

Measuring eudemonic well-being at work: a validation study for the 24-item the University of Tokyo Occupational Mental Health (TOMH) well-being scale among Japanese workers

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Received May 8, 2019 and accepted July 24, 2019

Published online in J-STAGE August 1, 2019

Abstract: Although the eudemonic perspective seems to be a promising in considering vocational identity among working population, well-being at work has been discussed primarily in terms of subjective/hedonic well-being. This study aimed to develop a new tool to measure eudemonic well-being at work (The University of Tokyo Occupational Mental Health [TOMH] well-being 24 scale) and investigate its validity in a collectivist culture. Two online surveys were conducted with a total of 1,760 workers in Japan. We created 89 potential items from existing scales. An exploratory factor analysis indicated eight factors for the dimensions of measurement. After item selection based on item response theory, the factor structure with three items from each of the eight dimensions indicated an excellent fit for another sample. Cronbach's α and intra-class coefficients ranged from 0.671 to 0.845. The scores of the tool were more strongly associated with subjective well-being in the work context rather than well-being in general. In addition, the participants in the group demonstrating a higher risk for mental illness and a more stressful work environment indicated significantly lower scores, even after adjusting for general eudemonic well-being. The new measurement may be useful both for academic and practical applications for measuring eudemonic well-being at work, independent from general eudemonic well-being.

Key words: Scale development, Psychometry, Item response theory, Eudemonia, Workers

Introduction

Well-being has been a central concept for promoting health and positive psychology in recent years. Its importance is recognized not only in psychological and health

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fields, but also in economics, sociology, management, and education^{1,2}). Well-being has critically different traits from the absence of negative factors³), having independent impacts on health and mortality^{4,5}). For working populations, well-being is also an indispensable indicator of positive association with human capital and productivity⁶).

There are two main conceptual types of well-being: hedonic and eudemonic^{7,8}). The former refers to emotional aspects of positive psychology. One of the famous theories in this type of well-being, theory of subjective well-being (SWB), suggested three dimensions of well-being: pleasant affect, unpleasant affect, and life satisfaction⁹). SWB is defined as a person's cognitive and affective evaluations of his or her life as a whole, including emotional reactions to events and cognitive judgements of satisfaction and fulfillment¹⁰). High levels of subjective well-being are beneficial in lowering morbidity, decreasing symptoms and pain, and increasing longevity¹¹). The latter type of well-being focuses on elements of a "good" or valuable life, such as purpose, growth, and meaning. The most well-known example of this type of well-being is psychological well-being (PWB), a theory developed by Ryff¹²) indicating six dimensions of eudemonic well-being: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. PWB has deeper philosophical roots and captures the essence of ancient Greek imperatives: to know yourself and to become what you are¹²). While these two types of well-being are correlated, their functions for health and productive outcomes differ^{2,13}). For instance, Straume and Vitterø¹³) reviewed functional differences between SWB and PWB, arguing that they are based on different groups of emotions: "pleasure" and "interest," respectively. They also reported that the former group of emotions is strongly correlated with happiness and satisfaction while the latter is strongly correlated with engagement, involvement, and inspiration. These findings suggest that SWB and PWB play different roles in regulating behaviors and have different antecedents and outcomes.

Practice and research for well-being in various domains and contexts (e.g., school, home, workplace) have become more common¹⁴). For example, concepts of positive psychology for children and adolescents require a developmental perspective and unique aspects¹⁵). It is reasonable to consider unique structures and outcomes of well-being among children and adolescents since they may be more sensitive to adaptation in school life and academic evaluation, rather than to life in general. Among the working population, domain-specific concepts of well-being

(i.e., well-being at work) are also applicable and useful as a major determinant of work-related outcomes such as productivity⁶). A recent review on positive psychology at work¹⁶) indicated various positive concepts at work such as commitment, engagement, resilience, psychological capital, positive teamwork, and leadership. Some of them could be re-conceptualized as unique factors of well-being at work.

Unfortunately, well-being at work has been discussed primarily in subjective/hedonic terms and eudemonic well-being has rarely been investigated. Previous studies have noted that well-being at work consists of emotional (e.g., positive affect at work) and cognitive (e.g., job satisfaction) components^{17,18}), which are both included in subjective well-being. Indeed, many psychosocial intervention studies in work-related settings have adopted positive affect or job satisfaction as notable outcomes of well-being^{19–22}). The eudemonic perspective in working lives seems to be more important and useful than the subjective/hedonic perspective when considering vocational identity, career attainment, and relationships with co-workers. A previous study revealed that falling short of early career goals was associated with increased symptoms of depression and lower levels of life purpose²³). Another study indicated that scores on life purpose, personal growth, self-acceptance, and environmental mastery were associated with career commitment and work-personality development²⁴). Enhancing eudemonic well-being is also attractive for employers, in terms of less frequent and more fully solved conflicts, loyalty, civility, and increases in innovation at the workplace¹). Therefore, creating a concept for eudemonic well-being at work and developing tools for measurement are both important objectives.

There are several previous studies that have integrated both subjective/hedonic and eudemonic well-being at work^{25–27}) and attempted to develop measurements for eudemonic well-being at work^{1,28,29}). The integrated models of well-being at work, for example, the one by Lent and Brown^{26,27}), have suggested social cognitive career theory to try unifying theoretical perspective on SWB and PWB. In this model, eudemonic processes serve as key routes by which people achieve and sustain hedonic well-being²⁷). The measurements for eudemonic well-being at work, for example, a recent study conducted in the US²⁹), suggests a new conceptualization for meaning-based job-related well-being beyond job satisfaction. Czerw¹) conducted a large validation study in Poland to develop a scale for eudemonic well-being in the workplace context and proposed a scale consisting of 43 items within 4

dimensions: positive organization, positive relations with co-workers, contribution to the organization, and fit and development. However, conceptualization for eudemonic well-being at work is still not enough. Across differing cultural contexts, we should accumulate findings regarding structures, correlations, and similarities and differences in comparison to general eudemonic well-being in working populations. Previous studies suggested that evaluation and predictors for well-being were different between people in individualist and collectivist nations because collectivist cultures give priority to in-group, define the self in relational terms, and sacrifice positive emotions for the achievement of important goals^{14, 30}). In addition, psychometric properties (i.e., reliability and validity), and interpretability for using the proposed measurements should be investigated since previous studies did not check for all aspects of these properties. Furthermore, considering practical use in workplace settings, scales with fewer items will be feasible.

This study aimed to develop a new measurement for eudemonic well-being at work (The University of Tokyo Occupational Mental Health [TOMH] well-being 24 scale) and investigate its structural validity, internal consistency, test-retest reliability, and convergent/known-groups validity. We conducted an exploratory examination of the factor structures of eudemonic well-being at work in Japan, which is predominated by a collectivist culture. We applied item response theory (IRT) to items and selected only three from each of the eight dimensions, with excellent performance for discrimination and difficulty. The developed scale is useful in both academic and practical terms owing to its confirmed psychometric properties and limited number of items. We hypothesized that the structures of the new measurement would overlap with those of general eudemonic well-being (i.e., six dimensions) and those of the previous study for well-being at work¹), but also include specific new dimensions because Japanese workers would place more emphasis on interdependence and sacrifice of positive aspects. The new measurement has good internal consistency (Cronbach's $\alpha \geq 0.70$) and test-retest reliability (intra-class correlation coefficient, ICC ≥ 0.70). Since the concepts of eudemonic well-being at work would overlap with general eudemonic and subjective/hedonic well-being, sufficient convergent validity (Pearson's $r \geq 0.50$) would be observed. In addition, higher correlations would be observed with job satisfaction than those with life satisfaction because the new measurement would focus more on the workplace context. Scores of the measurement would be significantly different by known-

groups (i.e., levels of psychological distress, job stressors), even after adjusting for general eudemonic well-being. According to previous findings, workers classified as high risk for mental illness and a stressful environment at work—that is, people who experience higher levels of psychological distress, higher job strain, lower social support—would show significantly lower scores on this measurement.

Subjects and Methods

Study design

This was a validation study of a measurement tool comprising two online surveys. The first survey (Survey 1) was conducted in February 2018 and the second survey (Survey 2) was conducted in February 2019. Survey 1 was consisted of a baseline survey and a two-week follow-up to explore the initial factor structure, item characteristics, internal consistency, test-retest reliability, and convergent/known-groups validity. Survey 2 was conducted to collect additional participants to confirm cross-validity for the factor structure by confirmatory factor analysis (CFA). The study protocol was approved by the ethics committee of the Graduate School of Medicine and the Faculty of Medicine, The University of Tokyo (No. 11242-(4)). This article was written according to the standard of development of measurement, Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN)³¹). The properties of the measurement (i.e., reliability and validity) were reported according to the COSMIN Risk-of-Bias checklist³¹).

Participants

For Survey 1, a total of 1,030 workers who lived in all prefectures in Japan were recruited from registered respondents of an Internet survey company³²). The survey company had access to a sample of over 2,000,000 participants in Japan and asked them to complete a self-reported questionnaire, based on the eligibility criteria. The criteria for participants were (a) all types of workers, including people engaged in part-time and freelance jobs, and (b) aged 18 or older. There were no exclusion criteria. Eligible participants who registered with the survey company were sent an e-mail with a link to the questionnaire. To obtain informed consent, participants clicked “agree” after reading the terms and conditions of the survey on the first page of the questionnaire and before answering the questionnaire. At the two-week follow-up, the survey company randomly selected 100 participants from the

1,030 workers who completed the baseline questionnaire and invited them to join again. The participants received about 100 points as a reward for each survey, which could be cashed out or used for shopping (one point was equal to one Japanese yen). A response rate could not be calculated because the survey company recruited participants until the number of completers reached the target (i.e., 1,030). Survey 2 was conducted following the same method as Survey 1, recruiting 730 workers.

Development process of an item pool for the new measurement

First, we collected potential items and created an item pool for the TOMH well-being 24 scale. We collected items from previous measurements for general eudemonic well-being based on Ryff's psychological well-being theory¹²⁾ and relevant concepts treated as positive outcomes at work¹⁶⁾ (e.g., commitment to work and work engagement), modified for the workplace context. A systematic search was conducted to explore existing scales for measuring eudemonic well-being at work by nine researchers (KW, KI, YO, ASH, HE, YK, HAd, HAr, and ASa), and a total of eight scales were selected to be suitable for creating the item pool: CASP-19³³⁾, Psychological Well-Being Scale (PWBS)³⁴⁾, Utrecht Work Engagement Scale³⁵⁾, Organizational Commitment Scales^{36, 37)}, Job Descriptive Index³⁸⁾, a modified version of Bar-On's Emotional Quotient Inventory (EQ-I)³⁹⁾, and Workplace PERMA-Profil^{3, 40)}. Second, items were selected from the eight scales which related to components of eudemonic well-being at work, based on discussion among the researchers. Third, sentences of the items were modified into the context of working life. Finally, the item pool for the measurement consisting of 89 items was created (Appendix 1). All items were rated on a seven-point Likert scale (0=strongly disagree, 6=strongly agree).

Measurements

In addition to potential items for the TOMH well-being 24 scale, other variables were also measured in Survey 1 to investigate convergent/known-groups validity. All variables were measured by self-reporting.

General eudemonic well-being

General eudemonic well-being, according to Ryff's PWB model, was measured with the Japanese version of the PWBS. This scale was developed and used in the Survey of Midlife in Japan (MIDJA), April–September 2008⁴¹⁾, with enough internal consistency (Cronbach's

α , 0.56 to 0.78). The scale consists of 6 factors, each of which includes 7 items: autonomy (e.g., 'I am not afraid to voice my opinions, even when they are in opposition to the opinions of most people,'), environmental mastery (e.g., 'In general, I feel I am in charge of the situation in which I live,'), personal growth (e.g., 'I think it is important to have new experiences that challenge how you think about yourself and the world,'), positive relations with others (e.g., 'Most people see me as loving and affectionate,'), purpose in life (e.g., 'I have a sense of direction and purpose in life,') and self-acceptance (e.g., 'In general, I feel confident and positive about myself,'). All items are rated on a seven-point Likert scale (1=strongly disagree, 7=strongly agree). The sum of scores in each factor were calculated and used in analyses. Cronbach's α of the scale in Survey 1 ranged from 0.647 to 0.843.

Positive and negative affect

As one indicator of subjective/hedonic well-being, positive and negative affect in general were measured using the Japanese version of the twenty-item Positive and Negative Affect Schedule (PANAS)⁴²⁾. PANAS is widely used in many languages to measure positive and negative affect. The two-factor structure, internal consistency, and convergent validity of the Japanese version of PANAS were also confirmed⁴²⁾. We used total scores of 10 items each for positive (e.g., excited) and negative (e.g., afraid) affects measured on a six-point Likert scale (1=not at all, 6=very much so). Cronbach's α of the scale in Survey 1 ranged from 0.874 to 0.893.

Life and job satisfaction

Another concept of subjective well-being, satisfaction in life and job, were measured with questions from the Brief Job Stress Questionnaire (BJSQ)⁴³⁾. This scale has been widely used to assess stress responses in Japan. Job and life satisfaction measures consisted of one item each: 'I am satisfied with my job' and 'I am satisfied with my family life,' respectively. The two items are rated on a four-point Likert scale (1=dissatisfied, 4=satisfied), with higher scores indicating higher satisfaction.

Psychological distress

As an indicator of known-groups validity, psychological distress was measured with the Japanese version of the K6 scale⁴⁴⁾. The scale consists of six items (e.g., 'About how often did you feel nervous?'), asking respondents how often they had experienced symptoms of psychological distress during the last 30 days. All items were rated on a

five-point Likert scale (0=none of the time, 4=all the time). The reliability and validity of the K6 were confirmed in a previous study⁴⁴). In this study, we divided the participants into three groups based on previous cut-off points: light distress (<5), subthreshold-level distress (≥ 5)⁴⁵), and severe mental illness (≥ 13)⁴⁶). Cronbach's α of the scale in Survey 1 was 0.916.

Job stressors

As other indicators of known-groups in the workplace context, three variables of job stressors (job demands, job control, and social support from supervisors and colleagues) were measured by items from the BJSQ⁴³) for job demands (three items, e.g., 'I have an extremely large amount of work to do,'), job control (three items, e.g., 'I can work at my own pace,') and social support from supervisors and colleagues (six items, e.g., 'How reliable are your superiors when you are troubled?'). All items are rated on a four-point Likert scale (for job demands and job control: 1=not at all, 4=very much so; for social support: 1=not at all, 4=extremely). Higher scores mean higher job demands, job control, and social support. We calculated medians for each variable and divided participants into four groups based on the level of job demands and job control (low strain, passive, active, and high strain)⁴⁷) and into two groups based on the level of social support (low and high). We supposed that workers experiencing higher job strain and lower social support were more stressful groups. Cronbach's α of the scale in Survey 1 ranged from 0.745 to 0.868.

Analysis

Of the completers, participants who seemed to answer the items irresponsibly were excluded from analyses based on two criteria: (a) responding to all potential items for the TOMH well-being 24 scale with 3 (neither disagree or agree) or (b) scores between non-reversed and reversed items were extremely different (more than 2 SD). Descriptive statistics (mean, SD, minimum and maximum values) for the 89 items in the item pool were calculated. For selection of the items, item-total (I-T) correlations (r) were calculated. If items had 0.40 or less correlations with total scores of the 89 items, the items were excluded afterward. Exploratory factor analysis (EFA) was conducted to investigate factor structure, using the maximum likelihood method for extraction and oblimin rotation (oblique=0). After exploring dimensionality, IRT analysis was conducted for each dimension using the generalized partial credit model (GPCM). We estimated discrimination

(a) and difficulty (b, thresholds) for the items and selected three items per each dimension based on the excellence of these parameters. To confirm factor structure in the selected items, CFA was conducted for participants of Survey 2, using a maximum likelihood estimation. Internal consistency and test-retest reliability were tested by calculating Cronbach's α and ICC. To examine for measurement errors, the standard error of measurement (SEM) and the smallest detectable change (SDC) were calculated. SEM describes the standard deviation of repeated measures in one participant, and SDC represents the minimal change that one participant must show on the measure to ensure that the observed change is real and not just measurement error^{48, 49}). Convergent validity of the measurement was investigated by correlations (r) with general eudemonic well-being, positive and negative affect, and life and job satisfaction. An analysis of variance (ANOVA) was conducted to investigate mean differences among known-groups (i.e., psychological distress, job strain, and social support). Differences of estimated means, after adjusting for general eudemonic well-being, were also tested by analysis of covariance (ANCOVA). There were no missing values in the data since participants could not finish the survey until they completed all items in the questionnaire. SPSS version 25 (IBM software) for ANOVA and ANCOVA and Mplus version 8.2⁵⁰) for all other analyses were used.

Results

Characteristics of the participants

For both Survey 1 and Survey 2, recruiting continued until 1,030 and 730 participants completed the questionnaire. At the two-week follow-up of Survey 1, a total of 88 participants of the 100 workers randomly sampled completed the questionnaire again (response rate=88.0%). Of those who completed both surveys, 66 participants in Survey 1 and 53 in Survey 2 were excluded from analyses based on the criteria that they seemed to answer the items irresponsibly. As a result, a total of 964, 82, and 677 workers were analyzed. Table 1 shows characteristics of the participants, the majority of which were full-time and daytime shift workers, had university degrees, and engaged in clerical jobs.

Factor structure and item parameters

Table 2 shows factor structures, discrimination (a) and difficulty (b) for potential items on the TOMH well-being 24 scale. From the 89 items, 12 were initially excluded

Table 1. Characteristics of the participants

	Survey 1 (N=964)		Survey 1 follow-up (N=82)		Survey 2 (N=677)	
	N	%	N	%	N	%
Sex						
Male	477	49.5	45	54.9	336	49.6
Female	487	50.5	37	45.1	341	50.4
Mean age (SD)	M=45.09 (SD=13.7)		M=44.39 (SD=13.0)		M=45.14 (SD=14.1)	
Educational status						
Junior high school	15	1.6	1	1.2	16	2.4
High school	269	27.9	22	26.8	172	25.4
Vocational/technical college	223	23.1	14	17.0	181	26.7
University	405	42.0	41	50.0	275	40.6
Graduate school	49	5.1	4	4.9	31	4.6
Other/unknown	3	0.3	0	0.0	2	0.3
Employment status						
Full-time	529	54.9	45	54.9	360	53.2
Part-time	235	24.4	23	28.0	189	27.9
Contract/dispatched	94	9.7	5	6.1	61	9.0
Freelance	95	9.8	8	9.7	58	8.6
Other	11	1.1	1	1.2	9	1.3
Employment shift						
Daytime shift	868	90.0	73	89.0	602	88.9
Rotation/night shift	96	10.0	9	11.0	75	11.1
Occupations						
Managerial	101	10.5	16	19.5	61	9.0
Professional/technical	173	17.9	13	15.9	110	16.2
Clerical	218	22.6	14	17.1	162	23.9
Sales	130	13.5	10	12.2	84	12.5
Services	144	14.9	15	18.3	108	16.0
Transport/construction	38	4.0	6	7.3	35	5.1
Production/skilled	83	8.7	5	6.0	51	7.5
Agriculture/forestry/fisheries	7	0.7	1	1.2	2	0.3
Safety	5	0.5	1	1.2	10	1.5
Other	65	6.7	1	1.2	54	8.0

owing to low correlations with the total score in the I-T analysis. As a result of EFA, eight factors seemed to be appropriate as dimensions for measurement. The first ten eigenvalues for factors were 32.825, 2.846, 2.421, 2.181, 1.800, 1.373, 1.090, 1.064, 0.921, and 0.899 (A scree plot in EFA is shown in Appendix 2). According to these values and Guttman's standard, we adopted eight dimensionalities. One of the items (Item No. 65) was excluded due to multiple loading to the factors. The second EFA for the remaining 76 items presented simple eight-factor structures. We named the eight factors, "F1: Role-oriented future prospects," "F2: Autonomy," "F3: Role-oriented positive perception," "F4: Personal growth and development," "F5: Negative schema," "F6: Occupational self-esteem," "F7:

Relationship," and "F8: Meaningful work." Inter-factor correlations among the eight factors ranged from 0.230 to 0.566. In each dimension, IRT analysis revealed discrimination and difficulty parameters of the items. Some items had low discrimination and reversed transition points for difficulty even if they had strong loadings to the factors. Standard errors for estimating latent factors (θ) ranged from 0.206 to 0.424. A total 24 items (three items for each of the eight factors) were selected as items for the final version of the TOMH well-being 24 scale.

The final version of the measurement

Table 3 shows the results of CFA and factor characteristics of the final version of the TOMH well-being

Table 2. Factorial structures of the items in exploratory factor analysis and item response theory analysis

Item No.	Exploratory factor analysis (Survey 1, N=964)								IRT analysis (Survey 1, N=964)								
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Difficulty (b, threshold)								SE for theta (θ) version
	Role-oriented future prospects	Autonomy	Role-oriented positive perception	Personal growth and development	Negative schema	Occupational self-esteem	Relationship	Meaningful work	(a)	b1	b2	b3	b4	b5	b6		
14	0.550	0.075	0.103	0.019	-0.036	0.103	0.158	-0.038	0.949	-0.768	-1.426	-1.133	1.227	1.933	2.018		
87	0.417	0.109	0.166	0.112	0.110	0.069	-0.010	0.157	1.652	-2.450	-2.364	-1.950	0.963	2.292	3.850	✓	
48	0.395	0.138	0.201	0.150	0.057	0.123	-0.018	-0.033	1.427	-1.947	-2.449	-1.737	1.040	2.040	2.867	✓	
88	0.366	0.126	0.120	0.004	0.042	0.253	0.025	0.087	1.242	-1.763	-2.063	-1.479	1.008	2.324	2.909	0.341	
15	0.339	0.041	0.237	0.084	0.088	0.054	0.186	0.046	1.393	-1.923	-2.121	-1.836	0.955	2.066	2.625	✓	
3	0.318	0.190	0.152	-0.109	0.037	0.129	0.159	-0.041	0.753	-1.367	-1.085	-1.218	0.972	1.524	1.677		
45	0.306	0.273	0.102	0.165	0.044	0.073	-0.028	0.134	1.244	-1.666	-2.479	-1.857	0.754	1.745	2.563		
16	0.059	0.764	-0.084	0.064	-0.067	0.111	0.026	-0.032	1.927	-3.028	-3.122	-2.082	0.785	2.222	3.365	✓	
20	-0.017	0.695	0.019	-0.091	0.208	-0.130	0.079	0.012	0.930	-1.340	-1.780	-1.494	0.806	1.412	1.587	✓	
22	-0.060	0.466	0.034	0.177	-0.061	0.059	0.011	0.017	0.721	-1.524	-1.877	-2.042	0.663	1.402	1.568	0.424	
19	0.130	0.428	-0.040	0.139	-0.031	0.295	-0.112	0.030	1.019	-1.289	-2.242	-1.885	0.870	1.833	2.150	✓	
86	0.249	0.256	0.196	0.175	0.089	0.078	-0.055	0.151	0.822	-0.676	-2.445	-1.474	0.596	1.490	1.716		
61	0.019	0.019	0.658	-0.029	0.050	0.029	0.104	0.042	1.212	-2.066	-1.764	-1.970	0.813	1.768	2.367		
66	0.057	-0.023	0.653	0.116	0.083	0.036	-0.007	0.110	1.991	-2.757	-2.727	-2.179	0.272	1.933	3.267	✓	
7	0.075	0.076	0.574	0.131	0.077	0.159	0.022	-0.080	1.853	-2.704	-2.741	-2.095	0.537	2.551	3.080	✓	
59	0.093	-0.025	0.519	0.200	0.041	0.103	0.082	0.007	1.623	-1.869	-2.755	-1.959	0.394	1.986	2.906		
29	0.085	0.082	0.488	-0.086	-0.039	0.126	0.288	0.033	1.237	-1.718	-2.100	-1.689	0.593	1.962	2.528		
5	0.081	0.088	0.456	-0.075	0.061	0.164	0.120	0.031	0.995	-1.850	-1.522	-1.622	0.672	1.431	2.176		
60	0.235	-0.015	0.409	0.150	0.057	0.025	0.007	0.225	1.699	-2.466	-2.421	-2.069	0.507	1.861	3.137	✓	
62	0.150	0.039	0.403	0.179	0.072	-0.024	0.063	0.133	1.317	-1.807	-2.033	-1.918	0.515	2.008	2.827		
78	0.219	0.059	0.396	0.125	-0.097	0.097	-0.041	0.061	0.949	-1.287	-1.917	-1.300	0.740	1.929	2.121	0.206	
64	0.158	0.032	0.393	0.127	0.020	0.007	0.057	0.176	1.233	-1.942	-2.166	-1.834	0.678	1.828	2.905		
11	0.273	-0.026	0.372	0.121	0.089	0.175	-0.016	0.080	1.663	-2.166	-2.243	-1.700	0.907	2.547	3.387		
79	0.344	0.064	0.351	0.182	0.055	0.097	0.029	-0.046	1.638	-2.374	-2.057	-1.874	0.795	2.416	3.187		
84	0.146	0.163	0.320	0.223	0.092	-0.080	0.000	0.249	1.497	-2.316	-2.320	-2.275	0.337	1.772	2.609		
13	0.230	0.105	0.309	-0.037	0.052	0.113	0.184	0.074	1.068	-1.489	-1.446	-1.587	0.662	1.622	2.201		
63	-0.032	0.280	0.292	0.229	-0.052	0.002	0.142	0.055	0.937	-1.534	-2.108	-2.166	0.418	1.207	1.819		
58	0.104	0.040	0.286	0.200	0.019	0.198	-0.051	0.237	1.267	-2.170	-1.994	-2.010	0.503	1.381	2.239		
67	0.251	0.005	0.257	0.129	0.060	0.048	0.141	0.229	1.489	-2.625	-2.333	-1.743	0.517	1.745	2.786		

Table 2. continued

Item No.	Exploratory factor analysis (Survey 1, N=964)								IRT analysis (Survey 1, N=964)						SE for theta (θ) version	
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Difficulty (b, threshold)							
	Role-oriented future prospects	Autonomy	Role-oriented positive perception	Personal growth and development	Personal growth and development	Negative Occupational self-esteem	Relationship	Meaningful work	(a)	b1	b2	b3	b4	b5		b6
34	0.169	0.097	0.079	0.597	0.054	-0.014	0.051	0.033	2.218	-3.558	-4.071	-2.857	0.235	1.979	3.563	✓
31	-0.117	0.110	0.095	0.586	-0.040	-0.015	0.016	0.076	0.936	-1.983	-2.392	-2.307	0.191	1.219	1.386	✓
30	0.048	0.018	-0.005	0.506	0.334	-0.012	-0.006	-0.026	0.730	-1.320	-1.767	-1.506	0.594	0.983	1.034	0.37
80	0.117	0.019	0.181	0.404	-0.094	0.100	0.152	0.052	0.889	-0.902	-2.018	-1.369	0.402	1.222	1.403	✓
74	-0.002	0.164	0.244	0.285	0.055	0.204	0.006	0.035	1.083	-1.989	-2.236	-1.764	0.447	1.646	1.988	✓
33	0.127	0.003	0.163	0.272	0.118	0.109	0.074	0.218	1.197	-1.899	-2.242	-2.195	0.191	1.442	2.094	✓
46	0.175	0.117	0.045	0.016	0.446	0.057	-0.022	0.150	0.918	-1.155	-1.899	-1.521	0.888	1.059	1.592	✓
77	-0.058	0.227	-0.051	0.085	0.438	0.170	0.065	0.083	1.097	-2.168	-2.101	-1.894	0.539	0.991	1.867	✓
28	0.096	0.183	0.207	-0.175	0.429	0.082	0.062	-0.075	0.813	-1.011	-1.833	-1.377	0.952	1.351	1.893	✓
47	-0.021	-0.068	0.083	0.054	0.427	0.022	0.000	0.262	0.639	-1.353	-1.830	-1.457	0.902	1.072	1.041	✓
35	0.229	0.050	0.145	0.189	0.415	-0.042	0.081	-0.050	0.837	-0.786	-1.675	-1.484	0.914	0.956	1.055	✓
55	-0.101	0.043	0.137	0.100	0.410	0.095	0.163	0.152	1.103	-1.790	-2.311	-1.715	0.448	0.764	1.734	✓
36	0.002	0.071	-0.021	0.220	0.405	0.159	0.142	-0.158	0.720	-0.898	-1.818	-1.428	0.848	1.041	1.522	0.331
4	-0.051	0.168	-0.026	0.022	0.388	-0.020	0.241	0.225	0.907	-1.435	-1.936	-1.876	0.492	0.978	1.331	✓
32	0.154	-0.016	-0.036	0.136	0.378	0.145	0.075	0.192	0.839	-0.967	-1.999	-1.245	0.586	1.216	1.029	✓
24	-0.154	0.054	0.198	0.071	0.378	0.114	0.110	-0.153	0.541	-0.646	-1.655	-1.343	0.629	0.825	1.073	✓
2	-0.012	0.255	0.099	-0.066	0.366	0.123	0.042	-0.067	0.632	-1.311	-1.357	-1.317	0.938	0.871	1.526	✓
56	0.085	0.026	-0.038	-0.076	0.363	0.319	0.081	-0.032	0.628	-0.757	-1.521	-1.440	1.343	1.345	1.521	✓
9	0.149	0.037	0.194	-0.162	0.299	-0.047	0.060	0.068	0.357	-0.169	-1.022	-1.003	1.075	0.552	0.652	✓
52	0.056	0.117	0.080	0.004	0.069	0.654	-0.006	0.027	2.010	-3.415	-2.623	-2.061	0.933	2.660	4.661	✓
70	0.079	0.079	0.106	-0.002	0.125	0.601	-0.019	0.104	2.078	-3.041	-2.655	-2.198	0.933	2.855	3.848	✓
76	0.016	0.301	-0.016	0.051	0.009	0.431	-0.005	0.157	1.168	-2.223	-1.797	-1.629	0.714	1.791	2.185	✓
54	0.095	0.061	0.128	-0.007	0.104	0.427	0.106	0.027	1.041	-1.404	-1.712	-1.629	0.744	1.673	2.466	✓
57	0.232	0.088	0.073	-0.075	0.013	0.398	0.117	0.131	1.196	-1.493	-2.251	-1.728	1.302	2.349	2.842	0.295
73	0.070	0.013	0.201	0.143	0.006	0.398	0.130	0.008	1.127	-1.697	-2.151	-1.833	0.878	1.807	3.009	✓
72	-0.043	0.102	0.187	0.006	-0.029	0.382	0.237	-0.227	0.534	-0.680	-1.440	-1.167	0.502	1.245	1.320	✓
71	-0.010	0.307	0.047	0.038	0.053	0.377	-0.076	0.213	1.183	-2.236	-2.237	-1.711	0.653	1.780	2.656	✓
82	0.055	-0.100	-0.056	0.096	0.057	0.375	0.260	0.293	0.945	-1.339	-2.299	-1.884	0.782	1.789	2.355	✓
75	-0.031	0.147	0.262	0.188	0.013	0.270	0.120	-0.035	0.984	-1.873	-1.838	-2.022	0.234	1.672	2.093	✓

Table 2. continued

		Exploratory factor analysis (Survey 1, N=964)								IRT analysis (Survey 1, N=964)						
Item No.	Factor 1 Role-oriented future prospects	Factor 2 Autonomy	Factor 3 Role-oriented positive perception	Factor 4 Personal growth and development	Factor 5 Negative schema	Factor 6 Occupational self-esteem	Factor 7 Relationship	Factor 8 Meaningful work	Discrimination (a)						SE for theta (θ)	Final version
									b1	b2	b3	b4	b5	b6		
83	0.096	0.144	0.182	-0.109	-0.128	0.006	0.641	0.024	1.019	-1.391	-1.285	-1.607	0.504	1.593	2.319	✓
39	0.035	0.007	0.002	-0.001	0.257	-0.074	0.580	-0.006	0.766	-0.950	-1.219	-1.596	1.011	0.696	1.105	✓
43	0.029	0.077	-0.005	0.066	-0.025	0.186	0.511	0.206	1.464	-3.166	-2.470	-2.300	0.541	2.180	3.081	
25	0.011	0.014	-0.132	0.113	0.293	0.100	0.501	0.048	0.974	-1.424	-2.002	-1.698	0.754	0.956	1.554	
42	0.105	-0.005	0.007	0.144	0.209	-0.077	0.481	0.050	0.883	-1.545	-1.715	-1.527	0.832	0.783	1.449	0.344
38	-0.092	0.076	0.163	0.032	0.263	0.025	0.465	-0.056	0.905	-1.160	-2.047	-1.554	0.677	1.139	1.482	
81	-0.122	-0.011	0.109	0.251	-0.009	-0.084	0.442	0.159	0.777	-1.586	-1.985	-2.079	0.215	1.019	1.403	✓
40	0.098	0.032	0.036	0.299	-0.029	0.149	0.408	0.010	1.089	-1.626	-1.946	-1.952	0.404	1.394	2.334	
51	0.221	-0.030	0.195	0.142	-0.012	0.186	0.271	0.079	0.893	-0.994	-1.922	-1.846	0.653	1.612	1.841	
68	-0.055	0.046	0.052	0.020	-0.004	0.179	0.267	0.529	1.554	-2.249	-2.735	-2.507	0.287	1.695	2.418	✓
69	0.159	0.028	0.107	0.053	0.095	0.072	0.023	0.529	1.540	-2.247	-2.461	-2.169	0.426	1.904	2.870	✓
85	0.110	0.115	0.220	0.136	0.052	-0.017	0.098	0.399	1.576	-2.533	-2.700	-2.056	0.557	2.022	2.754	✓
89	-0.271	0.138	0.192	0.043	0.049	0.246	0.075	0.392	1.055	-1.920	-2.335	-2.245	0.047	1.266	1.926	
26	0.117	0.125	-0.049	0.048	0.047	0.332	-0.006	0.349	0.969	-1.753	-1.834	-1.629	0.928	1.698	2.373	0.316
23	-0.283	0.252	0.071	0.198	0.050	0.145	0.036	0.339	0.972	-2.327	-2.453	-2.291	0.011	1.389	1.579	
37	0.076	-0.008	-0.143	0.248	-0.065	0.174	0.294	0.317	0.939	-1.132	-2.322	-2.288	0.709	1.639	2.129	
10	0.071	0.119	0.285	0.275	0.043	-0.127	0.109	0.309	1.295	-1.659	-2.624	-2.174	0.180	1.438	1.984	
49	0.268	0.240	0.014	0.011	0.154	0.063	-0.113	0.274	0.626	-0.497	-1.260	-1.747	0.775	1.189	0.922	

IRT: item response theory; SE: standard error. Exploratory factor analysis was conducted in maximum likelihood method and oblimin rotation. IRT analysis was conducted in the generalized partial credit model.

Table 3. Items, structures, means, internal consistency, and test-retest reliability of the final version of the scale (TOMH well-being 24)

Factor	Name	Item No.	Item loading	Item in English (not validated)	Min	Max	Mean	SD	Cronbach α	Test-retest Reliability (ICC) [†]	SEM [†]	SDC [†]
F1	Role-oriented future prospects	87	0.761	In my working life, I feel I am making progress towards accomplishing my goals.								
		48	0.671	In my working life, I enjoy making plans for the future and working to make them a reality.	0	6	3.13	1.1	0.820	0.738	0.507	1.407
		15	0.751	In my working life, I feel that the future looks good for me.								
F2	Autonomy	16	0.716	In my working life, I am not afraid to voice my opinions, even when they are in opposition to the opinions of people.								
		19	0.576	In my working life, I have confidence in my opinions, even if they are contrary to the general consensus.	0	6	3.23	1	0.761	0.749	0.486	1.348
		20	0.656	In my working life, It's difficult for me to voice my own opinions on controversial matters. (R)								
F3	Role-oriented positive perception	66	0.831	In my working life, I feel challengingness.								
		7	0.750	In my working life, I can please myself what I do.	0	6	3.31	1.2	0.863	0.731	0.624	1.731
		60	0.780	I am proud of my working life.								
F4	Personal growth and development	34	0.622	For me, working life has been a continuous process of learning, changing, and growth.								
		33	0.645	In my working life, I have the sense that I have developed a lot over time.	0	6	3.48	1.1	0.802	0.746	0.488	1.353
		74	0.736	In my working life, I am generally motivated to continue, even when things get difficult.								
F5	Negative schema	55	0.591	I feel disappointed about my achievements in my working life. (R)								
		77	0.587	Before beginning something new in my working life, I usually feel that I will fail. (R)	0	6	3.43	1.1	0.740	0.671	0.648	1.795
		46	0.635	I don't have a good sense of what it is I'm trying to accomplish in my working life. (R)								
F6	Occupational self-esteem	70	0.804	I feel sure of myself in my working life.								
		52	0.746	In my working life, I feel confident and positive about myself.	0	6	3.16	1.1	0.845	0.626	0.661	1.831
		76	0.612	In my working life, I believe in my ability to handle most upsetting problems.								
F7	Relationship	43	0.679	In my working life, I know that I can trust others, and they know they can trust me.								
		40	0.669	In my working life, I enjoy personal and mutual conversations with others.	0	6	3.30	1	0.765	0.695	0.604	1.674
		83	0.675	In my working life, I am satisfied with human relations.								
F8	Meaningful work	68	0.738	In my working life, I am needed.								
		69	0.753	In my working life, what I do is important.	0	6	3.40	1.1	0.834	0.781	0.546	1.513
		85	0.773	I feel that what I do in my working life is valuable and worthwhile.								

[†]N=82. TOMH: The University of Tokyo Occupational Mental Health; ICC: intra-class correlation coefficient; SEM: standard error of measurement; SDC: smallest detectable change.

24 scale (The Japanese version of the measurement is shown in Appendix 3). The eight-factor structure with 24 items indicated an excellent fit for the data of Survey 2: comparative fit index (CFI)=0.926, Tucker-Lewis index (TLI)=0.909, standardized root mean square residual (SRMR)=0.046, and root mean square error of approximation (RMSEA)=0.044 (95% confidence interval, 0.039 to 0.049). Factor loadings in the CFA ranged from 0.576 to 0.831. Cronbach's α coefficients and ICCs ranged from 0.671 to 0.845. SEM ranged from 0.486 to 0.661. SDC ranged from 1.348 to 1.831, indicating that an approximate 1.5-point change of scores implies meaningful change of the concepts.

Convergent validity of the measurement

Table 4 shows a matrix of correlation coefficients between the eight factors of the TOMH well-being 24 scale, general eudemonic well-being measured by the PWBS, and subjective/hedonic well-being measured by the PANAS and BJSQ (life and job satisfaction). Correlations among the eight factors of the TOMH well-being 24 scale ranged from 0.490 to 0.777, indicating moderate-to-strong interrelations between one another. The eight factors of the new measurement also had moderate-to-strong and positive correlations with general eudemonic well-being and week-to-moderate correlations with subjective/hedonic well-being. When compared with correlations between general eudemonic well-being and job satisfaction (0.204 to 0.468), correlations between the TOMH well-being 24 scale and job satisfaction were relatively stronger (0.351 to 0.633).

Known-groups validity

Table 5 shows descriptive and estimated means by levels of psychological distress, job strain, and social support. The scores of the TOMH well-being 24 scale were lower in the groups of severe psychological distress, high job strain and passive for job strain, and low social support. The mean differences in most factors of the TOMH well-being 24 scale among the known-groups were still significant even after adjusting for scores of general eudemonic well-being. Workers with severe distress and low social support had lower scores, and those with active for job strain scored higher; however some of the differences in scores were not statistically significant: F1, F2, F4, or F7 for psychological distress; F5 for job strain or social support.

Discussion

Our study suggested eight dimensions for eudemonic well-being at work among Japanese workers. Some of them were similar to previous findings and the others might be unique in the workplace context and/or collectivist cultures. Other indicators for validity and reliability of the final version of the measurement, which consists of the selected 24 items based on the IRT analysis, were enough-to-excellent. Scores were more strongly associated with subjective well-being in work contexts (i.e., job satisfaction). In addition, participants in the higher risk for mental illness and stressful environment at work indicated significantly lower scores, even after adjusting for general eudemonic well-being. The TOMH well-being 24 scale may be useful both for academic and practical use to measure eudemonic well-being at work, independent from the general concept of eudemonic well-being.

Among the suggested eight factors, autonomy (F2) and relationship (F7) were very similar to factors in general eudemonic well-being since Ryff's PWB scale has the same dimensions. The previous scale also indicated relationships with co-workers as one of the main dimensions¹⁾. These two factors may also be important at work. The other three factors, role-oriented future prospects (F1), personal growth and development (F4), and occupational self-esteem (F6), were similar but slightly different with those in general eudemonic well-being and the previous scale. While items in F1 included overlapping concepts of achievement, purpose in life, and self-realization, the most important concept of this factor might be "prospects" of working life in the future. Career development and management across working lives are closely related to health and well-being^{23, 24)}. In addition, safe and positive status control during occupational life are well-known as rewards that evoke a person's sense of mastery, efficacy, and esteem⁵¹⁾. Thus, positive evaluation of their future prospects may be a central concept for eudemonic well-being among workers. Items in the factor of personal growth (F4), which is also a dimension of general eudemonic well-being, might contain expanding experiences and skills, as well as continuation of working even when the work is stressful and difficult. Items in F6 represented occupational self-esteem rather than self-acceptance and optimism. These factors might overlap but express different aspects of well-being than eudemonic well-being in general. The extracted factors were consistent with eudemonic well-being in terms of self-determination theory (SDT)⁵²⁾, especially in the work context⁵³⁾. According

Table 4. Convergent validity (r) of the TOMH well-being 24 (Survey 1, N=964)

	TOMH well-being 24								General eudemonic well-being						
	Mean (SD)	F1	F2	F3	F4	F5	F6	F7	F8	Autonomy	Mastery	Growth	Relation	Purpose	Acceptance
F1 Role-oriented future prospects	3.13 (1.1)	1.000													
F2 Autonomy	3.23 (1.0)	0.527	1.000												
F3 Role-oriented positive perception	3.31 (1.2)	0.777	0.506	1.000											
F4 Personal growth and development	3.48 (1.1)	0.708	0.542	0.747	1.000										
F5 Negative schema	3.43 (1.1)	0.600	0.558	0.599	0.616	1.000									
F6 Occupational self-esteem	3.16 (1.1)	0.650	0.660	0.641	0.643	0.617	1.000								
F7 Relationship	3.30 (1.0)	0.615	0.490	0.637	0.621	0.555	0.610	1.000							
F8 Meaningful work	3.40 (1.1)	0.660	0.527	0.699	0.710	0.629	0.653	0.666	1.000						
General eudemonic well-being															
Autonomy	29.55 (6.0)	0.406	0.749	0.366	0.429	0.500	0.564	0.335	0.390	1.000					
Mastery	30.03 (5.7)	0.604	0.596	0.581	0.601	0.708	0.649	0.580	0.576	0.600	1.000				
Growth	31.17 (6.4)	0.657	0.510	0.617	0.727	0.694	0.584	0.569	0.626	0.498	0.742	1.000			
Relation	30.59 (6.3)	0.524	0.443	0.506	0.577	0.609	0.533	0.682	0.627	0.351	0.676	0.704	1.000		
Purpose	30.09 (5.0)	0.589	0.455	0.534	0.584	0.602	0.512	0.468	0.564	0.445	0.647	0.746	0.588	1.000	
Acceptance	29.12 (6.3)	0.649	0.562	0.585	0.594	0.679	0.695	0.568	0.603	0.526	0.770	0.739	0.662	0.641	1.000
Subjective/hedonic well-being															
Positive affect	33.19 (7.3)	0.647	0.519	0.606	0.582	0.521	0.600	0.519	0.567	0.422	0.554	0.581	0.492	0.529	0.605
Negative affect	29.43 (8.4)	-0.379	-0.431	-0.403	-0.412	-0.545	-0.453	-0.458	-0.397	-0.443	-0.614	-0.492	-0.468	-0.373	-0.531
Life satisfaction	2.78 (0.8)	0.314	0.203	0.309	0.274	0.267	0.239	0.293	0.250	0.168	0.350	0.325	0.337	0.280	0.386
Job satisfaction	2.55 (0.8)	0.552	0.351	0.633	0.485	0.454	0.419	0.529	0.486	0.204	0.478	0.444	0.399	0.359	0.468

All correlations were statistically significant ($p < 0.05$). TOMH: The University of Tokyo Occupational Mental Health; SD: Standard deviation.

Table 5. Known-groups validity of the TOMH well-being 24 (Survey 1, N=964)

Psychological distress (K6)	Descriptive statistics												Estimated means (Adjusted by Ryff's 6 factors of PWB)						p for ANCOVA
	Light (<5, N=348)			Subthreshold (≥5, N=460)			Severe (≥13, N=156)			Light		Subthreshold		Severe					
	Mean	SD		Mean	SD		Mean	SD		Mean	SE	Mean	SE	Mean	SE				
										Mean	SE	Mean	SE	Mean	SE				
F1 Role-oriented future prospects	3.53	1.1		3.07	0.9		2.41	1.2		3.10	0.05	3.18	0.04	3.06	0.07	0.174			
F2 Autonomy	3.63	1.0		3.18	0.9		2.51	1.2		3.25	0.04	3.26	0.03	3.13	0.06	0.127			
F3 Role-oriented positive perception	3.78	1.2		3.25	1.1		2.48	1.3		3.34	0.05	3.36	0.04	3.12	0.08	0.033			
F4 Personal growth and development	3.88	1.0		3.38	0.9		2.87	1.2		3.47	0.04	3.49	0.03	3.46	0.06	0.855			
F5 Negative schema	4.00	1.0		3.30	0.9		2.57	1.1		3.54	0.04	3.41	0.03	3.27	0.06	0.003			
F6 Occupational self-esteem	3.59	1.1		3.14	1.0		2.28	1.3		3.10	0.05	3.24	0.04	3.07	0.07	0.007			
F7 Reationship	3.76	0.9		3.18	0.9		2.62	1.2		3.38	0.04	3.27	0.03	3.20	0.07	0.097			
F8 Meaningful work	3.80	1.1		3.36	0.9		2.64	1.4		3.38	0.05	3.47	0.04	3.26	0.07	0.025			
Job strain (BJSQ)	Low strain (N=251)			Passive (N=212)			Active (N=233)			High strain (N=268)			Passive		Active		p for ANCOVA		
	Mean	SD		Mean	SD		Mean	SD		Mean	SD		Mean	SE	Mean	SE			
	3.32	1.1		2.72	0.9		3.60	1.0		2.87	1.2		3.00	0.05	3.34	0.05			
	3.53	0.9		2.87	0.9		3.67	1.0		2.87	1.1		3.14	0.05	3.42	0.04			
	3.52	1.2		2.81	1.0		3.93	1.1		2.99	1.3		3.09	0.06	3.68	0.06			
	3.62	1.1		3.02	0.9		3.93	1.0		3.30	1.1		3.33	0.05	3.67	0.05			
	3.73	1.0		3.09	0.9		3.80	1.1		3.11	1.1		3.41	0.05	3.51	0.05			
	3.35	1.1		2.81	1.0		3.65	1.1		2.84	1.2		3.10	0.05	3.38	0.05			
3.56	0.9		2.97	0.9		3.65	1.1		3.01	1.1		3.23	0.05	3.45	0.05				
F8 Meaningful work	3.56	1.0		2.88	1.0		3.87	1.1		3.27	1.2		3.18	0.06	3.62	0.05			
Social support by supervisor and colleagues (BJSQ)	Low support (N=419)			High support (N=545)			Low			High			Low		High		p for ANCOVA		
	Mean	SD		Mean	SD		Mean	SE	Mean	SE	Mean	SE	Mean	SE					
	2.80	1.1		3.39	1.1		3.02	0.04	3.21	0.03	3.02	0.04	3.21	0.03					
	2.98	1.0		3.43	1.0		3.14	0.03	3.31	0.03	3.14	0.03	3.31	0.03					
	2.89	1.2		3.64	1.1		3.12	0.05	3.46	0.04	3.12	0.05	3.46	0.04					
	3.16	1.0		3.72	1.0		3.40	0.04	3.54	0.03	3.40	0.04	3.54	0.03					
	3.13	1.0		3.67	1.1		3.39	0.04	3.47	0.03	3.39	0.04	3.47	0.03					
	2.85	1.1		3.40	1.1		3.09	0.04	3.22	0.03	3.09	0.04	3.22	0.03					
2.84	0.9		3.65	1.0		3.08	0.04	3.47	0.03	3.08	0.04	3.47	0.03						
F8 Meaningful work	3.03	1.1		3.69	1.0		3.27	0.04	3.50	0.04	3.27	0.04	3.50	0.04					

TOMH: The University of Tokyo Occupational Mental Health; PWB: psychological well-being; BJSQ: the brief job stress questionnaire; SD: standard deviation; SE: standard error; ANCOVA: analysis of covariance.

to this theory, human beings possess three basic, innate needs: relatedness, competence, and autonomy. In the work context, mastery and meaningfulness are additional basic psychological needs. Fulfillment of these basic needs by work can trigger intrinsic motivation and would affect work performance⁵³).

Role-oriented positive perception (F3), negative schema (F5), and meaningful work (F8) might be unique dimensions in the workplace context. Items in F3, named as role-oriented positive perception, might represent meaningful and challenging work and might be indispensable for discussing positive aspects. This factor may be similar to existing concepts of work engagement⁵⁴) and engagement in the Seligman's PERMA model⁵⁵). Our measurement suggested one more unique and important dimension, meaningful work (F8). When compared to daily personal life, working life may place more emphasis on how their work and work roles are meaningful, which reveal each worker's strengths and values as distinguishable from other employees. Previous studies also supported this finding, indicating that role conflict and unclarity for roles at work are adverse job stressors⁵⁶). It is worth investigating whether dimension of negative schema (F5) is unique only in collectivist cultures. This factor comprised only reversed items, which seemed to indicate an absence of negative cognition for working lives. Given the previous finding that East Asians tend to sacrifice positive emotions for achievement of important goals^{14, 30}), the negative aspects might stand out when discussing their well-being. Absence of negative cognition about their working lives might therefore be important for eudemonic well-being at work among Japanese workers.

Results for reliability have supported our hypothesis, indicating good internal consistency and test-retest reliability. The measurement also indicated reasonable values for SEM and SDC and can detect meaningful change of eudemonic well-being at work, at around a 1.5-point change in scores.

The hypotheses for convergent/known-groups were also supported. Scores of the eight factors of the TOMH well-being 24 scale had moderate-to-strong and positive correlations with general eudemonic well-being and subjective/hedonic well-being. Relatively strong correlations were observed between autonomy (F2) and autonomy of the PWBS, and between relationship (F7) and relation in the PWBS. These results might be based on the similarity of these concepts. In addition, positive correlations between the factors and job satisfaction, which represents subjective well-being at work, were stronger than those

between general eudemonic well-being and job satisfaction. The results might suggest that concepts measured by the TOMH well-being 24 scale are close to concepts in the workplace context. The most interesting result was that negative schema (F5) displayed a relatively strong correlation with general eudemonic well-being. This could have been owing to the basic traits of the target population; that is, East Asians tend to emphasize negative aspects when discussing well-being. The negative schema score (F5) significantly differed by the level of psychological distress but not by the level of job stressors (i.e., job strain and social support by supervisors and colleagues). Therefore, in collectivist cultures, the negative aspects of eudemonic well-being at work could be associated with general health status and not with domain-specific factors.

For mean scores of the new measurement by levels of psychological distress, differences between workers who had severe and light distress ranged from 1.01 to 1.43. Thus, a change in scores of over 1-point might be clinically meaningful. In addition, lower scores of the TOMH well-being 24 scale might be related to adverse psychosocial factors at work: high job strain and passive jobs, and low social support. Furthermore, results of the ANCOVA indicate that variances explained by the levels of psychological distress and job stressors were significantly different with those relating to general eudemonic well-being. The concepts measured by the TOMH well-being 24 scale might be distinguished from concepts measured by PWBS. High well-being scores in active jobs may be explained by existing findings that associations between job resources (including job control) and positive outcomes at work are exaggerated when levels of job demands are high⁵⁷).

The study has several limitations. First, because the response rate could not be calculated and because an online survey was used, selection bias might exist. For instance, participants who were unhealthy and had low eudemonic well-being at work may have been reluctant to participate in the survey. Secondly, there may have been errors in measuring assessment of the standards of convergent validity. Third, other confounders not measured in this study, such as psychological capital (e.g., self-efficacy, optimism, and intrinsic motivation), might have distorted the results of the correlation analyses. Forth, some of the measurement properties, such as content validity and responsiveness, could not be discussed. Finally, the generalizability of the results to workers from other cultural backgrounds could be questioned owing to the sampling method. Compared to a recent national Labour Force Survey in Japan⁵⁸), our sample included more workers engaged in managerial

jobs (1.9% in the national survey) and more workers who had graduated from university (27.7% in the national survey). These workers could be related to higher levels of job stressors and higher scores of well-being.

Conclusion

The newly developed measurement, named the TOMH well-being 24 scale, indicated good reliability and validity. It may be a useful measurement tool for eudemonic well-being at work, as an independent concept from general eudemonic well-being. Regarding practical implications, this scale can be used for preventing psychological distress; assessing key indicators for improving work performance and productivity; and considering vocational identity, career commitment, work-personality development, and relationships with colleagues.

Funding

This work was supported by Health and Labour Sciences Research Grants (Research on Occupational Safety and Health) 2017 (H27-Rodo-Ippan-004) from the Ministry of Health, Labour, and Welfare and a Grant-in-Aid for Scientific Research from the Japan Society for the Promotion of Science (JP18H06435).

Conflict of Interest

The authors declare that they have no conflict of interest.

Acknowledgement

We would like to offer thanks to all members of the University of Tokyo Occupational Mental Health (TOMH) research teams for offering valuable insight for developing the measurement.

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Appendix 1. Characteristics of items in the pool (Survey 1, N=964)

Item No.	Developed item	Item in English (not validated)	Original scale	Min	Max	Mean	SD
1	職業生活において、私は年齢のためにしたいことができない。(R)	In my working life, my age prevents me from doing the things I would like to do. (R)	CASP-19	0	6	3.46	1.3
2	職業生活において、私に起こることは自分ではコントロールできない。(R)	In my working life, what happens to me is out of my control. (R)	CASP-19	0	6	3.19	1.3
3	職業生活において、私は自由に将来の計画をたてられる。	In my working life, I can be free to plan for the future.	CASP-19	0	6	2.98	1.3
4	職業生活において、私は物事から取り残されている。(R)	In my working life, I am left out of things. (R)	CASP-19	0	6	3.52	1.3
5	職業生活において、私は自分のしたいことができる。	In my working life, I can do the things I want to do.	CASP-19	0	6	3.23	1.3
6	職業生活において、私は家族への責任のためにしたいことができない。(R)	In my working life, family responsibilities prevent me from doing the things I want to do. (R)	CASP-19	0	6	3.50	1.3
7	職業生活において、私は自分がすることを楽しんでる。	In my working life, I can please myself what I do.	CASP-19	0	6	3.26	1.3
8	職業生活において、私は自分の健康状態のためにしたいことができな	In my working life, my health stops me from doing the things I want to do. (R)	CASP-19	0	6	3.69	1.5
9	職業生活において、私はお金が足りないためにしたいことができない。(R)	In my working life, shortage of money stops me from doing things I want to do. (R)	CASP-19	0	6	3.03	1.5
10	私の職業生活には意味がある。	My working life has meaning.	CASP-19	0	6	3.55	1.3
11	職業生活において、私はやる気に満ちている。	In my working life, I feel full of energy.	CASP-19	0	6	3.06	1.3
12	職業生活において、私はこれまででこのことのないことを選ぶ。	In my working life, I choose to do things that I have never done before.	CASP-19	0	6	2.84	1.2
13	私はこれまででとってきた職業生活に満足している。	I feel satisfied with the way my working life has turned out.	CASP-19	0	6	3.15	1.4
14	私の職業生活はチャンスに満ちている。	My working life is full of opportunities.	CASP-19	0	6	2.81	1.4
15	職業生活において、将来は私にとって良いものであるように感じる。	In my working life, I feel that the future looks good for me.	CASP-19	0	6	3.14	1.3
16	職業生活において、他の人と意見が違っても、私は自分の意見を言うことを恐れない。	In my working life, I am not afraid to voice my opinions, even when they are in opposition to the opinions of people.	PWBS	0	6	3.27	1.3
17	職業生活において、私は何かを決めるときに他人のすることに影響され	In my working life, my decisions are not usually influenced by what everyone else is.	PWBS	0	6	3.12	1.2
18	職業生活において、私は強い意見を持つ人に影響されがちだ。(R)	In my working life, I tend to be influenced by people with strong opinions. (R)	PWBS	0	6	3.06	1.2
19	職業生活において、私は自分の考えが一般的に合意されていることと違っても、自分の考えに自信を持っている。	In my working life, I have confidence in my opinions, even if they are contrary to the general consensus.	PWBS	0	6	3.22	1.2
20	職業生活において、私は意見の分かれる事柄について自分の意見を言	In my working life, It's difficult for me to voice my own opinions on controversial matters. (R)	PWBS	0	6	3.21	1.3
21	職業生活において、私は他の人からどのように思われているのか心配	In my working life, I tend to worry about what other people think of me. (R)	PWBS	0	6	3.06	1.4
22	職業生活において、私は他の人の価値観ではなく、自分が大切だと	In my working life, I judge myself by what I think is important, not by the values of what others think is important.	PWBS	0	6	3.39	1.1
23	職業生活において、私は目の前の状況を把握している。	In my working life, I am in charge of the situation in front of me.	PWBS	0	6	3.67	1.1
24	職業生活において、私は日々やらなければならないことに愕然(がくぜ	The demands of everyday working life often get me down. (R)	PWBS	0	6	3.37	1.3

Item No.	Developed item	Item in English (not validated)	Original scale	Min	Max	Mean	SD
25	職業生活において、私は周囲にあまりとけ込んでいない。(R)	In my working life, I do not fit very well with the people around me. (R)	PWBS	0	6	3.39	1.4
26	職業生活において、私は日々いくつもある責任をやりくりすることに長けている。	I am quite good at managing the many responsibilities of daily working life.	PWBS	0	6	3.16	1.2
27	職業生活において、私は自分の責務にしばしば押しつぶされそうになる。(R)	In my working life, I often feel overwhelmed by my responsibilities. (R)	PWBS	0	6	3.24	1.4
28	私は自分にとって満足できるように職業生活を工夫することは難しい。(R)	I have difficulty arranging my working life in a way that is satisfying to me. (R)	PWBS	0	6	3.13	1.2
29	私は自分の好みにとっても合った職場環境や働き方を築くことができている。	I have been able to build a work environment and how to work for myself that is much to my liking.	PWBS	0	6	3.21	1.3
30	職業生活において、私は自分の視野を広げる活動に関心がない。(R)	In my working life, I am not interested in activities that will expand my horizons (R)	PWBS	0	6	3.43	1.3
31	職業生活を通して、自分や世の中についての考え方が変わるような新しい経験をするのは大切だと思う。	I think it is important to have new experiences in working life that challenge how I think about myself and the world.	PWBS	0	6	3.67	1.2
32	職業生活において、過去何年も私は本当には成長していない。(R)	In my working life, I haven't really improved much as a person over the years (R)	PWBS	0	6	3.32	1.4
33	職業生活において、私はこれまでとても成長してきたと思う。	In my working life, I have the sense that I have developed a lot over time.	PWBS	0	6	3.52	1.3
34	私にとって職業生活とは、学び続け、変化し続け、成長し続けるものである。	For me, working life has been a continuous process of learning, changing, and growth.	PWBS	0	6	3.53	1.3
35	職業生活をとてもよいものにしようとか、変えようとかすることは、私はこの昔にあきらめた。(R)	I gave up trying to make big improvements or changes in my working life a long time ago. (R)	PWBS	0	6	3.27	1.4
36	職業生活において、慣れ親しんだやり方を変えないといけないので、私は新しい環境は楽しめない。(R)	In my working life, I do not enjoy being in new situations that require me to change my old familiar ways of doing things. (R)	PWBS	0	6	3.25	1.3
37	職業生活において、たいいていの人は私のことを誠実で情に厚いと思っている。	In my working life, most people see me as loving and affectionate.	PWBS	0	6	3.36	1.1
38	職業生活において、良好な関係を維持することは私にとって難しく、欲求不満のもとになっている。(R)	In my working life, maintaining close relationships has been difficult and frustrating for me (R)	PWBS	0	6	3.35	1.3
39	職業生活において、職場には自分の悩みをうちあけられる人がほとんどいないので、私は孤独だと感じる。(R)	In my working life, I feel lonely because I have few close people with whom to share my concerns. (R)	PWBS	0	6	3.27	1.5
40	職業生活において、私は知り合った人たちとのやり取りを楽しんでいる。	In my working life, I enjoy personal and mutual conversations with others.	PWBS	0	6	3.39	1.3
41	職業生活において、人は私のことを「他の人のために時間を費やす面倒見のいい人だ」と言うだろう。	In my working life, people would describe me as a giving person, willing to share my time with others.	PWBS	0	6	3.07	1.2
42	職業生活において、私は心温まり信頼できる人間関係をもったことはそれほどない。(R)	In my working life, I have not experienced many warm and trusting relationships with others. (R)	PWBS	0	6	3.36	1.4
43	職業生活において、私は周りの人を信頼しているし、周りの人は私を信頼している。	In my working life, I know that I can trust others, and they know they can trust me	PWBS	0	6	3.34	1.2

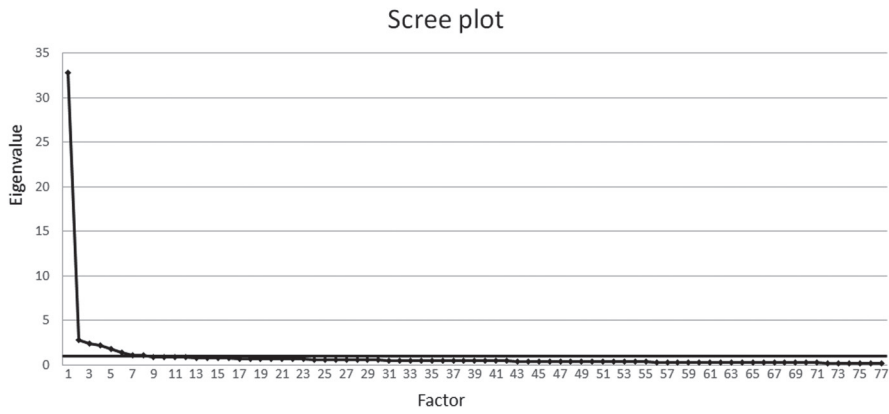
Item No.	Developed item	Item in English (not validated)	Original scale	Min	Max	Mean	SD
44	職業生活において、私は今、一日一日を生きているのであって、将来のことを深く考えたりしない。(R)	I live my working life one day at a time and don't really think about the future. (R)	PWBS	0	6	3.27	1.3
45	職業生活において、私は人生の方向や目的について考えをもっている。	I have a sense of direction and purpose in my working life.	PWBS	0	6	3.26	1.2
46	職業生活において、私は自分が何を成し遂げようとしているのかよくわかっている。(R)	I don't have a good sense of what it is I'm trying to accomplish in my working life. (R)	PWBS	0	6	3.27	1.3
47	職業生活において、私は自分が日常していることは、些細で、大切なことではないように感じる。(R)	My daily activities often seem trivial and unimportant to me (R)	PWBS	0	6	3.30	1.2
48	職業生活において、私は将来の計画をたて、それを実現させることに楽しみを見いだす。	In my working life, I enjoy making plans for the future and working to make them a reality	PWBS	0	6	3.13	1.3
49	職業生活において、目的を持たずにさまよって歩く人もいるが、私はそのような人間ではない。	Some people wander aimlessly through working life, but I am not one of them.	PWBS	0	6	3.27	1.3
50	職業生活において、私はなすべきことはすべてなしてきたかのように感じる。	I sometimes feel as if I've done all there is to do in my working life.	PWBS	0	6	2.84	1.2
51	職業生活において、私は自分を振り返ってみて、結果として起きていることをうれしく思う。	When I look at the story of my working life, I am pleased with how things have turned out.	PWBS	0	6	3.27	1.2
52	職業生活において、私は自分自身に対して自信があり肯定的だ。	In my working life, I feel confident and positive about myself.	PWBS	0	6	3.13	1.3
53	職業生活において、知っている人の多くは、私に比べてより多くのものを得てきたと感じる。(R)	I feel like many of the people I know have gotten more from working life than I have. (R)	PWBS	0	6	2.91	1.1
54	職業生活において、私は自分の性格のたいたいの部分は好きだ。(R)	In my working life, I like most parts of my personality. (R)	PWBS	0	6	3.15	1.3
55	職業生活において、私は自分がなしてきたことの多くに失望している。(R)	I feel disappointed about my achievements in my working life. (R)	PWBS	0	6	3.54	1.4
56	職業生活において、私は自分に対して他の人ほど肯定的ではない。(R)	In my working life, my attitude about myself is probably not as positive as most people feel about themselves. (R)	PWBS	0	6	3.01	1.2
57	職業生活において、同僚や知人と自分を比べてみて、私は自分がどんな人間であるかということに満足を感じている。	When I compare myself to others, it makes me feel good about who I am in working life.	PWBS	0	6	3.02	1.2
58	職業生活において、私は熱心である。	I am enthusiastic in my working life.	UWES-9	0	6	3.40	1.3
59	職業生活は、私に活力を与えてくれる。	In my working life, I feel bursting with energy.	UWES-9	0	6	3.32	1.4
60	私は自分の職業生活に誇りを感じる。	I am proud of my working life.	UWES-9	0	6	3.31	1.4
61	自分の職業生活は、私の価値観に非常に合っている。	My values and my working life are very similar.	Organizational commitment scales (Mowday <i>et al.</i> , 1979)	0	6	3.23	1.3
62	私にとって自分の職業生活は生きる意味を与えてくれる。	My working life has personal meaning for me.	Organizational commitment scales (Meyer <i>et al.</i> , 1993)	0	6	3.24	1.3

Item No.	Developed item	Item in English (not validated)	Original scale	Min	Max	Mean	SD
63	私がこれまでの職業生活を送ってきたのは、そう望んでいたと同時に必要であったからだ。	My spent working life is a matter of necessity as much as desire.	Organizational commitment scales (Meyer et al., 1993)	0	6	3.51	1.2
64	私にとってこれまでの職業生活は、忠誠を持ってやる価値があった。	My spent working life deserves my loyalty.	Organizational commitment scales (Meyer et al., 1993)	0	6	3.24	1.2
65	職業生活において、私は尊重されている。	In my working life, I am respected.	Job Descriptive Index (JDI)	0	6	3.22	1.2
66	職業生活において、私はやりがいを感じる。	In my working life, I feel challengingness.	Job Descriptive Index (JDI)	0	6	3.37	1.4
67	職業生活において、私は達成感がある。	My working life gives me sense of accomplishment.	Job Descriptive Index (JDI)	0	6	3.30	1.3
68	職業生活において、私は必要とされている。	In my working life, I am needed.	Job Descriptive Index (JDI)	0	6	3.51	1.3
69	職業生活において、私は重要なことをしている。	In my working life, what I do is important.	Job Descriptive Index (JDI)	0	6	3.36	1.3
70	職業生活において、私は自信がある。	I feel sure of myself in my working life.	EQ-I	0	6	3.15	1.3
71	職業生活において、私は難しい状況をきちんと取り仕切ることができる。	In my working life, I can manage tough situations.	EQ-I	0	6	3.26	1.2
72	職業生活において、私は楽観的である。	In my working life, I am optimistic.	EQ-I	0	6	3.20	1.3
73	職業生活において、私はたいがい良い結果が得られると予測している。	In my working life, I generally hope for the best.	EQ-I	0	6	3.18	1.2
74	職業生活において、困難があるときでも、私は継続する意欲がある。	In my working life, I am generally motivated to continue, even when things get difficult.	EQ-I	0	6	3.37	1.2
75	職業生活において、時々失敗しても、私は物事が上手いくと期待する。	In my working life, I expect things will turn out alright, despite setbacks from time to time.	EQ-I	0	6	3.42	1.2
76	職業生活において、私は問題のほとんどのに対処する力がある。	In my working life, I believe in my ability to handle most upsetting problems.	EQ-I	0	6	3.21	1.3
77	職業生活において、何か新しいことを始める前には、私はたいがい失敗すると感じる。(R)	Before beginning something new in my working life, I usually feel that I will fail. (R)	EQ-I	0	6	3.49	1.3
78	職業生活において、私は自分のしていることに没頭している。	In my working life, I am absorbed in what I am doing.	Workplace PERMA profiler	0	6	3.09	1.2
79	職業生活において、私はわくわくしたり、興味を感じたりしている。	I feel excited and interested in my working life.	Workplace PERMA profiler	0	6	3.13	1.3
80	職業生活において、楽しんでるとき、私はしばしば時間がたつのを忘れる。	In my working life, I often lose track of time while enjoying.	Workplace PERMA profiler	0	6	3.36	1.4

Item No.	Developed item	Item in English (not validated)	Original scale	Min	Max	Mean	SD
81	職業生活において、私は必要なときに周囲の人たちから手助けや協力を得ている。	In my working life, I receive help and support from others when I need it.	Workplace PERMA profiler	0	6	3.63	1.2
82	職業生活において、私は周囲の人たちから感謝されている。	In my working life, I feel being appreciated by others.	Workplace PERMA profiler	0	6	3.24	1.1
83	職業生活において、私は人間関係に満足している。	In my working life, I am satisfied with human relations.	Workplace PERMA profiler	0	6	3.17	1.4
84	私の職業生活は、意味や目的のあるものである。	My working life is purposeful and meaningful.	Workplace PERMA profiler	0	6	3.41	1.3
85	職業生活において、私は自分のしていることが重要で価値のあることだと感じる。	I feel that what I do in my working life is valuable and worthwhile.	Workplace PERMA profiler	0	6	3.34	1.3
86	職業生活において、私は目的や方向性を持っていると感じている。	I feel that I have a sense of direction in my working life.	Workplace PERMA profiler	0	6	3.28	1.2
87	職業生活において、私は目標達成に向かって進んでいると感じている。	In my working life, I feel I am making progress towards accomplishing my goals.	Workplace PERMA profiler	0	6	3.12	1.3
88	職業生活において、私は自分で立てた大切な目標を達成できている。	In my working life, I achieve the important goals I have set for myself.	Workplace PERMA profiler	0	6	3.02	1.2
89	職業生活において、私は責任を果たすことができている。	In my working life, I can handle my responsibilities.	Workplace PERMA profiler	0	6	3.63	1.2

(R): rating are reversed when calculating scores. PWBS: psychological well-being scale, UWES: Utrecht work engagement scale, EQ-I: emotional quotient inventory.

Appendix 2. Scree plot in exploratory factor analysis



Appendix 3. The TOMH well-being 24 scale

The TOMH well-being 24 scale

人の生活は仕事を中心とした職業生活、家庭を中心とした個人生活などに分けられますが、この質問ではあなたの職業生活について伺います。以下の文章それぞれについて、あてはまるもの1つに○をつけてください。		まったく同意しない			どちらともいえない			非常に同意する
1	職業生活において、私は目標達成に向かって進んでいると感じている。	0	1	2	3	4	5	6
2	職業生活において、他の人と意見が違っても、私は自分の意見を言うことを恐れない。	0	1	2	3	4	5	6
3	職業生活において、私はやりがいを感じる。	0	1	2	3	4	5	6
4	私にとって職業生活とは、学び続け、変化し続け、成長し続けるものである。	0	1	2	3	4	5	6
5	職業生活において、私は自分がなしてきたことの多くに失望している。	0	1	2	3	4	5	6
6	職業生活において、私は自信がある。	0	1	2	3	4	5	6
7	職業生活において、私は周りの人を信頼しているし、周りの人は私を信頼している。	0	1	2	3	4	5	6
8	職業生活において、私は必要とされている。	0	1	2	3	4	5	6
9	職業生活において、私は将来の計画をたて、それを実現させることに楽しみを見いだす。	0	1	2	3	4	5	6
10	職業生活において、私は自分の考えが一般的に合意されていることと違って、自分の考えに自信を持っている。	0	1	2	3	4	5	6
11	職業生活において、私は自分がすることを楽しんでいる。	0	1	2	3	4	5	6
12	職業生活において、私はこれまでとても成長してきたと思う。	0	1	2	3	4	5	6
13	職業生活において、何か新しいことを始める前には、私はたいてい失敗すると感じる。	0	1	2	3	4	5	6
14	職業生活において、私は自分自身に対して自信があり肯定的だ。	0	1	2	3	4	5	6
15	職業生活において、私は知り合った人たちとのやり取りを楽しんでいる。	0	1	2	3	4	5	6

16	職業生活において、私は重要なことをしている。	0	1	2	3	4	5	6
17	職業生活において、将来は私にとって良いものであるように感じる。	0	1	2	3	4	5	6
18	職業生活において、私は意見の分かれる事柄について自分の意見を言いにくい。	0	1	2	3	4	5	6
19	私は自分の職業生活に誇りを感じる。	0	1	2	3	4	5	6
20	職業生活において、困難があるときでも、私は継続する意欲がある。	0	1	2	3	4	5	6
21	職業生活において、私は自分が何を成し遂げようとしているのかよくわかっていない。	0	1	2	3	4	5	6
22	職業生活において、私は問題のほとんどに対処する力がある。	0	1	2	3	4	5	6
23	職業生活において、私は人間関係に満足している。	0	1	2	3	4	5	6
24	職業生活において、私は自分のしていることが重要で価値のあることだと感じる。	0	1	2	3	4	5	6

Scoring

F1. Role-oriented future prospects = (No.1 + No.9 + No.17) / 3

F2. Autonomy = (No.2 + No.10 + (6 - No.18)) / 3

F3. Role-oriented positive perception = (No.3 + No.11 + No.19) / 3

F4. Personal growth and development = (No.4 + No.12 + No.20) / 3

F5. Negative schema = ((6 - No.5) + (6 - No.13) + (6 - No.21)) / 3

F6. Occupational self-esteem = (No.6 + No.14 + No.22) / 3

F7. Relationship = (No.7 + No.15 + No.23) / 3

F8. Meaningful work = (No.8 + No.16 + No.24) / 3

If you want to use the TOMH well-being 24 scale, please contact the first author, Kazuhiro Watanabe.

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