Associations between Sense of Coherence and Psychological Work Characteristics with Changes in Quality of Life in Japanese Civil Servants: A 1-Year Follow-Up Study

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Abstract: We conducted a 1-year follow-up study to evaluate the lasting effect of psychosocial characteristics on quality of life among Japanese civil servants. For this purpose, sense of coherence (SOC), which has been associated with adoptive measures in responding to life stress, and job strain components of demand and control, were used. We evaluated 1392 civil servants working in departments related to the municipality of T city in Toyama prefecture, Japan, in the springs of 2001 and 2002 with complete information in both phases of the study. Using validated Japanese versions of WHOQOL-BREF (WHO/QOL-26) and SOC-13 and a self-reported questionnaire on job demand and control in the workplace, we conducted multiple linear regression analysis to assess the effects of above-mentioned characteristics on WHO/QOL-26 domains. After entering first phase scores, age, sex, employment category and negative affectivity into the models, SOC was associated positively with second phase scores in all domains of WHO/QOL-26 (standardized β coefficients of 0.21, $P < 0.01$; 0.12, $P < 0.001$; 0.13, $P < 0.001$ and 0.07, $P < 0.05$ for Physical Health, Psychological, Social Relationship and Environment, respectively). In addition job control was related positively to Physical Health, Psychological and Social Relationship domains (standardized β coefficient of 0.10, $p < 0.001$; 0.12, $p < 0.05$ and 0.07, $p < 0.05$, respectively), while job demand was negatively related to Physical Health domain with a β coefficient of -0.11, $p < 0.001$. Higher sense of coherence and job control could result in better subjective feeling of well-being in a 1-year follow-up among Japanese civil servants.

Key words: Quality of life, Sense of coherence, Job control, Job demand, Japan

Introduction

The significant influence of the psychological work environment on health has been focused on in a large number of articles^{1–7}. Psychological work environment is mainly resulted from the interaction of two factors of job demand

and the degree of control a worker may exert over those demands. Moreover, Antonovsky proposed a sense of coherence (SOC) as a construct that predicts effective coping measures against stressful conditions^{8–11}. SOC has been defined as a global orientation that expresses the extent to which one has a pervasive and dynamic feeling of confidence that the stimuli deriving from one's internal and external environments in the course of living are structured, predictable and explicable. On the other hand, Health related

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quality of life indicators usually encompass a person's ability to perform effectively physically, emotionally and socially and to maintain a sense of well-being¹²⁾. The more traditional biomedical health status measures demonstrate the presence, absence, and severity of disease or mortality. Although quality of life measures were developed mainly to reflect the consequences of health problems, losses in sense of well-being may conceivably precede, follow, or be independent of disease. Cederblad¹³⁾ found SOC as the best correlate of health and mental well-being in a group of middle-aged subjects, considered to be at risk for psychiatric disturbances, who were drawn from a longitudinal study in Sweden. Other reports also focused mainly on the modifying effect of SOC to the quality of life in specific diseases¹⁴⁾. In this study we tried to observe the movement of well-being in apparently normal working people and the contribution of job demand and control, as psychological work stress markers, and sense of coherence (SOC), as a construct that measures outlook on life against stressful conditions, to this movement by evaluating indicators of health related quality of life in a period of one year.

Methods

This study is in collaboration with the Whitehall II study¹⁵⁾ which was set up to investigate the degree and cause of the social gradient in morbidity and mortality in a cohort of civil servants in London.

In this 1-year follow-up study we evaluated 2100 civil servants working in departments related to the municipality of T city in Toyama prefecture, Japan, in the springs of 2001 and 2002. From the original population 1682 (80.9%) subjects participated in the first phase of the study. In the second phase, questionnaire was sent to all 2100 subjects from whom 1718 (81.8%) responded. In the second phase 5% of the original population in 2001 retired and 2.5% were new employees recruited in 2002. Finally data for 1392 (66.3%) subjects who had complete information for the first and second phases were analyzed.

We divided the civil servants into four groups based on the classification system used in the national census¹⁶⁾: 1) Administrative, 2) Professional, 3) Clerical and 4) Protective, Transportation and Telecommunication service workers who we put into the Office Support category. We also stratified the age of the participants into four groups: 29 or younger, 30~39, 40~49 and 50 years or older.

Questionnaire

QOL: The Japanese version of WHOQOL-BREF (WHO/

QOL-26¹⁷⁾) was used for this study. The WHO/QOL-26 contains a total of 26 questions which consist of the following domains: 1) Physical Health (7 questions), 2) Psychological (6 questions), 3) Social Relationships (3 questions), and 4) Environment (8 questions). The four domain scores denote an individual's perception of the quality of life in each particular domain. Domain scores are scaled in a positive direction, i.e. higher scores denote a higher quality of life. The raw score of items within each domain is used to calculate the domain score. The domain score is then converted to a transformed score (range of score: 4–20). The method for converting raw scores to transformed scores is given elsewhere¹⁷⁾, where more than two items were missing from the domain, the domain score was not calculated (with the exception of the Social Relationships domain).

SOC: We used the Japanese version of SOC-13¹⁸⁾ for our survey. The items were rated on a seven-point likert scale in which higher values indicate a stronger SOC. The scale consists of three dimensions: comprehensibility, manageability and meaningfulness, which are equally weighted and together make an overall score.

Psychological work characteristics: The questionnaire used in the Whitehall II study²⁾ to report the work environment characteristics (based on Karasek's job strain model) was adopted for this study to assess job strain¹⁹⁾. Face and content validity plus internal consistency-reliability (results) was satisfactory for the scale, which had already been used in other fields in Japan and also in other countries. We used job demand and control as continuous variables by rating on a four-point likert scale in which higher values indicate higher control and demand at workplace.

Negative affectivity is the disposition to respond negatively to questionnaires and may overestimate or underestimate correlations between self reported work characteristics and self reported health and disease^{20, 21)}. Negative affectivity was measured with the negative affect subscale of the affect balance scale.

The scales of psychological work characteristics, SOC-13 and negative affectivity were measured in the first phase and WHO/QOL-26 was measured both in the first and second phases of the study.

Statistical analysis

To detect the differences in the mean values of WHO/QOL-26 components' scores between the first and second phase we performed paired t-test after stratifying for the age and gender of the participants. We also used multiple linear regression analysis with the WHO/QOL-26 scores in the second phase as dependent variable and the first phase

Table 1. Paired t-test—Mean $\pm$ SD for domains of WHO/QOL-26 in first and second phases, stratified for age and sex of the subjects

Age	N(%)	Physical Health			Psychological		
		1st	2nd	P	1st	2nd	P
Male							
<29	37 (4.7%)	13.6 ± 3.66	12.9 ± 2.19	0.25	12.0 ± 2.65	12.2 ± 2.30	0.55
30–39	51 (6.5%)	12.9 ± 3.02	12.8 ± 2.27	0.76	12.2 ± 2.37	12.1 ± 2.19	0.6
40–49	352 (45.1%)	13.6 ± 3.26	12.6 ± 2.19	0.001	11.7 ± 2.15	11.6 ± 2.21	0.37
>50	340 (43.6%)	14.1 ± 3.25	13.1 ± 2.08	0.001	12.2 ± 2.01	12.3 ± 2.15	0.54
Female							
<29	66 (10.8%)	13.6 ± 3.32	12.6 ± 1.85	0.02	11.7 ± 2.06	11.9 ± 2.34	0.39
30–39	27 (4.4%)	12.3 ± 3.94	12.1 ± 2.14	0.78	11.3 ± 2.40	11.6 ± 2.86	0.46
40–49	288 (47.0%)	12.5 ± 3.48	11.4 ± 2.01	0.001	11.3 ± 2.08	11.2 ± 2.03	0.56
>50	231 (37.7%)	12.5 ± 2.84	11.9 ± 2.25	0.001	11.5 ± 2.21	11.5 ± 2.23	0.95

Age	N (%)	Social Relationship			Environment		
		1st	2nd	P	1st	2nd	P
Male							
<29	37 (4.7%)	12.6 ± 2.15	13.0 ± 2.92	0.27	12.2 ± 1.96	12.9 ± 2.09	0.02
30–39	51 (6.5%)	12.3 ± 2.14	11.8 ± 2.06	0.13	11.7 ± 1.99	12.0 ± 1.77	0.82
40–49	352 (45.1%)	11.9 ± 2.23	11.9 ± 2.16	0.80	11.7 ± 1.99	11.7 ± 1.97	0.92
>50	340 (43.6%)	12.3 ± 1.97	12.2 ± 2.19	0.44	12.1 ± 1.93	12.1 ± 2.06	0.63
Female							
<29	66 (10.8%)	13.4 ± 2.16	12.9 ± 2.03	0.02	12.2 ± 1.88	12.3 ± 1.73	0.73
30–39	27 (4.4%)	11.9 ± 2.22	12.5 ± 2.33	0.15	11.3 ± 2.01	11.9 ± 2.02	0.03
40–49	288 (47.0%)	12.6 ± 1.96	12.5 ± 1.96	0.42	11.6 ± 1.84	11.6 ± 1.73	0.94
>50	231 (37.7%)	12.8 ± 2.04	12.5 ± 2.04	0.06	11.6 ± 1.95	11.7 ± 1.95	0.41

scores plus age, sex, employment category, SOC, job control, job demand and negative affectivity as predictor variables to evaluate the importance of each variable on the second phase WHO/QOL-26 components' scores. In all models the F value for the test of overall goodness of fit was over 40 which was associated with $p < 0.001$. In addition, a qualitative approach to the models showed that the distribution of the residuals were normal and the plots of the residuals versus each independent variable were uniformly distributed in a symmetric band centered on a residual value of zero. As a quantitative measure we performed Cook's distance statistic²²⁾ and we found no potential outlier, which reiterated the validity of assumptions in the regression models. All reported significance levels are $P < 0.05$ (two-tailed test). The data were analyzed with Dr.SPSS (version 8.0.1J).

Results

Cronbach's alpha for job control and demand were 0.77

and 0.68, respectively. Cronbach's alpha for the SOC was 0.83 and for the domains of WHO/QOL-26 in the first and second phases were 0.75 and 0.75 for Physical Health, 0.76 and 0.75 for Psychological, 0.61 and 0.62 for Social Relationship, 0.76 and 0.77 for Environment.

Mean scores for domains of WHO/QOL-26 in the first and second phases of the study have been presented in Table 1. Over 40 years of age both men and women showed significantly lower scores for Physical Health domain in the second phase. Psychological scores did not change significantly among the age groups in both sexes.

Table 2 shows the results of multiple linear regression analysis with second phase WHO/QOL-26 domain scores as dependent variable. Age was negatively associated to all domains of WHO/QOL-26, while women were more likely to have lower scores in second phase for Physical Health and Psychological domains than men. Apart from first phase WHO/QOL-26 scores, which were strongly related to the domain scores one year later, SOC was also associated with the second phase scores in all domains (standardized

Table 2. Linear regression analysis—Associations between follow-up domains of WHO/QOL-26 (outcome measure) and predictor variables at baseline

First phase Second phase	Physical Health		Psychological		Social Relationship		Environment	
	β^*	P	β	P	β	P	β	P
WHO/QOL-26	0.26	<0.001	0.53	<0.001	0.46	<0.001	0.56	<0.001
Sex [†]	-0.19	<0.001	-0.06	<0.05	0.04	0.14	-0.04	0.12
Age	-0.09	<0.001	-0.06	<0.05	-0.06	<0.05	-0.08	<0.01
Employment category	-0.07	<0.01	-0.04	0.07	-0.03	0.18	-0.07	<0.01
SOC	0.21	<0.01	0.12	<0.001	0.13	<0.001	0.07	<0.05
Job control	0.17	<0.01	0.12	<0.05	0.12	<0.01	0.05	0.28
Job demand	-0.21	<0.001	-0.10	0.08	0.09	0.12	-0.03	0.63
Control $\times$ demand	-0.12	0.12	-0.11	0.07	0.11	<0.05	-0.04	0.57
Negative affectivity	-0.06	<0.05	-0.03	0.19	-0.01	0.66	-0.05	0.08
R ²	28%		41%		33%		41%	

* β indicates standardized β coefficient. [†]Dummy variable (male=0, female=1).

β coefficients of 0.21, $P<0.01$; 0.12, $P<0.001$; 0.13, $P<0.001$ and 0.07, $P<0.05$ for Physical Health, Psychological, Social Relationship and Environment, respectively). Meanwhile, job control was positively (standardized β coefficient of 0.10, $P<0.001$) and job demand negatively (standardized β coefficient of -0.11, $P<0.001$) related to Physical Health domain. In addition job control was positively related to the second phase scores of Psychological and Social Relationship domains with standardized β coefficients of 0.07 and 0.12 ($P<0.05$), respectively. The control, demand interaction was not related to WHO/QOL-26 domains except for Social Relationship. Overall the linear regression models accounted for 28%, 41%, 33% and 41% of the variance in Physical Health, Psychological, Social Relationship and Environment domains, respectively. Without entering the first phase scores, the models accounted for 22%, 23%, 18% and 18% of the variance in the WHO/QOL-26 domains (order as above).

Discussion

In this report we have shown that psychosocial characteristics could be assumed as predictable measures for self-perceived quality of life in a short follow-up period of one year. This was remarkably illustrated for SOC, while job control and demand were also related (the former positively and the latter negatively) to the Physical Health domain of WHO/QOL-26. There was also a relatively small overall mean decline in Physical Health scores over 40 years of age both in men and women.

In comparison with other health indicators such as daily

activities and behavior²³⁾, perceived health measures²⁴⁾, and disability/functional measures²⁵⁾ which are beginning to provide a measure of the impact of disease, WHO/QOL rather assesses the quality of life per se which has its own value in health measurement.

Antonovsky's SOC⁸⁻¹¹⁾ ought to explain why some people manage stress and stay well, while others breakdown. Our findings suggest that SOC can predict the movement towards health in a short period of 1-year follow-up. It indicates that those subjects who see their life as having some purpose and believe that their life tasks are worthy investments, in terms of energy and commitment as well as seeing themselves as having the personal resources to cope with the difficulties and demands that they may encounter, have better quality of life for all the domains of WHO/QOL-26.

People also may react differently to a given work environment, some perceiving high levels of stress, whereas others do not, so that some people may develop health problems more readily than others. This is illustrated by the job strain components, where job demand was negatively associated with the Physical Health of the subjects one year from the first survey, while job control was positively associated. Since the level of job demand can hardly be manipulated at workplaces, increasing the latitude of control may have an improving effect on Physical health, Psychological and Social Relationship domains of subjective quality of life. This may be achieved by adopting measures for work characteristics in order to give more decision authority to civil servants after considering its feasibility for each organization.

Interaction term of job demand and control was only turned

significant in predicting Social Relationship domain. Since the association between job control and Social Relationship was stronger than that of interaction, it may suggest that workers with higher job control and demand seek better social relationship probably to contrast with higher work pressure, but it was just the case for those with higher control in their job.

There were not any significant changes in Psychological domain between first and second phase of the study among age groups in men and women. A large cross sectional study in Britain has suggested that mental health remains stable across middle age and if anything is better for the 55–64 year olds²⁶⁾. Meanwhile, Martikainen²⁷⁾ reported from the Whitehall II study that adjustment for job decision latitude accounted for a large part of the differences in positive change of mental functioning and to a lesser extent physical functioning in a three year follow-up study. In this regard our findings were consistent with the Whitehall II results by observing that job control was associated with Physical Health, Psychological and Social Relationship domains despite a short follow-up period of one year.

The physiological and clinical significance of this short-term decline in self-reported measures of Physical Health is not clear, but one possibility is that it reflects early stages of more serious morbidity.

The limitations of our study mainly go back to the self-reported nature of the scales. Information bias is a potential source of bias in self-reported studies. However, a fairly large study population and also entering the measure of negative affectivity into the models along with other variables could minimize the effect of information bias on the results. Since we lost almost 34% of the original population in the second phase of the study we cannot rule out follow up bias. However, 20% of the subjects did not participate in the first phase while 2.5% of the entire second phase population were new employees. Therefore, we lost almost 12% of the participants in the follow up but there was no significant difference in the first phase WHO/QOL-26 domain scores between those who participated in both phases and those who did not participate in the second phase. Regarding multicollinearity between independent variables there were low correlations between Physical Health, SOC, Job control and demand, while as we expected the highest correlation was found between SOC and Psychological domain ($r=0.51$, $P<0.001$). Meanwhile, there was no large variance inflation factor for each independent variable in all models. It is also worth noting that since subjective sense of well-being may be affected by other variables including diet, material problems, life events, etc. our model which focused mainly

on psychosocial characteristics illustrates partly the factors contributed in change of quality of life in a period of one year.

In conclusion our findings have indicated that sense of coherence could modify the subjective feeling of well-being and there are also reasons to believe that higher decision latitude at workplace could result in better subjective Physical Health, Psychological and Social Relationship in a 1-year follow-up among our sample of Japanese civil servants.

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