INTERNATIONAL JOURNAL OF
OCCUPATIONAL SAFETY AND ERGONOMICS 2000, SPECIAL ISSUE, 59–70

Monitoring Psychosocial Stress at Work: Development of the Psychosocial Working Conditions Questionnaire

Maria Widerszal-Bazyl
Roman Cieślak

Department of Ergonomics,
Central Institute for Labour Protection, Warsaw, Poland

Many studies on the impact of psychosocial working conditions on health prove that psychosocial stress at work is an important risk factor endangering workers' health. Thus it should be constantly monitored like other work hazards. The paper presents a newly developed instrument for stress monitoring called the Psychosocial Working Conditions Questionnaire (PWC). Its structure is based on Robert Karasek's model of job stress (Karasek, 1979; Karasek & Theorell, 1990). It consists of 3 main scales—Job Demands, Job Control, Social Support—and 2 additional scales adapted from the Occupational Stress Questionnaire (Elo, Leppanen, Lindstrom, & Ropponen, 1992), Well-Being and Desired Changes. The study of 8 occupational groups (bank and insurance specialists, middle medical personnel, construction workers, shop assistants, government and self-government administration officers, computer scientists, public transport drivers, teachers, $N = 3{,}669$) indicates that PWC has satisfactory psychometrics parameters. Norms for the 8 groups were developed.

job stress job demands job control social support stress monitoring
well-being stress management

1. INTRODUCTION

The ever increasing number of studies on the impact of psychosocial stress on widely understood health of employees (e.g., Fletcher, 1991; Karasek & Theorell, 1990), as well as economic estimates of losses

Correspondence and reguests for reprints should be sent to Maria Widerszal-Bazyl, Central Institute for Labour Protection, ul. Czerniakowska 16, 00-701 Warszawa, Poland. E-mail: <mawid@ciop.pl>.

incurred by an organisation as a result of employees' stress, clearly demonstrate the necessity to undertake preventive actions intended to limit stress in an organisation. Psychosocial stress, like other risk factors in the working environment (e.g., noise, dustiness), should be subjected to constant monitoring (compare, e.g., Kompier & Levi, 1994), which allows to identify its sources and to evaluate the level of intensity. Only on that basis can properly designed intervention programs be created. An instrument for stress monitoring can also constitute an instrument for evaluation of such programs' effectiveness. Comparison of the state of affairs before and after intervention provides a picture of the magnitude and direction of changes that have occurred. The most famous questionnaires measuring psychosocial features of work, used in the western world, include the Occupational Stress Indicator (Cooper, Sloan, & Williams, 1988) and the Job Content Questionnaire (Karasek et al., 1998). So far, in Poland there has been no instrument that would allow to monitor a greater number of psychosocial variables referring to work conditions and their potential health effects. Therefore, referring to earlier work conducted in the Work Psychology Laboratory of the Central Institute for Labour Protection (Warsaw, Poland), it was decided to create such instrument.

2. OBJECTIVES AND STRUCTURE OF THE PSYCHOSOCIAL WORKING CONDITIONS QUESTIONNAIRE (PWC) AND ITS EARLIER VERSIONS

The Karasek' model of job stress constituted the starting point of work carried out on the questionnaire (Karasek, 1979; Karasek & Theorell, 1990). Its broadened version differentiates between three key work dimensions: demands, control, and social support. A vast number of studies examining Karasek's model indicate that although the significant assumption of the model of interactional (synergistic) impact of demands, control, and support on health still remains a matter of discussion, the linear relations between those dimensions and health are commonly found (for review see, e.g., Doef & Maes, 1998; De Jonge & Kompier, 1997). Therefore, differentiation of the those three dimensions as stress predictors seems to be sensible and remains beyond discussion. Consequently, those dimensions constituted the framework of the questionnaire that was being developed.

Earlier work of the Work Psychology Laboratory of the Central Institute for Labour Protection aimed at verification of the model (Widerszal-Bazyl, 1995) concludes that it is necessary to make more correct operationalization of the basic work dimensions than that in Karasek's original research. Therefore, questionnaires for measuring each dimension—demands and control (Widerszal-Bazyl, 1995), and social support (Cieślak, 1995)—were developed earlier. Those questionnaires constituted the first item pool for developing the instrument presented here.

The Scale of Demands, in its initial version, consisted of 44 questions. They referred not only to demands in terms of quantity, which according to Karasek's interpretation of that notion are predominant (e.g., Karasek, 1979), but also to demands related to the level of work complexity and conditions in which work is carried out (including role conflict; 6 questions came from scale of Rizzo, House, & Lirtzman, 1970). It resulted from the accepted definition of demands as the necessity to carry out work in a defined quota, defined rate, defined type, and defined conditions resulting from primary goals of a company. That scale was used in studies examining Karasek's model, carried out among 200 women doing office work (Widerszal-Bazyl, Cieślak, & Najmiec, 1994) and among 300 managers of middle and top level (Widerszal-Bazyl, 1995). In both cases its high reliability was confirmed (Cronbach's $\alpha = .85$ and .86, respectively).

The first version of the Control Scale (Widerszal-Bazyl & Żołnierczyk, 1995) departed from conceptualization of control as a combination of decision authority and skill discretion, which was so characteristic for original Karasek's formulation. Questions focused on control in a narrow sense, disregarding work complexity. Analysis of the concept of control done by Frese (1989) was an important starting point for formulation of the questions' content. In both of the aforementioned studies carried out among office workers and managers, reliability of the scale was $\alpha = .88$ and .89, respectively. Results of regression analysis indicated that job control measured by means of that scale is a significant predictor of many health indices: mental (e.g., job satisfaction, life satisfaction) and behavioural (e.g., absenteeism, smoking). This confirms the scale's validity.

The first version of the Social Support Scale at work included 16 questions, which were to measure perceived social support originating from four sources, that is, from superiors, co-workers, family, and

friends from outside work. Four types of social support were taken into consideration: emotional, evaluative, instrumental, and informative (House, 1981). Validity of the scale is confirmed by significant interrelations between social support measured with that scale and mental disposition indices, such as anger, anxiety, job satisfaction, and life satisfaction. The relation between social support and somatic health indices was more questionable (Cieślak, 1998; Cieślak, Widerszal-Bazyl, & Łuszczyńska-Cieślak, in press). More information on the process of developing the scales of Demands, Control, and Social Support can be found elsewhere (Widerszal-Bazyl & Cieślak, 1999).

Proceeding to prepare the PWC, it was presumed, among others, that it should meet the following conditions: It should be easy to fill in and interpret; it should include evaluation of the basic work dimensions, that is, demands, control, and social support in various professions; it should take into consideration potential effects of stress relating to mental and physical well-being; it should facilitate active participation of workers in the evaluation of work conditions. According to the aforementioned objectives, the number of questions included in the original versions of demands, control, and social support scales was reduced. This reduction took into account item-total correlation. Moreover, the pattern of questions and the pattern of replies was standardised (all on 5-point reply scales). Two extra scales were added to the three basic scales: for measuring Well-Being (WB) and the scale of Desired Changes (DC). The former includes questions examining physical and psychical well-being of a worker. The latter analyses the changes that according to a respondent should be implemented in an organisation: changes concerning management methods, social relations, furnishings, and so forth. The idea of including those scales was borrowed from the Occupational Stress Questionnaire (Elo et al., 1992). Therefore, ultimately the Psychosocial Working Conditions Questionnaire consists of five scales (Figure 1).

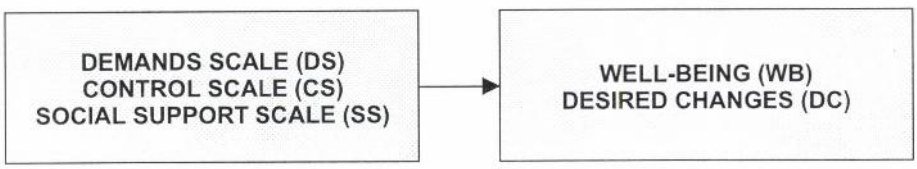

Figure 1. Pattern of Psychosocial Working Conditions Questionnaire.

3. PSYCHOMETRIC PARAMETERS OF THE QUESTIONNAIRE

3.1. Participants and Procedure

Three thousand, six hundred and sixty-nine persons from eight occupational groups were examined. They included specialists in banking and insurance ($N = 462$), middle medical personnel ($N = 455$), construction workers ($N = 441$), shop assistants ($N = 472$), officials of government and public administration ($N = 502$), computer scientists ($N = 420$), public transport drivers ($N = 436$), and teachers ($N = 481$). The number of women and men was nearly identical (women: 51%, men: 49%). The average age was 38.2 ($SD = 10.67$). The examined group included 33% of persons with tertiary education, 64% with secondary education, and 3% with primary education. The study was carried out by trained pollsters in all regions of Poland and in population centres that differ with respect to the number of inhabitants.

To verify test-retest reliability, 252 persons filled in the PWC twice at 3-to-6-week intervals.

3.2. Questionnaire Factor Structure

To examine the structure of particular theoretical scales, a series of exploratory factor analyses was carried out, based on the results of all occupational groups collectively. The number of factors was selected on the basis of Kaiser's rule (eigenvalues > 1). VARIMAX rotation was applied.

As for the Demands Scale (DS), three factors were identified: (a) intellectual demands, 22.6% of the variation in the data; (b) psychophysical demands and demands resulting from responsibility for safety, 10.8%; and (c) demands resulting from role conflict and overload, 8%.

As concerns Control Scale, two factors were differentiated: (a) behavioural control, 26% of variability; and (b) cognitive control, 11% of variability.

In the Social Support Scale (SS) two factors evolved: (a) support from superiors (53.8%), concerning emotional, evaluative, instrumental, and informational support from superiors; and (b) support from co-workers (12.6%), which concerned the same types of support as those just referred to, however, it came from co-workers.

TABLE 1. Reliability Indices of Theoretical and Empirical Scales

Scale	Number of Questions	Cronbach's α	Pearson r Test-Retest	Scale	Number of Questions	Cronbach's α	Pearson r Test-Retest
DS	24	.82	.76***	DS3	6	.62	.61***
CS	19	.84	.66***	CS1	10	.81	.68***
SS	16	.94	.68***	CS2	9	.73	.55***
WB	22	.90	.72***	SS1	8	.93	.73***
DC	19	.92	.73***	SS2	8	.92	.60***
DS1	9	.82	.75***	WB1	11	.86	.68***
DS2	9	.75	.75***	WB2	11	.83	.70***

Notes. ***—$p < .001$; Theoretical scales: DS—Demands Scale, CS—Control Scale, SS—Social Support Scale, WB—Well-Being Scale, DC—Desired Changes Scale; Empirical scales: DS1—intellectual demands, DS2—psychophysical demands and demands resulting from responsibility for safety, DS3—demands resulting from the conflict of role and overload, CS1—behavioural control, CS2—cognitive control, SS1—support from superiors, SC2—support from co-workers, WB1—physical well-being, WB—mental well-being.

In the Well-Being Scale (WB) two factors were identified: (a) physical well-being, 33.7%; and (b) mental well-being, 7.1%.

On the Desired Changes Scale (DC) only one factor was differentiated, 41% of variation in the data.

3.3. Reliability

Table 1 shows results concerning internal consistency of theoretical and empirical scales (measured with Cronbach's α (coefficient), as well as data concerning test-retest reliability. Obtained results indicate high internal consistency of all five theoretical scales α (from .82 to .92, depending on the scale) and slightly lower consistency of empirical scales: for nine scales of that type, Cronbach's α was lower than the value .70 in one case only (scale DS3, $\alpha = .62$). This can be the result of the fact that this scale includes a smaller number of questions than empirical scales.

3.4. Validity—Analysis of Differences Between Occupational Groups

Theoretical validity of the questionnaire can be deduced, among others, on the basis of an analysis of differences between groups if there are bases to presume that there are differences in the examined feature between groups (also compare Brzeziński, 1996). That type of analysis was also applied in the present case. It was decided that if the questionnaire was valid, mean results in particular scales (theoretical and empirical) should considerably differ in environments of dissimilar occupational activity. Therefore, mean results from three occupational groups were compared. The groups represented the following: (a) highly qualified work related to finances (specialists in banking and insurance), (b) supplementary medical work (middle medical personnel), and (c) physical work (construction workers). Detailed data are presented in Table 2.

Analyses of variances showed that for theoretical scales the mean results obtained by the three analysed occupational groups differed considerably. The values of F indices were significant, $p < .001$. On theoretical scales measuring three basic job dimensions, the following differences between the groups proved significant (measured with Student's t test): specialists in banking obtained a higher mean result

TABLE 2. Mean Results on Theoretical and Empirical Scales of PWC in Three Occupational Groups. Results of Variance Analysis (Entire Group) and *t* Test (for Determination of Differences Between Particular Pairs of Occupational Groups)

	ANOVA	Group 1	Group 2	Group 3	Group 1 and 2		Group 1 and 3		Group 2 and 3	
Sub-Scales	***F***	***M***	***M***	***M***	***T***	***df***	***t***	***df***	***t***	***df***
DS	143.2****	3.33	3.33	2.87	–.17	913	14.46****	898	14.19****	893
CS	28.0****	3.36	3.13	3.16	7.18****	915	5.78****	901	–.86	894
SS	18.8****	3.34	3.14	3.08	4.46****	915	6.06****	901	1.44	894
WB	9.7****	3.79	3.70	3.84	2.93***	914	–1.57	900	–4.13****	894
DC	8.5****	3.22	3.35	3.17	–2.93***	915	1.25	901	3.87****	894
DS1	278.77****	3.71	3.20	2.68	11.92****	913	23.42****	898	11.85****	893
DS2	207.31****	3.70	4.16	3.41	–13.60****	913	7.61****	898	19.18****	893
DS3	6.65***	2.35	2.37	2.23	–.56	913	2.98***	898	3.23***	893
CS1	41.48****	2.83	2.44	2.52	8.90****	915	6.63****	901	–1.76**	894
CS2	3.03**	3.93	3.90	3.85	1.02	915	2.38**	901	1.45	894
SS1	16.35****	3.24	2.94	3.00	5.46****	914	4.38****	897	–1.06	891
SS2	20.11****	3.44	3.35	3.15	2.02**	914	6.48****	901	4.04****	893
WB1	16.51****	3.93	3.78	4.00	3.90****	914	–1.90*	900	–5.45****	894
WB2	1.93	3.64	3.61	3.67	1.14	914	–0.90	900	–1.85*	894

Notes. ****—$p < .001$, ***—$p < .01$, **—$p < .05$; *—$p < .1$; Group 1—specialists in banking and insurance, group 2—middle medical personnel, group 3—construction workers; Theoretical scales: DS—Demands Scale, CS—Control Scale, SS—Social Support Scale, WB—Well-Being Scale, DC—Desired Changes; Empirical scales: DS1—intellectual demands, DS2—psychophysical demands and demands resulting from responsibility for safety, DS3—demands resulting from the conflict of role and overload, CS1—behavioural control, CS2—cognitive control, SS1—support from superiors, SC2—support from co-workers, WB1—physical well-being, WB—mental well-being; PWC—Psychosocial Working Conditions Questionnaire.

on Control and Social Support Scales (mean values 3.36 and 3.34, respectively) than middle medical personnel (mean values 3.13 and 3.14, respectively) as well as a higher mean result on Demands, Control, and Social Support Scales than the group of construction workers. Moreover, middle medical personnel obtained a higher mean result on the Demands Scale than construction workers. The direction of those differences conforms to expectations: work of specialists in banking imposes the highest formal qualification demands in comparison with work of middle medical personnel and construction workers, and at the same time it offers more possibilities to determine the course of work (i.e., to control).

For all empirical scales, which constitute derivatives of the three main work dimensions, significant differences between occupational groups were also established. Due to lack of space, we do not discuss them in detail, but only compile them in Table 2. Also in those comparisons the direction of differences conformed to expectations.

3.5. Validity—Analysis of the Questionnaire's Internal Structure

Conformity of the questionnaire's internal structure with empirical data was examined. The relation between demands, control, and social support on the one hand, and well-being and desired changes on the other is the basic axis of that structure. Verification of the model structure of the questionnaire was carried out by means of structural modelling (GLS method). Additionally, an assumption was accepted that there is a relation between well-being of a worker and the worker's desire for change as well as the age.

The analyses that were carried out established a significant conformity of the questionnaire's model structure with empirical data. Fit indices of the model were very good ($chi^2 = 1.84$; $p = .17$; $df = 1$; $chi^2/df = 1.84$; $GFI = 1$; $AGFI = .99$; $NFI = .99$; $NNFI = .99$; $RMSEA = .01$). All values of paths were significant, $p < .05$. As for well-being (WB), independent variables (age, DS, CS, SS, DC) jointly accounted for 15% of variations in the data concerning well-being. Analysis of β indices indicated that a high level of control ($\beta = .18$), young age ($\beta = -.13$), low desire for changes ($\beta = -.13$), high social support ($\beta = .12$), and low level of demands ($\beta = -.06$) are predictors of a high level of well-being. Three psychosocial variables defined in the model as exogenous variables (DS, CS, SS) account for not less than 32% of the

variations in the data concerning Desired Changes Scale (DC). A high level of a desire for changes at work results from a low level of control ($\beta = -.37$), high demands ($\beta = .34$), and low social support ($\beta = -.15$).

3.6. Norms

Three types of norms were prepared: sten norms for theoretical scales, sten norms for empirical scales, and percent distributions of replies for particular questions. The norms were prepared separately for each examined occupational group and jointly for all groups subjected to examination.

4. CONCLUSIONS

The Psychosocial Working Conditions Questionnaire allows to effect evaluation of work with respect to its three main dimensions: demands, control, and social support. Each of the basic dimensions includes a number of detailed features. A factor analysis of questions demonstrated that the Demands Scale not only allows to calculate the total index of demands in particular work, but also three detailed indices: intellectual demands, psychophysical demands, and demands arising from role conflict and overload. The Control Scale allows to calculate the global control index, as well as behavioural and cognitive control indices. The Social Support Scale allows to evaluate the general amount of support, and, separately, support received from superiors and co-workers. Consequently, the questionnaire offers the opportunity to evaluate a wide spectrum of work features. The additional Well-Being Scale offers the characteristic of physical and mental disposition of workers, whereas the Desired Changes Scale offers workers the opportunity to participate in the process of evaluation and alteration of work conditions. Satisfactory psychometric parameters of the questionnaire, as well as the fact that it was prepared with Polish population in mind (and tested on it) and that the norms for eight occupational environments have already been prepared give us hope that it will be applied in practice for psychosocial monitoring of work features. The first attempts to apply it in practice, commissioned by an aviation company, for air-traffic controllers (Najmiec & Widerszal-Bazyl, 1998) demonstrated that it delivers significant information on company operation, facilitating the process of taking decisions by the management.

REFERENCES

Brzeziński, J. (1996). *Metodologia badań psychologicznych* [Methodology of psychological research]. Warsaw, Poland: PWN.

Cieślak, R. (1995). Problemy pomiaru wsparcia społecznego. Skala Wsparcia Społecznego [Problems of social support measuring: Social Support Scale]. *Ergonomia, 18*, 203–213.

Cieślak, R. (1998). Wsparcie społeczne a stres w pracy kierowniczej [Social support and stress in managerial work]. *Czasopismo Psychologiczne, 4*, 29–46.

Cieślak, R., Widerszal-Bazyl, M., & Łuszczyńska-Cieślak, A. (in press). The moderating role of hardiness and social support in the relation between job stressors and well-being. A lesson from a clerical women sample. *International Journal of Occupational Safety and Ergonomics*.

Cooper, C.L, Sloan, S.J., & Williams, S. (1988). *Occupational stress indicator. Management guide*. Windsor, UK: NFER-Nelson.

De Jonge, J. & Kompier, M.A.J. (1997). A critical examination of the demand-control-support model from a work psychological perspective. *International Journal of Stress Management, 4*, 235–258.

Doef, M. van der, & Maes, S. (1998). The job demand-control (-support) model and physical health outcomes: A review of the strain and buffer hypotheses. *Psychology and Health, 13*, 909–936.

Elo, A.L., Leppanen, A., Lindstrom, K., & Ropponen, T. (1992). *Occupational stress questionnaire: User's instructions*. Helsinki, Finland: Institute of Occupational Health.

Fletcher, B. (1991). *Work, stress, disease and life expectancy*. Chichester, UK: Wiley.

Frese, M. (1989). Theoretical models of control and health. In Sauter S.L., Hurrell J.J., & Cooper C.L. (Eds.), *Job control and worker health* (pp. 107–128). Chichester, UK: Wiley.

House, J.S. (1981). *Work stress and social support*. Reading, MA, USA: Addison-Wesley.

Karasek, R. (1979). Job demands, job decision latitude and mental strain: Implication for job redesign. *Administrative Science Quarterly, 24*, 285–308.

Karasek, R., Brisson, Ch., Kawakami, N., Houtman, I., Bongers, P., & Amick, B. (1998). The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of Occupational Health Psychology, 4*, 322–355.

Karasek, R., & Theorell, T. (1990). *Healthy work*. New York, NY, USA: Basic Books.

Kompier, M., & Levi, L. (1994). *Stress at work: Causes, effects and prevention*. Dublin, Ireland: European Foundation for Improvement of Living and Working Conditions.

Najmiec, A., & Widerszal-Bazyl, M. (1998). *Ocena obciążenia psychicznego w pracy kontrolera ruchu lotniczego* [Assessment of psychological overload in the work of air traffic controllers]. Unpublished report No. 2/97, Central Institute for Labour Protection, Warsaw, Poland.

Rizzo, J.R, House, R.J., & Lirtzman, S. (1970). Role conflict and role ambiguity in complex organizations. *Administrative Science Quarterly, 15*, 150–163.

Widerszal-Bazyl, M. (1995). *Psychospołeczne właściwości pracy kadry kierowniczej, ich interakcja a stres i dolegliwości zdrowotne* [Psychosocial conditions of managerial

work, their interactions, stress and health ailments]. Unpublished report No. PB 0177/P1/93/05, Central Institute for Labour Protection, Warsaw, Poland.

Widerszal-Bazyl, M., & Cieślak, R. (1999). Monitorowanie stresu psychospołecznego jako element zarządzania organizacją [Psychosocial stress monitoring as an element of organization management]. *Ergonomia, 22*, 13–35.

Widerszal-Bazyl, M., Cieślak, R., & Najmiec, A. (1994). *Psychospołeczne właściwości pracy urzędniczej, zmienne osobnicze a stres i dolegliwości zdrowotne* [Psychosocial conditions of clerical work, individual differences, stress and health ailments]. Unpublished report No. III.019, Central Institute for Labour Protection, Warsaw, Poland.

Widerszal-Bazyl, M., & Żołnierczyk, D. (1995). Dimensions of job control in computerized and traditional office work and its health effects. *International Journal of Occupational Safety and Ergonomics, 1*(1), 29–41.