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

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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.

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...
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 de­
cided 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 pre­
dictors 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.](image)
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>
<thead>
<tr>
<th>Scale</th>
<th>Number of Questions</th>
<th>Cronbach's $\alpha$</th>
<th>Pearson $r$ Test-Retest</th>
<th>Scale</th>
<th>Number of Questions</th>
<th>Cronbach's $\alpha$</th>
<th>Pearson $r$ Test-Retest</th>
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<td>.62</td>
<td>.61***</td>
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<td>.68***</td>
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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, SS2—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 \( \alpha \) (coefficient), as well as data concerning test-retest reliability. Obtained results indicate high internal consistency of all five theoretical scales \( \alpha \) (from .82 to .92, depending on the scale) and slightly lower consistency of empirical scales: for nine scales of that type, Cronbach's \( \alpha \) 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>
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<tr>
<th>Sub-Scales</th>
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<th>Group 3</th>
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<td>M</td>
<td>M</td>
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<td>3.16</td>
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</table>

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, SS2—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 \( \beta \) 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 ($\beta = -0.37$), high demands ($\beta = 0.34$), and low social support ($\beta = -0.15$).

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 Unpublished report No. PB 0177/P1/93/05, Central Institute for Labour Protection, Warsaw, Poland.

