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Short Communication: Work stress assessment and instability of employment: complementary contribution of different data sources

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Summary
From 2000 to 2003 a prospective research on work stress was conducted in Belgium. One hypothesis was that besides stress experienced by the worker and induced by local and direct working conditions, additional stress caused by work instability can be identified. In order to take this hypothetical difference into account in our sample, administrative data was used to build a contextual variable relying upon an index of economic sectoral 'instability' of employment. Thus 90 semi-structured interviews were conducted in four selected firms presenting contrasted levels of job instability. Additionally, self-administered questionnaires were sent to all workers in these firms. Results issued from the interviews with key informants and from the self-administered questionnaires indicate that our index is a good tool for the selection of firms in terms of instability. Stress appraisal is very congruent across the different sources of information: index of instability, interviews and questionnaires. Copyright © 2006 John Wiley & Sons, Ltd.

Key Words
stress; workplace; methods; data collection

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Introduction

Stress has for many years been recognized as a source of physical and mental health impairment. This is abundantly described in the literature (Cooper & Payne, 1988; Karasek & Theorell 1990; van Der Doef & Maes, 1998). Other authors have shown that organizational change could be considered as a stressor since it has effects on the health of employees. Most of these studies were conducted among civil servants and

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local government workers in Britain and Finland (Ferrie, Shipley, Stansfeld, & Marmot, 2002; Ferrie, Shipley, Marmot, Stansfeld, & Davey, 1998a, 1998b; Ferrie et al., 2001; Stansfeld, Fuhrer, Head, Ferrie, & Shipley, 1997; Vahtera, Kivimäki, & Pentti, 1997). They observed that self-reported morbidity and certificated sickness absence are higher among workers whose job security is threatened. More recently, Virtanen and coworkers also measured high odds for poor health among the employed with atypical contracts (Virtanen, Liukkonen, Vahtera, Kivimäki, & Koskenvuo, 2003). This paper explores further the relationship between stress and job insecurity, using different data sources.

Work stress and health are usually assessed by self-reported data provided by the worker (questionnaires). Self-reported data on stress is sometimes criticized because of the intrinsic subjectivity of its definition. Personality characteristics, such as neuroticism, could interfere with the report of stress (Parkes, 1986; Stronks, Looman, & Mackenbach, 1998; Wainwright & Calnan, 2002). However, more diverse 'objective' measurements are also used, such as medical examination, sick leave certificates, morbidity and mortality data.

Other indirect sources about conditions that may likely generate stress are available and published, such as economic bulletins, (un)employment statistics presented by gender, geographic localization or branch of activity. Those indicators are often neglected for practical reasons or due to poor data accessibility.

In order to better understand and measure work stress in the Belgian Somstress survey (Godin & Kittel, 2004), we tried to measure stress by collecting information from different sources. This was done so as to have a global and comprehensive understanding between working conditions, health and well-being. The study aims at investigating the psychosocial determinants of stress and their impact on the worker's health and well-being, in different and contrasted economic activity sectors.

The first objective was to develop an instrument capable of classifying workplaces according to their economic (in)stability. This instability could be produced by globalization, a recent occurrence or threat of merging or downsizing. The assumption is that besides the stress experienced by the worker and induced by the local and direct working conditions, additional stress caused by work instability can be assessed. In an unstable economic sector, independently from the direct work stress, we expected higher stress levels than in economic sectors considered as stable (economic sectors are defined using the NACE categories, i.e. Statistical Classification of Economic Activities).

The research design is a prospective one, with two waves of measurement in each organization. This allows the assessment of the evolution of the stress measurement in a 1 year interval and avoids the limitation of cross-sectional data analysis. Interpretation of cross-sectional studies can be spurious because the nature of the relationship between stress factors and health issues can not be substantiated without ambiguity (Tennant, 2001).

Methodology

Since data on the number of people employed are not available at the firms' level, we used aggregate sector based data to ensure the presence in our sample of different levels of employment instability. We built a contextual variable relying upon an index of economic sectoral 'instability' of employment (Godin, Desmarez, & Kittel, 2002). Economic sectoral data available on employment and unemployment are used to calculate this index. The purpose of this index construction is the production of an instrument easy to compute and to manipulate. This index served as a guide for selecting the enterprises to be included in the study and, consequently, four firms were selected.

The stability index

The stability index was computed on the basis of two sources of data published in Belgium on a regular basis: employment and unemployment trends, by industry (economic sector) (Employeurs et travailleurs assujettis à la sécurité sociale, statistique décentralisée (forces de travail) 1998; Stat Info, 1999). A negative employment time trend along with an increase in unemployment are characteristic of an unstable economic sector. The combination of both trends allows for the index construction. This index is calculated as the ratio between job seekers in an activity branch and the number of workers occupied in this same branch in the preceding year. This can be considered as a marker of a risk of unemployment and

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of job instability. A detailed description of this index construction was published earlier (Godin et al., 2002).

The economic sectors categorization within this index indicate for instance that health and education sectors of activity could be classified as 'stable', while construction, metallurgy, and clothing industry clearly appear as 'unstable' sectors. Services and administration sectors occupy an intermediate position.

Four firms with a minimum size of 500 workers, belonging respectively to different positions on the stability index (one very unstable, one very stable, one with a recent history of merging and one with a forthcoming merger) were selected, contacted and accepted to participate in the study.

Two techniques were used to collect stress related data in the work organizations. Firstly, interviews of key informants were carried out in the selected enterprises. Secondly, self-administrated questionnaires were sent to all workers in the four workplaces.

Key informant's interviews

Key informants were selected according to their position or function in the firm: board of direction members, heads of departments, trade unions delegates, personnel department or company's doctor. The final choice of key informants to be interviewed was done through suggestions of the firms themselves; this may lead to some bias.

Interviews were conducted with key informants in each firm. The purpose was to investigate the working conditions, and more precisely, to assess the possible sources of stress, as well as the potential differences among departments, functions or positions in the hierarchy. Data obtained through this information source was further compared with the firm's instability indicator and with the workers' self-reports (questionnaires).

Interview questions and guidelines were based upon three existing analysis grids and we added some questions relating to our topic of interest (Gaussin, Karnas, & Karnas, 1995; Technologiediffusie in Vlaanderen, Methodologie en Vragenlijst, 1997; Vade Mecum Conseil d'Entreprise, 1989).

About 10 informants were interviewed in each firm. The questions of the semi-structured interviews concerned productivity trend, firm's stability, structural changes (current and/or forecast for the future), competition threat, market position, global stress assessment, as well as possible stress induced by work insecurity, quality of information, rumours and workers' complaints. Each respondent was seen twice, in a 1-year interval, corresponding to the two moments of measurement by worker's self-administered questionnaires, making up a total of 90 interviews. The key informants were considered as experts: no question was asked about the sources of their knowledge of the firm's situation.

Self-administered questionnaires

The last source of information was a self-administered questionnaire sent to all workers in the four firms, with the same pattern used for the key informants: two measurements, in a 1-year interval (2000 and 2001). Participation was on a voluntary basis. For the first measurement (T1), 9634 questionnaires were sent out, and 3804 were returned (global participation rate 40 per cent). For the second measurement (T2), the global participation rate (37 per cent) was quite similar to the first measurement (N = 2709). According to the Belgian current standards for similar surveys, the participation rates can be considered as satisfactory. Data presented here is related to the paired sample representing participants in both measures, (N = 1986).

Questionnaires contained data on stress, measured by the stress model of Karasek (1979) or Job-Demand-Control (JDC) model. According to this model, a high level of job demands, combined with a low level of job control (decision latitude) is characteristic of a stress situation.

An additional score, comprising three items, measures threat perceived from global economy. Job insecurity is assessed by one item (Likert scale, in four categories).

The definition of the 'high strain' risk category for the Karasek model is characteristic of the situation in which the worker is simultaneously above the median for the job demands and below the median for the job control. The upper quartile of the score is used for the definition of 'job security threatened with globalization'. The variable job insecurity categories are merged for 'poor' and 'very poor' job security on the one hand and 'good' and 'very good' job security on the other hand.

Socio-economic and demographic questions were also part of the questionnaire: gender, age, education, occupational qualification (ILO-ISCO

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codes of occupations, grouped in three skill categories: low, intermediate and high).

The health indicator presented here is the classical self-rated (or subjective) health (SRH) gauge recommended by the World Health Organization (WHO) to evaluate subjective general health status. From this question 'How do you rate your current health status?', two categories of answers were constructed on the initial five: 'good health' ('very good' and 'good' together) and 'poor' (from 'average' to 'very poor health' appraisal).

Statistical analysis

Bivariate cross-sectional differences are tested with the Pearson chi-square. Logistic regression analyses (method enter) were performed to study the different socio-demographic data with regard to stress exposure.

For stress variables, in the logistic regressions, the reference categories are defined by employees without work stress exposure and workers of the most stable workplace (labelled as Firm 1). For socio-economic and demographic variables, reference categories are men for gender, the youngest age group (under 35 years of age) and the highest levels of education (university level) and qualification (highly qualified workers, ILO ISCO codes). Arbitrarily, the odds ratio is one for these categories.

Results

Instability index

According to the instability index, four firms were selected for the survey: one stable (Firm 1, health sector, 2721 workers), one unstable (Firm 4, telecommunication company, 3965 workers) and two in an intermediate position (Firm 2, services and insurance companies, 1961 workers, and Firm 3, insurance company, 987 workers). Firm 4 had a very recent history of restructuring and downsizing. Firm 2 was in the post-phase of a merger and Firm 3 expected a merger in the near future and subsequent downsizing. The firm was too small to keep its market share.

Key-informants

Production trend. At first measurement (T1), across the four firms, there is a general agreement to report an increase in productivity (intensity of work) in the workplace, with no marked differences from one place to another. The opinions are less clear at T2, even though the majority of interviewees report an increase in productivity. In Firm 3 only (insurance company), two respondents report a decline in productivity. Generally speaking, the productivity increase appears to be linked more to downsizing than to an increase in activity. Productivity does not appear to be linked to instability.

Presumption of structural change. In the assumed most unstable environment and in Firm 2 (services), all respondents at T1 predict a structural change within the Firm at T2. Most of the key informants in Firm 3 predict a structural change as well. During the 1 year interval, Firm 3 indeed experienced an important structural change, with the closure of many sales offices, but this change does not exclude another forthcoming one for the key informants at T2. In Firm 4, respondents to this question say that structural change is permanent, which explains all positive (valid) answers at T1 and T2.

The relation between structural change and instability clearly appears, being more often cited by key informants in unstable economic environments. In the stable ones, the anticipated structural change is the foreseen replacement of the two directors, leaving their position because they will reach retirement age.

Evaluation of the firm's stability. The evaluation of the firm (in)stability by the key informants allowed us also to test our stability indicator. At T1, the only negative appraisals of stability are given in Firms 3 and 4, but the majority of respondents, in all firms, gave a positive answer to this question. Some diversity is though to be observed. Trade unions representatives are more often pessimistic than the management concerning the firm stability.

Stress evaluation (apart from job insecurity). Another important issue was to have an idea about stress within the enterprise. This question was split into two sub-questions: stress induced by work insecurity and stress excluding work insecurity. Interviewees were asked to quote global stress on a scale from 0 (absence of stress) to 10 (maximum). This evaluation produces roughly similar results in the different

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workplaces, and at the two different measures (all ratings between 6 and 8 on the 10 points scale). For some respondents, it was quite difficult to rate stress on such a scale. Therefore, they gave a qualitative evaluation: 'moderate', 'very important' or 'permanent'. In the unstable firm, stress was only quoted as 'very important'. The quantitative evaluation showed a decline of stress in Firm 1 and a slight increase in the second firm between the two measures. The stress appraisal is also linked to the key informant's role in the workplace: trade unions delegates tend to give a higher stress evaluation than other respondents, although not systematically.

Functions and services/departments are particularly exposed to stress. In the most stable firm (hospital), according to the key informants, levels in the hierarchy most exposed to stress are the extreme ones: top managers and unskilled workers. Emergency and surgery wards are particularly exposed to stress.

In Firm 2 (services to enterprises, medical insurance) at T1, differences were not so wide between departments, but mainly between functions. The high stress positions are the ones that are in contact with clients (face to face or telephone contact) and managers. But at T2, stress appears to heavily depend on departments. Some of them are particularly exposed because of their poor financial results, resulting in high pressure on the workers.

In Firm 3 (insurance company), during the first measure, the same comments as the ones for the second firm could be applied: managers and people in contact with clients are the functions most exposed to stress. In terms of departments, production and damage services are frequently cited. During the time lapse between both measurements, there was an important restructuring in this firm, resulting in a sharp decrease in the number of agencies in the country. Technical sales department and agencies managers are consequently more exposed to stress.

In the last most unstable firm, Firm 4, (telecommunications), at T1, many positions are cited by the key informants, but the most frequent ones once again are the extremes in the hierarchy line: top managers and client facing positions (here the less qualified workers). At T2, for the key informants, the less qualified workers and middle management are the positions with the highest stress. In terms of services/departments, the call centres and helpdesks are particularly at risk of stress.

Self-reported stress measures

The total paired sample size is composed of 1986 workers (participation to the two measures). Data provided by the workers themselves are very similar to the information obtained from the two previous sources. Work stress measured by the Karasek's model indicates a clear gradient across the four firms: high strain prevalence being almost double in Firm 4 compared to Firm 1 (Table I). There is a remarkable stability of the measure over time.

The differences between the firms in their prevalence of threat from globalization and poor job security are even more striking. Those indicators are also very stable over time.

There is evidence of a link between stress perceived (high strain) and threat from globalization. Workers acutely perceiving a threat from the global economy are more stressed (high strain category) than the others: 22 per cent and 11 per cent respectively ($p < 0.001$). The same association is true for stress and job insecurity: 21 per cent of the workers perceiving an important job insecurity are in the high strain category, 14 per cent of the others ($p < 0.001$).

The information provided by key informants allowed us to grasp the firm's characteristics and particularities, as well as to understand and interpret data collected via the questionnaires in the same firms.

A first example is provided by the information collected in the most unstable firm. In this firm, characterized by a semi-private structure, half of the workers work as civil servants, with very good job security, whereas the remaining ones have contracts (long-term contracts for most of

Table I. Stressful working conditions by working place (in percentages, $N = 1969$).

Firm	High strain		Important threat from global economy		Poor job security	
	T1	T2	T1	T2	T1	T2
1 ($N = 545$)	9.7	12.0	8.5	8.8	12.9	11.2
2 ($N = 475$)	10.5	13.2	20.4	18.9	14.3	9.6
3 ($N = 290$)	15.9	18.5	58.0	55.5	44.3	45.5
4 ($N = 659$)	26.6	22.1	81.4	80.4	46.9	46.2
Total	16.5	16.6	43.1	42.1	29.3	27.5
Difference	***	***	***	***	***	***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

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them). High strain and job insecurity are much higher within the contractual workers'group than in the civil servants one. But civil servants more often report that they feel an important threat from the global economy (Table II). This can easily be understood because this workers' category particularly fear firm privatization.

Another example is the diversity of situations within the workplace encountered in the most stable firm (hospital). Surgery and emergency wards are particularly and traditionally more exposed to work stress than other wards and, stress prevalence differs greatly accordingly. Similar analyses could be done regarding the position occupied by the workers in the hospital: medical doctors, nurses, nurse assistants, laboratory assistants, clericals. It is not surprising to observe noticeable differences across these categories. Our questionnaire data shows that the categories of medical and laboratory assistants are for instance particularly at risk of higher stress compared to other functions.

The next step was to identify the socio-economic and demographic characteristics of the respondents exposed to stress. This analysis was performed by means of logistic regression (Table III).

According to our survey results, older workers are more inclined to report threat from globalization but the inverse relation is found for job insecurity. Sector instability shows evident relations with the feeling of job insecurity and job dissatisfaction. Being a woman and belonging to the low skill categories represent a risk of being exposed to high stress (strain). Low education and low professional qualification are also characteristic of high stress exposition.

In the self-administered questionnaires, participants were also invited to give information on their health and to quote their health status (self-rated health), at each measure. We could observe a clear gradient in the negative self-rated health across the four firms: workers belonging to the most unstable one have at each measurement worse health indicators than in the other firms (Figure 1). The proportion of workers rating negatively their health is about 17 per cent in the most stable firm and reaches 35 per cent (first

Table II. Work status and stress indicators in the most unstable firm, T1 (in percentages, $N = 1428$).

	High strain	Job insecurity	Threat from global economy
Civil servants ($N = 761$)	20.7	40.1	83.5
Contractual workers ($N = 667$)	28.0	49.3	75.1
Difference	**	***	***

** $p < 0.01$; *** $p < 0.001$.

Table III. Worker's socio-economic and demographic characteristics, work instability and stress indicators, T1 (O.R., 95 per cent C.I.).

Determinants	Strain	Threat from globalization	Job insecurity	Job dissatisfaction
Sex	***			
Women	1.8 (1.4–2.4)	0.8 (0.6–1.1)	1.3 (1.0–1.6)	1.1 (0.8–1.4)
Age		***		*
35–49 years	1.0 (07–1.3)	2.1 (1.6–3.0)	0.9 (0.7–1.2)	1.5 (1.1–2.0)
>49 years	0.9 (0.6–1.4)	2.8 (1.8–4.4)	0.6 (0.4–1.0)	1.4 (0.9–2.1)
Education	*			
College	1.5 (0.9–2.6)	1.3 (0.8–2.0)	1.0 (0.7–1.5)	1.2 (0.8–1.8)
Secondary school	2.0 (1.1–3.6)	1.5 (0.9–2.5)	1.2 (0.7–1.9)	0.9 (0.5–1.4)
Max. vocational	2.1 (1.2–3.8)	1.4 (0.9–2.4)	1.2 (0.7–1.9)	1.1 (0.6–1.7)
Firm	***	***	***	**
2	1.1 (0.8–1.6)	2.4 (1.6–3.6)	1.1 (0.8–1.6)	0.8 (0.6–1.1)
3	1.5 (1.0–2.3)	13.4 (8.8–20.3)	5.9 (4.1–8.6)	1.6 (1.1–2.3)
4	2.1 (1.5–3.1)	35.5 (23.7–56.1)	6.6 (4.6–9.5)	1.4 (1.0–2.0)
Professional qualification	***			*
Intermediate	2.9 (1.9–4.4)	1.5 (1.0–2.1)	1.1 (0.8–1.5)	1.6 (1.1–2.2)
Low	2.9 (1.7–4.9)	1.2 (0.7–2.0)	1.2 (0.8–1.9)	1.8 (1.1–2.9)

* $p < 0.05$; ** $p < 0.01$; $p < 0.001$.

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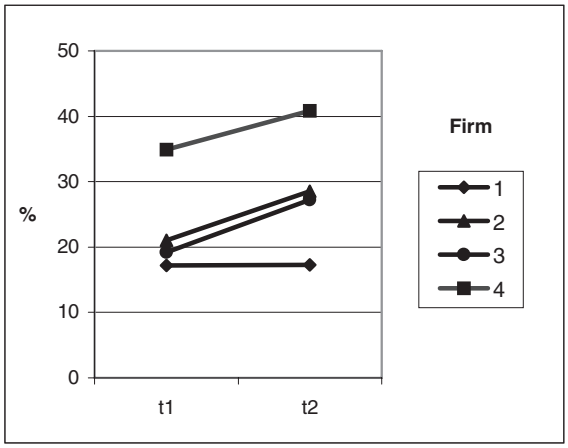

Figure 1. Poor self-rated health evolution (T1 and T2) and work instability.

measure) and 41 per cent (second measure) in the most unstable one. The two intermediate firms showing very similar results.

Discussion

Some limitations have to be acknowledged before starting the discussion. The small number of enterprises as well as the relatively low participation rate plead for some caution, but does not hinder the presentation of some interesting findings.

The definition and use of our instability index was motivated by the lack of data on the evolution of the number of people employed by individual firms and the need to include in our (small) sample of firms different instability levels, which could be incorporated into a contextual variable useful for quantitative statistical analysis . Even if one has to remain very careful, the analysis of both data sources (key informants and self-administered questionnaires), used to assess work stress, leads us to accept the hypothesis that our instability index is an appropriate criterion for the selection of cases. This index also has the advantage to be easily computable using available aggregated data at the industry level. It would deserve to be used in other samples.

One of the originalities of our study is that both interviews and questionnaires were conducted twice, in a 1-year interval. Our results show that interviews with key informants not only provided useful information about the firm and its history, or expected future, but were also of great help to interpret questionnaire data that otherwise would have been more difficult to understand. Among others, interviews throw some light on the reasons why one or another trend appeared in data collected through the two measures of the panel. It became for instance possible to understand why the stress level could change between the two occasions of questionnaire measurement without any change of the worker's individual working conditions and position.

There is certainly no single definition of work stress, and the meaning attached to this word is conditioned by individual personal experience, professional status, place and role occupied in the hierarchy. This is why it is important to combine more global objective or independent measures of stress like the ones collected during the interviews with key informants as well as information produced by the instability index with the more subjective individual information (self-administered questionnaires). As Wainwright and Calnan (2002) state, work stress is usually defined by high demands and high work pressure (strain), but other factors produce the same effects. One of those factors is the managerial change due to privatization for instance or structural reorganization leading to tensions and pressures due to transition.

Complementing the stress measures obtained through worker's self reports with key informant's interviews has another advantage. The latter provides a global picture of the processes at work in the firm while taking into account systemic dimensions, which are very difficult to grasp through standardized questionnaires. Human resources policies, culture and other local peculiarities, as perceived by the management or union representatives, lead e.g. to a richer image of the organization. Being able to introduce such a 'contingency' factor in the analysis and also to compare the studied firms with the contextual sectoral data provided by the instability index, allows researchers to take into account simultaneously the impact of individual stressors and of broader economic conditions on the way workers experience stress.

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