

Reliability and validity of the Chinese version of the New Brief Job Stress Questionnaire (New BJSQ) among workers in China

Yui HIDAKA^{1,2}, Kazuhiro WATANABE³, Kotaro IMAMURA¹,
Oraphan TATHA¹ and Norito KAWAKAMI^{1*}

¹Department of Mental Health, Graduate School of Medicine, The University of Tokyo, Japan

²Japan Society for the Promotion of Science, Japan

³Department of Public Health, Kitasato University School of Medicine, Japan

Received February 1, 2021 and accepted September 26, 2021

Published online in J-STAGE November 1, 2021

DOI <https://doi.org/10.2486/indhealth.2021-0027>

Abstract: This study aimed to develop the Chinese version of the New Brief Job Stress Questionnaire (New BJSQ) and investigate its reliability and validity. The survey was administered at two time-points separated by a two-week interval among Chinese workers. The Chinese version of the New BJSQ was developed according to the international guidelines. Cronbach's alpha, intra-class correlation coefficients (ICCs), and Pearson correlation coefficient were calculated to assess the reliability. A variance explained by the first factor was calculated to examine factor-based validity, and confirmatory factor analysis was performed (CFA) to determine the construct validity. Baseline and follow-up analyses included 516 and 52 workers, respectively. In most scales, sufficient internal consistency and test-retest reliability were observed, and principal component analyses demonstrated that the first factor explained more than 50% proportion of the variance. CFA showed that the four-factor model (Job demands, Task-level job resources, Workgroup-level job resources, and Organizational-level job resources) demonstrated a moderate fit, similar to the original version. The Chinese version of New BJSQ showed good reliability and moderate validity. Future studies should explore content and construct validities and the factor structure of the Chinese version of the New BJSQ in more detail.

Key words: New brief job stress questionnaire, Reliability, Validity, Stress assessment, Psychosocial factors at work, Scale development

Introduction

Since the early 1990s, China has been experiencing rapid economic and social changes. The continuous growth led to

dramatic changes in China's working environment, with workers experiencing increased workload or working hours¹⁾ that negatively affect workers' mental health^{2–5)}. Therefore, to prevent them from developing mental illness and promote their healthy mental state, it is essential to measure and subsequently improve psychosocial factors at work.

Occupational stress has been considered a risk factor for

*To whom correspondence should be addressed.

E-mail address: nkawakami@m.u-tokyo.ac.jp

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various health outcomes^{6–8}). The two most prominent theoretical approaches that have been developed to understand the effect of job stressors on the health outcomes of workers are the job-demand-control (JDC) model⁹ and the effort-reward imbalance (ERI) model¹⁰. These models have shown elevated disease risks in the exposed population. The Job Content Questionnaire (JCQ) and Effort reward Imbalance (ERI) scale have been translated into Chinese, and their reliability and validity have been proven^{11, 12}. Those two models have also been applied to China's working population and have shown adverse health effects, such as depression¹³.

Additionally, attention to organizational justice, workplace social capital, or workplace bullying has been increasing worldwide^{14–18}. Their effects on health have also been studied in China^{19–22}. Although all these factors are essential, no comprehensive questionnaire has been developed in Chinese; thus, each factor has to be measured using a separate measure. The combined scales contain too many items; thus, their administration is time-consuming and tiresome for the participants. Accordingly, it is necessary to develop a questionnaire with fewer items and the same level of validity that would comprehensively measure psychosocial factors at work and health-related outcomes.

The New Brief Job Stress Questionnaire (New BJSQ) measures psychosocial factors at work, organizational outcomes, and employees' health-related states²³. The New BJSQ was developed based on the original Brief Job Stress Questionnaire (BJSQ) that has been widely used in Japan^{24, 25}. By adding new questions to the BJSQ, the New BJSQ extensively covers a psychological work environment with a broader range of theoretical models of job stress, such as job-demand-control-support (JDCS), ERI, organizational justice, and a wide range of outcomes, such as work engagement, perceived workplace social capital, and workplace harassment²³. New BJSQ has been used in several studies that have demonstrated the association of high job strain with depressive symptoms and burnout and a buffering effect of coworkers' support on depressive symptoms and burnout among physicians²⁶. The risk ratio for the onset of depression was 2.96 in the group scoring in the top 25% of the stress response on the BJSQ (same in New BJSQ) compared to the other 75%²⁷. Workers scoring high on the stress dimension of the BJSQ (57 items out of 141 items of New BJSQ) were more likely to take a sick leave²⁵. Accordingly, the New BJSQ can measure psychosocial factors and health-related outcomes simultaneously. The New BJSQ has two strengths. First, measures the abovementioned factors comprehensively with a small number of

items (141 items) instead of measuring each element separately. Second, the New BJSQ can assess both individual-level job stressors (i.e., job demands or job control) and workgroup-level or organizational-level job stressors (i.e., supervisor support or procedural justice) simultaneously. Thus, the results calculated at the workgroup-level or the organizational level can clarify the advantages and disadvantages of the workplace, encouraging employees to think about how to improve the work environment. However, in the Chinese language, no questionnaire can measure job-related factors and outcomes as comprehensively as the New BJSQ.

The purpose of this study was to examine the internal consistency reliability, test-retest reliability, and construct validity of the Chinese version of the New BJSQ among workers in China. The validation study would permit extending the use of the New BJSQ, which is currently limited only to the Japanese version. Based on the original scale development study²³, we hypothesized that the Chinese version of the New BJSQ would have high internal consistency, high intraclass correlation coefficient, and moderate structural validity.

Methods

Study design and participants

This current study aimed to validate the Chinese version of the New BJSQ. This manuscript was written according to the Consensus-based Standards for selecting health Measurement INstruments (COSMIN) study design checklist²⁸. We administered two Internet surveys among Chinese workers two weeks apart to test its reliability and validity. A Chinese Internet survey company managed the surveys, and all the participants had registered with the company. The first survey was conducted in May 2019, and the second one in June 2019. The invitation e-mail to participate in the study was sent to the registered members, and those who agreed to participate could access the online survey website. In the beginning, they were asked some questions related to demographic information (age, work contract, and occupation) to identify the participants who were eligible for the inclusion criteria mentioned below. The participants' inclusion criteria were Chinese full-time workers (except military) who lived in China and were 20–59 years old. A total of 516 individuals who passed the inclusion criteria participated in the baseline survey on a first-come, first-served basis. The participants were stratified by gender (males, females) and age (20–29, 30–39, 40–49, and 50–59). The response rate for the baseline sur-

vey could not be calculated because we surveyed the company. Those who have answered the baseline survey were asked to complete the follow-up survey. Fifty-two participants who completed baseline filled out the second survey on a first-come, first-served basis. All data were collected with a self-reported questionnaire. This research protocol has approved by the research ethics committee of the Graduate School of Medicine and the Faculty of Medicine, The University of Tokyo, Japan (No. 10003-(5)). Under the approved protocol, we obtained informed consent from every participant through the questionnaire on the website.

The development procedure of the Chinese version of the New BJSQ

The development process of the Chinese version of the New BJSQ complied with the International Society of Pharmacoeconomics and Outcomes Research (ISPOR) task force guidelines²⁹. First, we obtained permission from the original authors to translate the New BJSQ from Japanese into Chinese, which was done by a native Chinese speaker who is an expert in translation. The translated questionnaire was sent to three Chinese researchers (university researchers, two with a Ph.D. and one with a master's degree) in mental health fields for validation. After some corrections, a draft of the measurement was developed based on a consensus among the three Chinese researchers and two researchers working on this project (YH and NK). This version was back-translated into Japanese by a professional native Japanese translator who was not familiar with the questionnaire. The back-translated questionnaire was sent to the original authors and two other researchers specializing in occupational mental health. They reviewed its literal and conceptual equivalence, and the original author confirmed the back translation. Finally, one bilingual worker of Chinese and Japanese reviewed the Chinese version of the New BJSQ to verify if the items were appropriated, and the authors confirmed its cognitive equivalence.

Measures

The study's self-reported questionnaire included the newly developed Chinese version of the New BJSQ and demographic measures (gender, age, education, occupation, and worksite size (number of employees)). The Chinese version of the New BJSQ consists of 49 scales and 141 items, like the original version of the New BJSQ²³ (see Table 2). Each scale consists of one to 11 items rated on a four-point Likert scale ranging from 1 (Almost never) to 4 (Almost always) for the scales assessing health status (scale No. 36–41), from 1 (Extremely) to 4 (Not at all) for the

scales assessing social support (scale No. 17–19), from 1 (Satisfied) to 4 (Dissatisfied) for the scales assessing satisfaction (scale No. 42 and 43), and from 1 (Very much) to 4 (Not at all) for the other scales. We utilized the same method as the original study²³ to calculate each scale's score. Each scale (ranging from 1 to 4) was calculated by dividing the sum of the items' score by the number of items included. Before calculating the scale scores, all items were recoded so that higher scores indicated better psychosocial environment status (i.e., lower job stressors and higher resources) and outcomes.

Statistical Analysis

To evaluate the internal consistency, Cronbach's alpha coefficient was calculated for each subscale. A proportion of variance explained by the first factor in principal component analyses was calculated for scales with more than one item to examine their factor-based validity. Moreover, among those who answered the follow-up survey, the intra-class correlation coefficient (ICC) and Pearson's correlation coefficients were calculated to evaluate test-retest reliability. Confirmatory factor analyses were employed among the 34 scales of psychosocial work environment scales to verify whether the Chinese version of the New BJSQ would have the same four factor structure as the original version of the New BJSQ²³. The fit of the four-factor model was assessed using fit indices, specifically goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) predicted by the maximum likelihood method were examined. The standard scores for fit indices are GFI, AGFI, and CFI > 0.90 and RMSEA < 0.05³⁰. All analyses were conducted using SPSS Statistics version 22 and Amos version 26.

Sample size calculation

According to the COSMIN checklist²⁸, to test the construct validity, it is recommended to collect more than 100 participants in the study. The estimated sample size based on the calculation by Bonett³¹ was 18 participants to achieve Cronbach's alpha of 0.70 or greater for the scales included in the Chinese version of the New BJSQ, considering an alpha error rate of 0.05 and a beta error rate of 0.80. The estimated sample size was 11 participants to achieve ICC or Pearson's correlation coefficients of 0.7 or greater for the scales at an alpha error rate of 0.05 and a beta error rate of 0.80. G*Power 3 program was used for the sample size calculation^{32, 33}. In other words, more than 100 participants are required for the baseline survey, and

more than 11 participants are needed for the follow-up survey. According to the COSMIN checklist²⁸⁾, the required sufficient sample size for confirmatory factor analyses was 238 (34 factors*7). Thus, this study needed more than 238 participants.

Results

Participants' characteristics

A total of 516 and 52 Chinese workers responded to the baseline and follow-up surveys, respectively. The response rate of the follow-up survey was 10.1%. Table 1 lists the participants' characteristics, showing that 30.4% were professionals or technicians, 27.5% were managers, and 23.3% were clerks. More than 70% of them had a university with more education. The dataset did not contain any missing data because the respondents answered the questionnaires through the survey company's website, and the survey system could not process questionnaires with unanswered items.

Mean scores of the Chinese version of the New BJSQ scales

The average scores, standard deviations (SDs), kurtosis, and skewness of scales of the Chinese version of the New BJSQ are shown in Table 2. Average scores of almost all the scales ranged from 2.0 to 3.0. The scale of workplace harassment had the highest kurtosis (−1.12), and the scale of depression had the highest skewness (−0.85).

Internal consistency and test-retest reliability

The Cronbach's alpha coefficients of the Chinese version of the New BJSQ ranged from 0.51 to 0.91. Cronbach's alphas were greater than 0.70 for most subscales (see Table 3), although the internal consistency values ranged from 0.60 to 0.69 for role conflict, coworker support, and qualitative job overload and from 0.50 to 0.59 for interpersonal conflict, esteem reward, and job security. Among the 52 participants who completed the baseline and two-week follow-up survey, test-retest reliability was calculated using the intraclass correlation coefficient (ICC) and Pearson's correlation coefficients. ICCs were greater than 0.70 for several scales. Pearson's correlation coefficients were 0.50 or greater for most scales except for job control, predictability, leadership, preparedness for change, vigor, fatigue, anxiety, and depression with values smaller than 0.50. For anger-irritability, the correlation between baseline and follow-up survey was non-significant.

Factor-based validity of the Chinese version of the New

BJSQ

For most scales, the variance explained by the first factor in the principal component analysis exceeded 50% (Table 3). The variance explained was less than 50% for psychological stress reaction and physical stress reaction scales.

Construct validity (Structural validity)

The results of the confirmatory factor analysis are shown in Table 4. GFI, AGFI, CFI, and RMSEA fit indices for the four factors that were the same as in the original questionnaire were 0.67, 0.63, 0.70, and 0.10, respectively.

Discussion

In the present study, we developed the Chinese version of the New BJSQ (Appendix file 1). This questionnaire assesses a comprehensive set of job demands, job resources, and outcomes (psychological and physical stress reactions). The newly developed questionnaire showed good internal consistency reliability Cronbach's alpha coefficients > 0.7) for 39 (88.6%) out of the 44 calculatable subscales, with low internal consistency reliability (<0.6) for some scales (Role clarity, Qualitative job overload, Interpersonal conflict, Esteem reward, and Job security). The two-week test-retest reliability was acceptable for 41 (83.7%) out of the 49 subscales (Pearson's correlation coefficients ≥ 0.5) except for the following subscales: job control, predictability, leadership, preparedness for change, vigor, fatigue, anxiety, and depression. For the factor-based validity, the variance explained by the first factor exceeded 50% for most scales except for psychological stress reaction and physical stress reaction scales. However, the scale factor structure only moderately to poorly fit to the hypothesized factor structure. The study suggests that most subscales of the Chinese version of the New BJSQ are reliable. However, because the study tested only limited aspects of its validity and the scale structure may vary across cultures even if each scale is valid, further research is needed to investigate the validity of the questionnaire based on the present findings.

Most subscales of the Chinese version of the New BJSQ showed acceptable internal consistency levels (Cronbach's alpha > 0.70). The scales of Role clarity and Qualitative job overload had moderate (0.60–0.69) while Interpersonal conflict, Esteem reward, and Job security had low (0.50–0.59) scores. Test-retest reliability (ICC and Pearson's correlation coefficients) over two weeks was moderate. Although coefficients for most scales were greater than 0.50 and statistically significant, some scales had low cor-

Table 1. Demographic characteristics of employees who participated in baseline survey (N=516) and follow-up survey (N=52)

Demographic characteristics	Baseline	Follow-up
	N (%)	N (%)
Gender		
Male	258 (50.0%)	25 (48.1%)
Female	258 (50.0%)	27 (51.9%)
Age		
20–29	128 (24.8%)	4 (7.7%)
30–39	130 (25.2%)	16 (30.8%)
40–49	130 (25.2%)	21 (40.4%)
50–59	128 (24.8%)	11 (21.2%)
Occupation		
Managers	142 (27.5%)	14 (26.9%)
Professionals and Technicians	157 (30.4%)	16 (30.8%)
Clerks	120 (23.3%)	16 (30.8%)
Service workers	15 (2.9%)	1 (1.9%)
Transportation and telecommunications	30 (5.8%)	1 (1.9%)
Production workers and laborers	21 (4.1%)	2 (3.8%)
Others	31 (6.0%)	2 (3.8%)
Education		
Junior high school	1 (0.2%)	0 (0.0%)
High school	22 (4.3%)	2 (3.8%)
College	116 (22.5%)	14 (26.9%)
University	342 (66.3%)	31 (59.6%)
Graduate school	35 (6.8%)	5 (9.6%)
Worksite size (number of employees)		
–49	61 (11.8%)	12 (23.1%)
50–99	59 (11.4%)	6 (11.5%)
100–499	185 (35.9%)	19 (36.5%)
500–999	117 (22.7%)	3 (5.8%)
1,000–4,999	62 (12.0%)	10 (19.2%)
5,000–	32 (6.2%)	2 (3.8%)

relations, less than 0.40. The correlation between baseline and follow-up scores on the anger-irritability scale did not show a significant correlation. The internal consistency reliability for the anger-irritability scale was high (Cron-

bach's alpha of 0.85), while the test-retest reliability was extremely low. The discrepancy between the two measures of the scale reliability is puzzling, but may indicate that changing anger-irritability may be responsible for the low

Table 2. Averages, standard deviations (SDs), kurtosis, and skewness of the Chinese version of the New BJSQ scores collected at baseline (N=516)

Scales†	Number of items	Mean	SD	Kurtosis	Skewness
1. Quantitative job overload	3	2.29	0.64	−0.22	−0.08
2. Qualitative job overload	3	2.15	0.63	−0.19	0.27
3. Physical demands	1	2.78	0.85	−0.30	−0.44
4. Interpersonal conflict	3	2.80	0.59	−0.62	−0.11
5. Poor physical environment	1	2.75	0.86	−0.46	−0.34
6. Emotional demands	3	2.78	0.79	−0.93	−0.42
7. Role conflict	3	2.77	0.72	−0.62	−0.25
8. Work-self balance (negative)	2	2.39	0.73	−0.41	0.12
Job demands summary	19	2.59	0.44	−0.28	−0.18
9. Job control	3	2.75	0.65	−0.26	−0.19
10. Suitable jobs	1	2.92	0.70	0.05	−0.31
11. Skill utilization	1	2.79	0.87	−0.33	−0.48
12. Meaningfulness of work	3	2.93	0.70	0.07	−0.56
13. Role clarity	3	2.97	0.60	0.26	−0.52
14. Career opportunity	3	2.86	0.70	−0.52	−0.28
15. Novelty	3	2.50	0.76	−0.60	−0.05
16. Predictability	3	2.65	0.65	0.44	−0.60
Task-level job resources summary	20	2.80	0.36	−0.26	−0.09
17. Supervisor support	3	2.64	0.67	−0.22	−0.26
18. Coworker support	3	2.87	0.56	−0.05	−0.14
19. [Support from family and friends]	3	3.16	0.65	−0.73	−0.30
20. Monetary/status reward	2	2.99	0.70	−0.16	−0.44
21. Esteem reward	2	2.95	0.65	−0.40	−0.13
22. Job security	3	2.67	0.66	−0.40	−0.04
23. Leadership	3	2.75	0.67	0.28	−0.63
24. Interactional justice	3	2.73	0.70	−0.44	−0.20
25. Workplace where people complement each other	3	2.78	0.73	−0.36	−0.47
26. Workplace where mistakes are acceptable	2	2.60	0.83	−0.73	−0.10
27. Collective efficacy	3	2.85	0.65	0.03	−0.46
Workgroup-level job resources summary	30	2.78	0.46	−0.02	−0.29
28. Trust with management	3	2.90	0.64	−0.11	−0.39
29. Preparedness for change	3	2.79	0.73	−0.51	−0.34
30. Procedural justice	3	2.72	0.73	−0.43	−0.41
31. Respect for individuals	3	2.76	0.70	−0.25	−0.33
32. Fair personnel evaluation	3	2.72	0.76	−0.44	−0.37
33. Diversity	3	2.61	0.78	−0.53	−0.37
34. Career development	5	2.75	0.67	−0.41	−0.41
35. Work-self balance (positive)	2	2.78	0.70	−0.25	−0.31
Organizational-level resources summary	25	2.75	0.56	0.10	−0.35

Table 2. Continued

Scales†	Number of items	Mean	SD	Kurtosis	Skewness
36. Vigor	3	2.56	0.75	-0.65	-0.13
37. Anger-irritability	3	2.94	0.74	-0.58	-0.44
38. Fatigue	3	2.75	0.76	-0.62	-0.41
39. Anxiety	3	3.08	0.65	-0.13	-0.60
40. Depression	6	3.17	0.61	0.28	-0.85
Psychological stress reaction (total)	18	2.94	0.54	-0.44	-0.38
41. Physical stress reaction	11	3.06	0.57	-0.44	-0.42
42. Job satisfaction	1	2.98	0.70	0.20	-0.39
43. [Satisfaction with family life]	1	3.18	0.71	-0.23	-0.48
44. Workplace harassment	2	3.07	1.00	-1.12	-0.61
45. Workplace social capital	3	2.93	0.66	0.12	-0.54
46. Work engagement	2	2.93	0.66	-0.60	-0.24
47. Performance of a duty	3	2.76	0.78	-0.01	-0.49
48. Realization of creativity	3	3.00	0.69	0.20	-0.76
49. Active learning	3	2.91	0.65	-0.35	-0.33

†[] indicates non-work environment or outcome. According to the original paper, each scale score was converted so that the higher score indicates better state and ranges from 1 to 4.

test-retest reliability. Anger-irritability is affected by the social environment more among Chinese than Americans³⁴⁾. Anger-irritability of participants may have fluctuated depending on the social situation where they had at each time point. It would be useful how cultural differences in expression of anger could affect the stability of anger. Principal component analyses of scale items revealed that the first factor explained 50% or more variance in most scales, suggesting factor-based validity of these scales. GFI, AGFI, CFI, and RMSEA scores were below standard values (i.e., GFI, AGFI, and CFI > 0.90 and RMSEA < 0.05)³⁰⁾, indicating that the Chinese version of the New BJSQ was not well fitted to the structural model of the original New BJSQ. Such a moderate fitness could have resulted from insufficient cognitive debriefing. In summary, the current study partially supported the reliability and validity of the newly developed Chinese version of the New BJSQ.

Test-retest reliability of some scales (Role clarity, Qualitative job overload, Interpersonal conflict, Esteem reward, and Job security) in this newly developed questionnaire was moderate or low. The Cronbach's alpha coefficients for the scale of Interpersonal conflict, Role clarity, and Job security were also reasonable in the original Japanese questionnaire²³⁾. In this study, random sampling was not employed for the follow-up survey, and a Likert scale, which asks for a variation of the respondents' physical and mental

status, was not used. Thus, we could not detect and exclude the respondents whose physical or mental health states changed significantly from the baseline survey to the follow-up survey, which might have decreased the test-retest reliability of this questionnaire.

The confirmatory factor analysis of the Chinese New BJSQ did not achieve the recommended model fit. We conducted an ad-hoc exploratory factor analysis (EFA) to detect the Chinese version's data-based structure. The EFA revealed a three-factor structure (the results can be shown upon the request). The first factor included job resource items; the second comprised job demand items, including skill utilization; and the third contained only job security. In the Japanese version of the New BJSQ, skill utilization is classified as a task-level job resource based on the job demands-resources model (JD-R model)^{35, 36)}. On the other hand, another model for evaluating job stress is the National Institute for Occupational Safety and Health (NIOSH) job stress model³⁷⁾, where underutilization of skills is proposed as a job stressor that can elicit stress reaction. Earlier studies have shown that skill underutilization is associated with increased risk for depressive symptoms³⁸⁾ and hypertension³⁹⁾. Therefore, skill utilization may act as a resource or stressor, and in this newly developed Chinese version of the new BJSQ, it may be linked to job demand, unlike the Japanese version. The third factor from the EFA contained

Table 3. Internal consistency, two-week test-retest reliability, and factor-based validity of the Chinese version of the New BJSQ scales

Scales†	Cronbach's alpha coefficient (N=516)	Proportion explained by the first factor (%) (N=516)	Two-week test-retest (ICC) § (N=52)	Two-week test-retest (Pearson's r) § (N=52)
Job demands				
1. Quantitative job overload	0.75	66.6	0.72**	0.73**
2. Qualitative job overload	0.68	61.3	0.77**	0.77**
3. Physical demands	NC	NC	0.50**	0.51**
4. Interpersonal conflict	0.51	57.2	0.71**	0.71**
5. Poor physical environment	NC	NC	0.46**	0.50**
6. Emotional demands	0.82	73.2	0.68**	0.67**
7. Role conflict	0.79	70.5	0.64**	0.64**
8. Work-self balance (negative)	0.78	82.3	0.52**	0.53**
Job resources: task-level				
9. Job control	0.79	70.3	0.41**	0.40**
10. Suitable jobs	NC	NC	0.52**	0.54**
11. Skill utilization	NC	NC	0.62**	0.71**
12. Meaningfulness of work	0.84	76.1	0.77**	0.78**
13. Role clarity	0.61	57.4	0.63**	0.64**
14. Career opportunity	0.83	74.4	0.77**	0.76**
15. Novelty	0.83	74.7	0.56**	0.56**
16. Predictability	0.77	68.5	0.45**	0.45**
Job resources: workgroup-level				
17. Supervisor support	0.76	67.7	0.64**	0.64**
18. Coworker support	0.63	57.2	0.63**	0.63**
19. [Support from family and friends]	0.76	68.0	0.66**	0.66**
20. Monetary/status reward	0.78	82.1	0.73**	0.74**
21. Esteem reward	0.58	70.6	0.61**	0.60**
22. Job security	0.58	55.1	0.63**	0.63**
23. Leadership	0.80	72.4	0.48**	0.48**
24. Interactional justice	0.82	73.8	0.71**	0.70**
25. Workplace where people complement each other	0.84	76.3	0.59**	0.59**
26. Workplace where mistakes are acceptable	0.81	84.2	0.52**	0.51**
27. Collective efficacy	0.82	74.1	0.51**	0.51**
Job resources: organizational-level				
28. Trust with management	0.79	70.6	0.83**	0.83**
29. Preparedness for change	0.82	73.3	0.49**	0.49**
30. Procedural justice	0.81	72.9	0.61**	0.61**
31. Respect for individuals	0.81	73.1	0.73**	0.75**

Table 3. Continued

Scales†	Cronbach's alpha coefficient (N=516)	Proportion explained by the first factor (%) (N=516)	Two-week test-retest (ICC) § (N=52)	Two-week test-retest (Pearson's r) § (N=52)
32. Fair personnel evaluation	0.85	77.1	0.74**	0.74**
33. Diversity	0.82	74.0	0.62**	0.62**
34. Career development	0.85	63.0	0.76**	0.77**
35. Work-self balance (positive)	0.83	85.4	0.52**	0.51**
Outcomes				
36. Vigor	0.88	80.2	0.29*	0.28**
37. Anger-irritability	0.85	77.7	0.20	0.20
38. Fatigue	0.87	79.1	0.44**	0.44**
39. Anxiety	0.79	70.3	0.37**	0.37**
40. Depression	0.87	61.0	0.48**	0.49**
Psychological stress reaction (total)	0.93	45.0	0.62**	0.63**
41. Physical stress reaction	0.89	47.4	0.52**	0.53**
42. Job satisfaction	NC	NC	0.70**	0.70**
43. [Satisfaction with family life]	NC	NC	0.76**	0.76**
44. Workplace harassment	0.91	91.5	0.88**	0.88**
45. Workplace social capital	0.81	73.4	0.66**	0.67**
46. Work engagement	0.83	85.4	0.67**	0.67**
47. Performance of a duty	0.79	70.5	0.55**	0.56**
48. Realization of creativity	0.85	76.8	0.63**	0.63**
49. Active learning	0.81	72.6	0.52**	0.54**

** $p < 0.01$ * $p < 0.05$

NC: Not calculated because of one-item scale. †[] indicates non-work environment or outcome.

§: Calculated among respondents of the follow-up.

only job security item. In the Japanese version of New BJSQ, job security is recognized as a job resource, which may not be the case for the Chinese version. Employees in collectivistic countries, such as China and Japan, are believed to react more sensitively to the threat of job insecurity compared to employees in individualistic countries (e.g., United States of America)⁴⁰. For this reason, job security may have a positive effect on the mind of workers. However, recent human resources in China have become more fluid, like the United States these days. Thus, job security might not be as highly valued as it used to be, and it may act less as a job resource among Chinese workers.

As introduced, the New BJSQ can comprehensively assess psychosocial workplace environments and their em-

ployee and organizational outcomes. It can be used to compare the national average score and evaluate the workplace environment, or the workplace and employee states, to prevent the diverse effect of the workplace stressors and promote positive health at work²³). Thus, to validate the evidence of the Chinese version of the New BJSQ, a longitudinal observational study or an intervention study should incorporate the new scale to assess the work environment.

Limitation

This study has several limitations that should be considered. First, all the recruited participants were Chinese peo-

Table 4. Confirmatory factor analysis of 34 psychosocial work environment subscales of the Chinese version of the New BJSQ

Scales		Job demands	Task-level job resources	Workgroup-level job resources	Organizational-level job resources
1.	Quantitative job overload	0.49			
2.	Qualitative job overload	0.07			
3.	Physical demands	0.38			
4.	Interpersonal conflict	0.60			
5.	Poor physical environment	0.50			
6.	Emotional demands	0.82			
7.	Role conflict	0.75			
8.	Work-self balance (negative)	0.41			
9.	Job control		0.54		
10.	Suitable jobs		0.54		
11.	Skill utilization		0.67		
12.	Meaningfulness of work		0.51		
13.	Role clarity		0.75		
14.	Career opportunity		−0.36		
15.	Novelty		0.48		
16.	Predictability		0.17		
17.	Supervisor support			0.62	
18.	Coworker support			0.65	
19.	Monetary/status reward			0.66	
20.	Esteem reward			0.66	
21.	Job security			0.18	
22.	Leadership			0.73	
23.	Interactional justice			0.79	
24.	Workplace where people complement each other			0.74	
25.	Workplace where mistakes are acceptable			0.53	
26.	Collective efficacy			0.73	
27.	Trust with management				0.82
28.	Preparedness for change				0.65
29.	Procedural justice				0.69
30.	Respect for individuals				0.83
31.	Fair personnel evaluation				0.80
32.	Diversity				0.73
33.	Career development				0.86
34.	Work-self balance (positive)				0.67

Goodness-of-fit indicator: GFI=0.67, AGFI=0.63, CFI=0.70, and RMSEA=0.10.

ple living in China who registered with the Internet survey company; therefore, the findings' generalizability is limited. Another validation study should be conducted with Chinese workers in Japan to use this questionnaire among them. Second, the participants in this research had higher educational background compared to the national representative survey⁴¹⁾, and those who had lower educational background might not enter the survey. This may cause a selection bias. There is a possibility that high educated population may pay attention to their psychological stress more than lower educated population; therefore, they answered the surveys more precisely, which might make the reliability of the newly developed questionnaire higher. Third, random sampling was not employed at baseline and follow-up, and since we used the company, we were not able to calculate the response rate for the baseline survey. Moreover, we stopped recruiting for the follow-up survey when the number of participants reached over fifty. For these reasons, the results may have been affected by the selection bias to some extent. Fourth, for cognitive debriefing, we could approach only one Chinese worker who was working in Japan. The ISPOR guideline²⁹⁾ recommends engaging 5–8 individuals who would be practical users of this questionnaire. Because of this flawed process, the cross-cultural validity of this questionnaire could not be established. Moreover, the present study provided partial support for the construct validity of the Chinese version of the New BJSQ by calculating a proportion of variance explained by the first factor and conducting factor analyses. However, convergent and discriminant validities of this newly developed questionnaire were not examined; thus, future research should include other highly reliable and valid measurements (i.e., Job Content Questionnaire [JCQ]¹²⁾, Kessler 6 [K6]⁴²⁾, among others) to validate this scale. Fifth, a few scales of the Chinese version of the New BJSQ showed only modest internal consistency, and several scales showed medium to low test-retest reliability. Further review of these items and cognitive debriefing with a corporate from Chinese workers living in China is needed to achieve higher measurement accuracy. Finally, since the confirmatory factor analysis did not reach acceptable model fit³⁰⁾, further study on the factor structure of the Chinese version of the New BJSQ is needed.

Conclusion

This study examined the structure of the Chinese version of the New BJSQ and its internal consistency, test-retest reliability, and construct validity among workers in China.

The questionnaire had good reliability and moderate to low validity. While further study is needed to improve its validity, this newly developed questionnaire could be used to measure individual job demands or resources and evaluate China's workplace situation.

Acknowledgment

The present study was funded by Fujitsu Software technologies limited. The study's sponsor played no role in the study design, data collection, data analysis, data interpretation, or report writing. The authors had access to the data in the study and the final responsibility for submitting the paper.

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新版工作压力简易调查表

A. 对您的工作进行提问。请在最符合的项目处画○。

	完全如此	基本如此	不全是这样	从来没有过
工作量负担（3项）				
1. 有非常多的工作要做	1分	2分	3分	4分
2. 无法在规定时间内处理完工作	1分	2分	3分	4分
3. 不得不拼命努力干活	1分	2分	3分	4分
工作量负担 = (No. 1 + No. 2 + No. 3) / 3				
工作性质负担（3项）				
4. 必须高度集中注意力	1分	2分	3分	4分
5. 工作难度高，需要专业知识和技术	1分	2分	3分	4分
6. 工作时间内必须一直考虑工作的事	1分	2分	3分	4分
工作性质负担 = (No. 4 + No. 5 + No. 6) / 3				
身体负担程度（1项）				
7. 是非常消耗体力的工作	1分	2分	3分	4分
工作掌控（3项）				
8. 能够按照自己的节奏来工作	4分	3分	2分	1分
9. 能够自己决定工作的顺序和方法	4分	3分	2分	1分
10. 能够将自己的意见反映到职场工作方针上	4分	3分	2分	1分
工作掌控 = (No. 8 + No. 9 + No. 10) / 3				
技能运用（1项）				
11. 很少在工作中使用自己的技能和知识	1分	2分	3分	4分
职场人际关系（3项）				
12. 自己的部门内存在意见分歧	1分	2分	3分	4分
13. 自己的部门与其他部门不合	1分	2分	3分	4分
14. 自己职场的氛围友好	4分	3分	2分	1分
职场人际关系 = (No. 12 + No. 13 + No. 14) / 3				
工作环境（1项）				
15. 自己工作的作业环境（噪音、照明、温度、通风等）不佳	1分	2分	3分	4分
工作适应性（1项）				
16. 工作适合自己	4分	3分	2分	1分
工作价值（3项）				

17. 工作值得做	4 分	3 分	2 分	1 分
64. 自己的工作具有意义	4 分	3 分	2 分	1 分
65. 觉得自己的工作很重要	4 分	3 分	2 分	1 分
工作价值 = (No. 17 + No. 64 + No. 65) / 3				

B. 对您最近 1 个月的状态进行提问。请在最符合的项目处画○。

	基本没有	偶尔有	经常有	基本总是有
活力 (3 项)				
18. 充满活力	1 分	2 分	3 分	4 分
19. 精力充沛	1 分	2 分	3 分	4 分
20. 生气勃勃	1 分	2 分	3 分	4 分
活力 = (No. 18 + No. 19 + No. 20) / 3				
焦虑感 (3 项)				
21. 感觉愤怒	4 分	3 分	2 分	1 分
22. 心中生气	4 分	3 分	2 分	1 分
23. 情绪急躁	4 分	3 分	2 分	1 分
焦虑感 = (No. 21 + No. 22 + No. 23) / 3				
疲劳感 (3 项)				
24. 非常疲劳	4 分	3 分	2 分	1 分
25. 精疲力竭	4 分	3 分	2 分	1 分
26. 身体困倦	4 分	3 分	2 分	1 分
疲劳感 = (No. 24 + No. 25 + No. 26) / 3				
不安感 (3 项)				
27. 心情紧张	4 分	3 分	2 分	1 分
28. 感到不安	4 分	3 分	2 分	1 分
29. 无法镇定	4 分	3 分	2 分	1 分
不安感 = (No. 27 + No. 28 + No. 29) / 3				
抑郁感 (6 项)				
30. 忧郁	4 分	3 分	2 分	1 分
31. 做任何事都觉得麻烦	4 分	3 分	2 分	1 分
32. 无法专注于事物	4 分	3 分	2 分	1 分
33. 心情不畅	4 分	3 分	2 分	1 分
34. 无法专心工作	4 分	3 分	2 分	1 分
35. 感觉悲伤	4 分	3 分	2 分	1 分
抑郁感 = (No. 30 + No. 31 + No. 32 + No. 33 + No. 34 + No. 35) / 6				

心理应激反应= (No. 18-35 之和) / 18				
身体症状 (11 项)				
36. 眩晕	4 分	3 分	2 分	1 分
37. 关节酸痛	4 分	3 分	2 分	1 分
38. 头晕、头疼	4 分	3 分	2 分	1 分
39. 颈肩酸痛	4 分	3 分	2 分	1 分
40. 腰疼	4 分	3 分	2 分	1 分
41. 眼睛疲劳	4 分	3 分	2 分	1 分
42. 心悸、气喘	4 分	3 分	2 分	1 分
43. 肠胃不舒服	4 分	3 分	2 分	1 分
44. 没有食欲	4 分	3 分	2 分	1 分
45. 便秘、腹泻	4 分	3 分	2 分	1 分
46. 睡眠不好	4 分	3 分	2 分	1 分
身体症状 = (No. 36-46 之和) / 11				

C. 请回答以下关于您周围人的相关问题。请在最符合的项目处画○。

来自上司、同事、家人、朋友的支持 (各 3 项)	非常能够	相当能够	稍微能够	完全不能
以下人员能够轻松交谈的程度如何?				
47. 上司	4 分	3 分	2 分	1 分
48. 单位同事	4 分	3 分	2 分	1 分
49. 配偶、家人、朋友等	4 分	3 分	2 分	1 分
您遇到困难时, 以下人员对您提供帮助的程度如何?				
50. 上司	4 分	3 分	2 分	1 分
51. 单位同事	4 分	3 分	2 分	1 分
52. 配偶、家人、朋友等	4 分	3 分	2 分	1 分
当您征求与个人事务相关的建议时, 以下人员能够倾听的程度如何?				
53. 上司	4 分	3 分	2 分	1 分
54. 单位同事	4 分	3 分	2 分	1 分
55. 配偶、家人、朋友等	4 分	3 分	2 分	1 分
来自上司的支持 = (No. 47 + No. 50 + No. 53) / 3 来同事的支持= (No. 48 + No. 51 + No. 54) / 3 来家人和朋友的支持= (No. 53 + No. 54 + No. 55) / 3				

D. 请回答以下关于满意度的相关问题。请在最符合的项目处画○。

	满意	较为满意	不太满意	不满意
工作满意度				
56. 对工作感到满意-----	4 分	3 分	2 分	1 分
家庭满意度				
57. 对家庭生活感到满意-----	4 分	3 分	2 分	1 分

E. 请您回答以下关于您工作的具体情况的问题。并在最符合的选项处画○。

	是这样	基本是这样	不全是这样	不是这样
情绪负担 (3 项)				
58. 工作上, 有时心情或情绪会被搅乱	1 分	2 分	3 分	4 分
59. 是在情感方面有负担的工作	1 分	2 分	3 分	4 分
60. 是容易卷入情感的工作	1 分	2 分	3 分	4 分
情绪负担 = (No. 58 + No. 59 + No. 60) / 3				
职责纠葛 (3 项)				
61. 不能按照自己认为正确的方法来做工作	1 分	2 分	3 分	4 分
62. 被多人要求做相互矛盾的事情	1 分	2 分	3 分	4 分
63. 在没有足够人手和资源的情况下, 被分配工作	1 分	2 分	3 分	4 分
职责纠葛 = (No. 61 + No. 62 + No. 63) / 3				
职责明确性 (3 项)				
66. 知道自己的职务和责任是什么	4 分	3 分	2 分	1 分
67. 自己的工作权限是清晰的	4 分	3 分	2 分	1 分
68. 有人向我解释在工作中应该做什么	4 分	3 分	2 分	1 分
职责明确性 = (No. 66 + No. 67 + No. 68) / 3				
发展机会 (3 项)				
69. 工作中有学习新东西的机会	4 分	3 分	2 分	1 分
70. 工作中可以得到提高自己的机会	4 分	3 分	2 分	1 分
71. 职场中能够充分提升自己的技能	4 分	3 分	2 分	1 分
发展机会 = (No. 69 + No. 70 + No. 71) / 3				
新奇性 (3 项)				
72. 经常从事以前未做过的工作类型	1 分	2 分	3 分	4 分
73. 是每次都需要新技术和知识的工作	1 分	2 分	3 分	4 分
74. 工作上, 会遇到以前未经历过的事情	1 分	2 分	3 分	4 分

新奇性 = (No. 72 + No. 73 + No. 74) / 3				
可预测性（3 项）				
75. 知道大概什么时候自己的工作量会增加	4 分	3 分	2 分	1 分
76. 可预想大概什么时候自己的工作可告一段落	4 分	3 分	2 分	1 分
77. 可预测大概什么时候工作上会出问题	4 分	3 分	2 分	1 分
可预测性 = (No. 72 + No. 73 + No. 74) / 3				

F. 请回答以下关于您工作职场的相关问题。请在最符合的项目处画○。

	是这样	基本是这样	不全是这样	不是这样
经济及职位方面的报酬（2 项）				
78. 领取与自己工作相称的工资和奖金	4 分	3 分	2 分	1 分
79. 担任与自己能力和经历相称的职位、职务	4 分	3 分	2 分	1 分
经济及职位方面的报酬 = (No. 78 + No. 79) / 2				
尊重方面的报酬（2 项）				
80. 自己受到上司的适正评价	4 分	3 分	2 分	1 分
81. 受到同事对自己工作上的适正对待	4 分	3 分	2 分	1 分
尊重方面的报酬 = (No. 80 + No. 81) / 2				
稳定方面的报酬（3 项）				
82. 升职希望小	1 分	2 分	3 分	4 分
83. 担心失去工作	1 分	2 分	3 分	4 分
84. 正在职场经历不好的变动。或者今后可能会出现这种状况	1 分	2 分	3 分	4 分
稳定方面的报酬 = (No. 82 + No. 83 + No. 84) / 3				
上司领导能力（3 项）				
85. 上司会对我的工作表现给予反馈	4 分	3 分	2 分	1 分
86. 上司让下属能够有机会施展能力	4 分	3 分	2 分	1 分
87. 上司鼓励我去自己解决问题	4 分	3 分	2 分	1 分
上司领导能力 = (No. 85 + No. 86 + No. 87) / 3				
上司公正态度（3 项）				
88. 上司能够不独断专行地看待事物	4 分	3 分	2 分	1 分
89. 上司亲切，关怀地对待自己	4 分	3 分	2 分	1 分
90. 上司以诚恳的态度对待自己	4 分	3 分	2 分	1 分
上司公正态度 = (No. 88 + No. 89 + No. 90) / 3				
职场中可获得表扬（3 项）				
91. 认真工作，便可获得表扬	4 分	3 分	2 分	1 分
92. 努力工作，便可获得表扬	4 分	3 分	2 分	1 分
93. 完成那些理所当然的事情也可获得表扬	4 分	3 分	2 分	1 分
职场中可获得表扬 = (No. 91 + No. 92 + No. 93) / 3				

职场中允许失败（2 项）				
94. 是能够将危机变成机会的职场	4 分	3 分	2 分	1 分
95. 是即使失败也有机会挽回的职场	4 分	3 分	2 分	1 分
职场中允许失败 = (No. 94 + No. 95) / 2				
团队能力（3 项）				
96. 对自己所属团队的工作能力非常高这一点有信心	4 分	3 分	2 分	1 分
97. 对自己所属团队能够妥善处理突发事件这一点有信心	4 分	3 分	2 分	1 分
98. 整体来看，自己所属团队解决问题的能力强	4 分	3 分	2 分	1 分
团队能力 = (No. 96 + No. 97 + No. 98) / 3				

G. 对您工作的公司或组织进行提问。请在最符合的项目处画○。

	是这样	基本是这样	不全是这样	不是这样
与管理层的信赖关系（3 项）				
99. 管理层信赖员工的工作表现	4 分	3 分	2 分	1 分
100. 管理层发布的信息值得信赖	4 分	3 分	2 分	1 分
101. 管理层认真对待员工提出的建议	4 分	3 分	2 分	1 分
与管理层的信赖关系 = (No. 99 + No. 100 + No. 101) / 3				
应对变动（3 项）				
102. 有机会询问上司，职场及工作的变动	4 分	3 分	2 分	1 分
103. 职场及工作中有变动时，会听取员工意见	4 分	3 分	2 分	1 分
104. 职场及工作中有变动时，会提前说明	4 分	3 分	2 分	1 分
应对变动 = (No. 102 + No. 103 + No. 104) / 3				
手续公正性（3 项）				
105. 所有因决策而受到影响的人员都能参与该决策的制定过程	4 分	3 分	2 分	1 分
106. 决策具有一贯性（规则同様地适用于所有员工）	4 分	3 分	2 分	1 分
107. 进行决策之前，会听取受影响人群的想法	4 分	3 分	2 分	1 分
手续公正性 = (No. 105 + No. 106 + No. 107) / 3				
尊重个人（3 项）				
108. 考虑每一个人的长处及擅长领域之后，再分配工作	4 分	3 分	2 分	1 分
109. 是尊重每一个人价值观的职场	4 分	3 分	2 分	1 分
110. 有机会在公司内找到适合自己的工作及职场	4 分	3 分	2 分	1 分
尊重个人 = (No. 108 + No. 109 + No. 110) / 3				
公正的人事评估（3 项）				
111. 关于人事评估结果，有充分的说明	4 分	3 分	2 分	1 分
112. 关于工作方针及职责，有令人信服的说明	4 分	3 分	2 分	1 分
113. 人事评估标准明确	4 分	3 分	2 分	1 分
公正的人事评估 = (No. 111 + No. 112 + No. 113) / 3				

应对各种劳动者（3 项）				
114. 公司为女性、老年人和残疾人士提供舒适的工作环境	4 分	3 分	2 分	1 分
115. 公司为年轻人提供舒适的工作环境	4 分	3 分	2 分	1 分
116. 职场中，各种身份的人（正式员工、非正式员工、临时工等）都作为公司或组织的一员受到平等地尊重	4 分	3 分	2 分	1 分
应对各种劳动者 = (No. 114 + No. 115 + No. 116) / 3				
职业形成（5 项）				
117. 激发员工工作热情，或实施有益于职业的教育	4 分	3 分	2 分	1 分
118. 人事管理中包括员工从早期入职阶段开始的职业发展内容	4 分	3 分	2 分	1 分
119. 针对不同集团和个人的教育、培训目标明确	4 分	3 分	2 分	1 分
120. 自己职场中，任何人都能够在需要时接受必要的教育、培训	4 分	3 分	2 分	1 分
121. 自己职场中，认为培养员工很重要	4 分	3 分	2 分	1 分
职业形成 = (No. 117 + No. 118 + No. 119 + No. 120 + No. 121) / 5				
工作生活平衡（消极）（2 项）				
122. 因为考虑工作的事，无法充实自己的生活	1 分	2 分	3 分	4 分
123. 因为工作上的日程安排，无法充实自己的生活	1 分	2 分	3 分	4 分
工作生活平衡（消极） = (No. 122 + No. 123) / 2				
工作生活平衡（积极）（2 项）				
124. 运用工作中学到的东西，充实了自己的生活	4 分	3 分	2 分	1 分
125. 通过在工作中获得能量，进一步充实了自己的生活	4 分	3 分	2 分	1 分
工作生活平衡（积极） = (No. 124 + No. 125) / 2				

H. 对您工作的状况及成果进行提问。请在最符合的项目处画○。

<结果>	是这样	基本是这样	不全是这样	不是这样
职场骚扰（2 项）				
126. 自己在职场中遭遇欺负（霸凌）（包括性骚扰、职权骚扰）	1 分	2 分	3 分	4 分
127. 有人在职场中遭遇欺负（霸凌）（包括性骚扰、职权骚扰）	1 分	2 分	3 分	4 分
职场骚扰 = (No. 126 + No. 127) / 2				
职场一体感（社会资本）（3 项）				
128. 我们职场中，有团队意识	4 分	3 分	2 分	1 分
129. 我们职场中，大家互相理解并认同	4 分	3 分	2 分	1 分
130. 我们职场中，能够共享工作相关信息	4 分	3 分	2 分	1 分
职场一体感（社会资本） = (No. 128 + No. 129 + No. 130) / 3				
工作敬业度（2 项）				
131. 工作时，感觉充满活力	4 分	3 分	2 分	1 分
132. 对自己的工作感到自豪	4 分	3 分	2 分	1 分
工作敬业度 = (No. 131 + No. 132) / 2				

执行职务（3 项）				
133. 较之其他人，觉得自己本月的工作表现更好	4 分	3 分	2 分	1 分
134. 被指派的工作已认真完成	4 分	3 分	2 分	1 分
135. 充分完成被期望的工作	4 分	3 分	2 分	1 分
执行职务 = (No. 133 + No. 134 + No. 135) / 3				
发挥创造性（3 项）				
136. 工作中积极动脑筋和想办法	4 分	3 分	2 分	1 分
137. 对工作上的问题思考新的解决方案	4 分	3 分	2 分	1 分
138. 对工作方法提出新的建议	4 分	3 分	2 分	1 分
发挥创造性 = (No. 136 + No. 137 + No. 138) / 3				
积极学习（3 项）				
139. 能够通过工作有效地提高自己	4 分	3 分	2 分	1 分
140. 通过掌握新事物，享受刺激	4 分	3 分	2 分	1 分
141. 经历新事物，获得成长	4 分	3 分	2 分	1 分
积极学习 = (No. 139 + No. 140 + No. 141) / 3				

If you wish to use the Chinese version of New Brief Job Stress Questionnaire, please contact the first author.
如果您想使用《新版工作压力简易调查表》中文版，请联系第一作者。

Yui Hidaka: yui.hidaka11729@gmail.com