usefulness and the relationships among the component factors. We will also use the questionnaire for other samples to examine its effectiveness and evaluate the generalizability of these findings in other settings. We also plan to apply the scales to make a longitudinal comparison among MHP.

Conclusion

The scales have good reliability, validity and responsiveness and are a useful instrument for assessing QWL for female MHP and the relations between the aspects that affect it. A combination of GHQ and SOC might be useful for multipurpose assessment and enable the development of strategies to support workers. The result indicated reasonable support for the validity of the new questionnaire; however, more data are required before the instrument can be used with confidence.

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