The WOrking Conditions and Control Questionnaire (WOCCQ): Towards a Structural Model of Subjective Stress.

Running Head: WOCCQ, towards a structural model of subjective stress

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ABSTRACT

This paper examined the structural model of subjective stress considering the job control dimensions of the WOrking Conditions and Control Questionnaire (WOCCQ), a psychosocial risk diagnosis widely used in French-speaking countries. Two research questions were investigated: (1) Do all the control facets influence subjective stress in the same way?, and (2) Are certain control scales more important than others in the prediction of stress? The sample used includes 816 workers of a public employment agency. First, not all of the facets of job control influence stress in the same way. The control of resources dimension is important in indirectly influencing the stress process. Planning control is a partial mediator between control of resources and other dimensions of control. The model suggests considering future control as an exogenous variable. Finally, the direct effect of the four job control subscales on stress is identical in terms of R-square. These results are discussed not only in the theoretical perspective of stress at work but also in the stress intervention perspective.

Keywords: job control, subjective stress, working conditions, psychosocial risks

RESUME

L'objectif de la recherche est de présenter un modèle structural du stress au travail permettant de prendre en compte les dimensions de contrôle du 'Questionnaire sur le contrôle de l'activité de travail' (WOCCQ), un diagnostic des risques psychosociaux largement utilisé dans les pays de langue française. Deux questions guident cette recherche : (1) Les dimensions de contrôle influencent-elles toutes de la même manière le stress subjectif ? et (2) Certains dimensions de contrôle sont-elles plus importantes que d'autres dans la prédiction du stress ? L'échantillon utilisé comprend 816 travailleurs d'une agence publique pour l'emploi. Tout d'abord, toutes les dimensions de contrôle n'influencent pas le stress de la même manière. Le contrôle sur les ressources est primordial même s'il n'influence le stress que de manière indirecte. Le contrôle sur la planification des tâches se présente comme un médiateur partiel entre le contrôle sur les ressources et les autres dimensions de contrôle. Le modèle suggère également de considérer le contrôle de l'avenir comme une variable exogène. Enfin, les effets directs mis en évidence pour quatre dimensions de contrôle sont semblables en termes de R-carré. Ces résultats sont discutés non seulement dans la perspective théorique du stress au travail mais aussi en termes d'interventions relatives à la gestion du stress.

Mots-clés: contrôle de la situation de travail, stress subjectif, conditions de travail, risques psychosociaux

INTRODUCTION

Job control is one of the most popular concepts in occupational psychology literature. The complexity of this concept is largely recognized and discussed in the scientific literature (e.g. Aronsson, 1989; Frese, 1989). More particularly in the perspective of stress studies, the feeling of uncontrollability on job factors is hypothesized to influence the generation of stress. High job control also has an impact on health and well-being, i.e. fewer somatic complaints and higher satisfaction (e.g. Spector, 1986; Smith, Tisak, Hahn, & Schmieder, 1997).

Several models exist to explain how job control has an impact on the well-being of workers (Frese, 1989; Karasek, 1979). More specifically, according to Frese (1989), it is possible, as far as mechanisms of control are concerned, to distinguish between different moderating and direct effects. Carayon (1993) has tested the moderating effect of control assumption. Her results did not confirm a moderating effect of job control on stress outcomes. She argues that "job control does not play a mediating role (endogenous variable) but rather functions as an exogenous variable. Job control could be a structuring factor that would allow individuals to adjust job demands and other job elements to their desired level" (Carayon, 1993, p.474). Frese (1989) called this mechanism "stressor reduction". This means that the perception of control has an indirect effect on stress reactions by reducing the impact or intensity of the demands of the situation. This underlines the importance of a job control measurement that makes it possible to assess whether or not a worker has a perception of control over all job factors included in his/her tasks. Consequently, control dimensions focusing on specific aspects of the job should be negatively correlated with the perception of stress. In this sense, perceived control is even more important insofar as only perceived control leads the person to change the work environment situation (Frese, 1989).

The job demand–control model (Karasek, 1979), which is the reference in the field of job control research, is useful for epidemiological studies but insufficient for diagnostic purposes in an interventionist perspective (de Jonge & Kompier, 1997). Even if this model is intuitively attractive and largely recognized in the scientific community, its empirical validity still has to be demonstrated. From a methodological point of view, many authors criticize the use of the decision latitude construct as a measure of job control. The decision latitude items of Karasek (1979) reflect decision authority and skill discretion. But many authors (e.g. De Croon, Van Der Beek, Blonk, & Frings-Dresen, 2000; Kristensen, 1995; Smith et al., 1997) mention that the skill discretion items are quite confused in that they are closer to job characteristics such as skill utilization, job complexity and job variety than to job control. However skill discretion is not necessarily linked to job control (see Wall, Jackson and Mullarkey, 1995; Van der Doef and Maes, 1999). All these authors recommend more specific scales to measure job control and job demands.

From unidimensional scales of job control to multi-faceted job control scales

From a methodological point of view, we have to deal with an important criticism of studies dealing with job control (Karasek, 1979, p.290): the measurement of job control through global scales (e.g. Jones & Fletcher, 1996; Mc Knight & Glass, 1995).

De Croon et al. (2000) observe that up until now many studies have used the general decision latitude construct, as defined by Karasek (1979). During the 1980s, following criticisms regarding one-dimensional scales, we could observe an evolution in the way in which control scales are conceived. Admittedly, certain authors have created scales that are still one-dimensional, but they are based on items which make reference to various aspects of the work

situation. But most recent studies, aiming to verify Karasek's model or the moderating role of control, still make reference to one-dimensional scales (e.g. Barling & Kelloway, 1996).

The disparity of the scales is quite obvious. The most representative example of the problem is probably Carayon (1993) who obtains four different response formats for nine items taken from three different scales: the autonomy scale of the Insel and Moos diagnosis (1974, cited by Carayon 1993), the participation scale of Caplan, Cobb, French, Harrison & Pinneau (1975, cited by Carayon 1993) and items of Smith, Cohen & Stammerjohn (1981, cited by Carayon 1993).

It is not until the end of the 1980s and thereafter, that we see certain authors propose scales with several control dimensions, parallel to the elaboration of different taxonomies (see Table 1). Unfortunately, numerous criticisms can be levelled at these multifaceted scales. First of all, it is said that the authors seem to agree on the content of the different facets but, unfortunately, little consensus is to be found regarding the optimal number of fields to be considered. Certain aspects are also relatively neglected, in particular control over the physical environment, responsibilities and the future. Moreover, different indicators measure different aspects, and this means that there is little prospect of obtaining sound databases. The scales are often specific to the job analyzed and do not incorporate validity constructs. Different indicators measure different aspects, which makes it difficult to look for reliable data. As Jackson, Wall, Martin and Davids (1993) noticed, only standardised, generally applicable measures will allow the accumulation of comparative and normative data that is necessary to make more systematic judgments about whether job control is at an optimal level. Finally, the relatively small number of items contained in the existing multidimensional scales is a problem when making a differentiated diagnosis of the psychosocial risks in a working environment. The fields should therefore not only be pertinent for the purposes of adjustment of the intervention after the diagnosis, but should also be

sufficiently detailed to allow more specific control problems to be targeted in each field (Kristensen, 1995).

Insert table 1 about here

In response to these criticisms, we have developed a control scale that relates to different fields of work, from the point of view of the stressor reduction mechanism (see Frese, 1989), and which generally applies to any working environment. Above all, our approach aims to be practical in the sense that the methodology proposed should be useful in terms of the potential for intervention by any professional concerned by the problem of psychosocial risks in the workplace.

From a new multi-faceted job control scale to research questions

Up until now, none of the studies that have highlighted control tools pertaining to different aspects of work have attempted modelling. The authors involved in this field of study have put forward multidimensional control scales (e.g. Breaugh, 1985; Jackson et al., 1993; Wall et al., 1995; Hurrell & McLaney, 1989; Sargent & Terry, 1998; Widerszal-Bazyl & Zolnierczyk, 1995) but their efforts have focused chiefly on the construction of scales. In order to do so, they base themselves on the criticisms of the decision latitude scale proposed by Karasek (1979). Their main objective remains linked to the Karasek model (e.g. Elsass & Veiga, 1997; Mullarkey, Jackson, Wall, Wilson, & Grey-Taylor, 1997), in that they sometimes consider a global control score based on several subscales that are brought to the fore (e.g. de Jonge, Janssen & van Breukelen, 1996).

Terry & Jimmieson (1999) recommend a multidimensional approach to the extent that workers are able to perceive personal control over different facets of their work, and the perception of a high level of control over one facet does not necessarily mean a high level of control over other facets. Frese (1989) also observes that areas of control can vary depending on how they are linked to the workers' daily activities. Sargent and Terry (1998) point out that the sources of control which are relevant to the task (e.g. work pace, organization of the task, control of planning) are more important stress moderators than the peripheral sources of control. Starting from the idea that certain types of control are more important than others (e.g. Israel & Schurman, 1990), Baker, Israel and Schurman (1996) measure several types of control at different levels and show that various types of control have different effects. Therefore, according to several studies (e.g. Zijlstra, Den Hoedt & de Vries, 2000; Hurrell & Lindstrom, 1992), the type of control envisioned could have different effects on subjective stress. More particularly, direct sources of task control could be of primordial importance.

Going beyond the unidimensional quality of the concept of job control thus allows us to ask some interesting questions. Do all aspects of job control influence subjective stress in the same way? Are some aspects of job control more important than others in the prediction of stress? Do areas of control vary systematically according to the type of profession envisioned? Is the control of different areas of work accumulated in order to determine a general sense of control over the job activity? Can a high level in one area of control compensate for weakness in another? In this paper, we will focus on the first two research questions. The objective is to work out and test a theoretical structural model that will make it possible to incorporate all the control subscales for explaining stress and, from there, to progress in the understanding of the stress process.

METHOD

Material

Multifaceted job control scale

Kasl's (1989) recommendations and suggestions from other empirical research (see e.g. Jones & Fletcher, 1996) were used to elaborate the WOrking Conditions and Control Questionnaire (WOCCQ). After a pilot test, some items were reformulated, elucidated and even eliminated according to the Cronbach's Alpha coefficients. The final version of the WOCCQ (Hansez, 2001) includes 77 items. The items were grouped together in six subscales: control over resources needed to perform the tasks involved in the job (8 items), control over tasks (definition of the tasks, job role and procedures) (16 items), control over risks to oneself and to others (16 items), planning control (12 items), time management control (14 items) and control over the future (11 items). Each item makes reference to a person's perception of the situation at his/her work, such as "I see my work piling up without being able to resolve latencies", "I can say something about the way work should be done", "I can adapt my work pace as I want"[2]. The items were not formulated directly in terms of control but they could all be easily coded in terms of control. The WOCCQ response format was a four-point frequency Likert scale as follows: 1= rarely or never applicable to my job, 2= sometimes applicable to my job, 3= regularly applicable to my job, 4 = almost always or always applicable to my job. The valence of the items was balanced. High scores reflect high job control. The validity of the WOCCQ has been determined by means of the combined use of the Item Response Theory through a Rasch analysis, a study of the construct validity and the joint use of quantitative and qualitative data (Hansez, 2001). We used the Rasch parameters which are continuous variables measured on an interval scale. All variables were normalised after a preliminary analysis of these parameters (skewness and

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[2] The complete questionnaire is available on request from the author or from www.woccq.be.

kurtosis tests) in Prelis 2 (Jöreskog & Sörbom, 1999). When considering the 77 items all together, the Rasch reliability coefficients for the items and for the subjects are .93 and .89 respectively. When considering the job control subscales, the Rasch reliability coefficients for the items are in a margin of .90-.95. The reliability coefficients for the subjects vary between .56 and .79. Low subject reliability coefficients apply mainly to control of resources and risk control but are probably justified in part by the inter-individual variability about workers' perception. On the whole, the means and standard deviations of the infit (weighted) and outfit (unweighted) fit statistics in their mean square and transformed (t) forms are acceptable which means that the data is compatible with the model (Hansez, 2001).

Psychological State of Stress Measure

The Psychological State of Stress Measure has been elaborated at the University of Laval (Canada), by the team of Dr. Tessier and Dr. Lemyre. Their aim was to construct a unidimensional measurement that would be representative of the conception of stress as an indicator of the adaptive tension, a conception which separated stressors (sources of stress) from pathological symptoms (illnesses). The state of stress is self-observed directly by the person and is not derived from clinical symptoms as is done with some existing questionnaires. The results of this research is the PSSM (49 items) and two short versions PSSM-A and PSSM-B (25 items each) (Lemyre, Tessier, & Fillion, 1990). We used the short version A. Examples of items are: "I am strained or nervous", "I have a lump in my throat or my mouth feels dry", "I feel pressed for time, caught up with time, I am short of time". The item response theory was also used through Rasch analysis to validate this instrument. The final results yielded a version of 20 items with a five-point-Likert scale as response format. The Rasch reliability coefficients for the items and for the subjects are .92 and .85 respectively. On the whole, the 20 items had high indices of fit to the model (Hansez, 2001).

Subjects

The study took place in a public employment agency. Agents in daily contact with users of the services took part in the survey: the counselors, who offer support and job orientation, and trainers, who teach job skills to the unemployed. The entire population of counselors and trainers, corresponding to 1100 workers, was tested. 417 counselors returned the questionnaire, or a response rate of 79 percent; 316 trainers participated in the study, or a response rate of 59 percent. Since 82 individuals returned the questionnaire without specifying their function, the total population is 816 subjects. In all, 399 women and 325 men took part in the study (92 agents did not specify gender). The subjects worked in 12 different locations throughout Belgium.

Procedure

First, training correspondents for each agency were chosen as middlemen to win workers' trust and to collect the questionnaires anonymously in ballot boxes, so that confidentiality was assured. The training correspondents participated in an informational meeting to raise awareness about the stress problems and the procedure to follow when collecting the data. The questionnaire was then distributed in the 12 agencies by the training correspondents. Every agent, both counselors and trainers, received a questionnaire. The agents' participation was voluntary.

RESULTS

Preliminary results

First the means (M), standard deviations (S.D.), minimum and maximum values, and zero-order Pearson correlations of the variables were calculated (Table 2). On the face of it, it seems that all job control facets are significantly and strongly associated. Additionally, each job control facet was significantly and negatively correlated to subjective stress.

Insert Table 2 about here

Regression analysis to define a theoretical model of job control explaining stress

Formerly, scientific authors have implicitly used a model in which all job control subscales influence stress at the same level. This saturated model corresponds to a linear regression, translating correlations in terms ß ($F(6, 765) = 55,464$, $P < .0001$, $R^2 = .30$). In this regression, the t values for the "resources" and "planning" subscales are not significant (Table 3). The other subscales (task management, risks, time management and future) have significant coefficients. In an attempt to explain these results, we can admit an important overlapping of job control subscales which are inter-correlated (Table 2). In this sense, the partial correlation between the "resources" and the "planning" subscales and stress is low (Table 3). Moreover, we can find similar results for the control of resources dimension in Carayon and Zijlstra (1999). The "resources" and the "planning" subscales are important from a conceptual point of view. In this way, we postulate that they have a special position in our structural model.

Insert Table 3 about here

On the basis of the definition according to which stress at work is "a response by the employee in the face of the demands of the situation for which said employee doubts that he has the necessary resources, and which he feels he has to face up to" (De Keyser & Hansez, 1996, p. 133), the perception of controlling the resources is the first stage in the perception of an imbalance and, therefore, of stress. Frese (1989, p. 111), among others, agrees with the idea that the "resources" subscale is a prerequisite in his proposal of job control subscales. In this way, we will always consider this "resources subscale" as the first variable of job control – stress models we intend to test.

Basing ourselves, among other things, on an empirical observation of the new forms of work organisation, such as, for example, "just-in-time management", virtual enterprises or even teleworking, it is clear that control over work planning plays a central role in the perception of working conditions at the present time. This work planning should also depend directly on resources that the worker has at his disposal to perform the job. Planning control is very often cited in job control taxonomies (e.g. Zapf, 1993) and in existing multidimensional job control scales (Breaugh, 1985; de Jonge, Landeweerd, & van Breukelen, 1994; Jackson et al., 1993; Sargent & Terry, 1998). Frese (1989) and Zapf (1993) go beyond the idea of the importance of planning in defining several decision or control opportunities particularly according to the sequence of actions and to planning. This leads one to suppose a central role for the planning control subscale.

According to our theoretical model (Figure 1), control over resources is considered as an initiator of the process. The control over planning is a mediator between the control over the resources on the one hand, and the control over the management of the task, the time constraints, the risks and the future on the other. These four job control subscales directly influence the generation of stress. The "Resources" and "Planning" subscales would therefore have an indirect effect on stress.

Insert Figure 1 about here

Testing the fit of this theoretical model to a data sample should thus allow us to know if all job control facets will influence stress in the same way (first research question). A more detailed analysis of this model should also give us indications about the relative importance of job control aspects in the prediction of stress (second research question).

Statistical analyses

Covariance matrices were performed using Lisrel 8.30 in order to analyse the structural models. Two statistical considerations have to be formulated about the variables. The reliability indices of the Rasch parameters were considered to define the latent variables (Table 4) (see Anderson & Gerbing, 1988, p. 415). In LISREL 8.30, this means fixing the error variance of each of the observed variables, if the error variance value is equal to (1-reliability)*variance (Farkas & Tetrick, 1989, p. 858). If the error variance is determined, the relation of each latent variable to its indicator is equal to the square root of the indicator alpha coefficient.

Insert Table 4 about here

Moreover, latent variables, which are not observed, do not have definite scales. To define the model properly, it is important to define the origin and the unit of measure of each latent variable. Two different techniques can be used: (a) to postulate that latent variables are standardised, so that they have a mean of 0 and variances equal to 1 in the population (standard method in LISREL) or (b) to fix a coefficient different from 0 (normally equal to 1) for the relation with the observed indicator. As we have only one indicator for each latent variable, we have chosen the first technique.

Testing the theoretical structural model

In all, three models have been tested. The goodness of fit statistics and the R squares are shown in tables 5 and 6 respectively.

Insert Tables 5 and 6 about here

In the first stage, the initial model (model 1) has been tested (Tables 5 and 6). The analysis of the parameters shows that all the values of the structural coefficients are superior to 0.05 and that t

values are all significant. Standard errors are all acceptable and not closed to 0. But the goodness of fit statistics are not acceptable (Table 5). The chi-square is significant and the RMSEA has a value beyond the acceptable margins. The standardised residuals matrix reveals that some residuals go largely beyond the critical value of 2.58, with a minimum value of –7.05 and a maximum value of 9.92. The modification indices were taken into account to elaborate the second model.

Model 2 is closed to the basic theoretical model but allows some indicators and latent variables to have correlated errors. Covariance errors between some pairs of variables have been relaxed on the basis of modification indices[3]. This modification in the theoretical model is justified if we remember that job control subscales are strongly and significantly inter-correlated (cf. Table 2). Model 2 is acceptable (Table 5) as far as goodness of fit statistics are concerned. Structural coefficients are all significant, except the t value of the risk control subscale on subjective stress, which is inferior to 1.96. The R-square of future control is rather low (Table 6) in other respects. General goodness of fit statistics are acceptable even if the chi-square is not totally significant. Standardised residuals are all in the acceptable margins and further modification indices are not proposed.

Model 3 is illustrated in the form of standardised coefficients in figure 2. It proposes more in-depth modifications in the relations between variables. As future control was slightly explained

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[3] The following pairs of variables have been relaxed: task management control/future control (exi/ave); planning control/future control (pla/ave); planning control/risk control (pla/ris); planning control/task management control (pla/exi). Some error covariances of Rasch parameters are also relaxed: time management control / planning control (RASTEM/RASPLA); time management control / future control (RASTEM/RASAVE); risk control/task management control (RASRIS/RASEXI); risk control / planning control (RASRIS/RASPLA).

in model 2, we consider it as an exogenous variable in model 3. Not only does this variable have a direct effect on subjective stress, but on task management control and risks as well. Task management depends on available resources, and time management results from task management. In this third model, any covariance error is correlated. Results (Table 5) are at least as (and even more) interesting as those found for model 2: significant parameters, acceptable general goodness of fit statistics and standardised residuals in the acceptable margins.

Insert Figure 2 about here

In figure 2, the first exogenous variable is control of resources. The more resources the worker has, the higher are planning (ß = 0.82) and task management (ß = 0.54). As expected, planning plays a central role: it has a positive direct effect on task management (ß = 0.33), risk control (ß = 0.49) and time management control (ß = 1.48). Another important result is that the more task management is controlled, the more time management becomes difficult (ß = - 0.83). The second exogenous variable, future control, has a significant direct effect on risk perception (ß = 0.19) and task management (ß = 0.17). Four control facets have a direct effect on subjective stress. Subjective stress will be all the more low since task management (ß = - 0.23), risks (ß = -0.25), time management (ß = -0.22) and future control (ß = -0.25) increase. This model makes it possible to explain 50% of the variance of subjective stress (Table 6). This percentage is in accordance with, and even superior to, results found in the scientific literature (e.g. de Jonge, Mulder, & Nijhuis, 1999; Jimmieson & Terry, 1993; Sargent & Terry, 1998; Schreurs & Taris, 1998).

The theoretical model presented planning control as a total mediator. Results in model 3 do not totally confirm our expectations. The fact that control of resources influences task management

control through planning control does not cancel a direct effect of control of resources on task management control (t (771) = 4.07, p <.001). We have also tested the assumption of a total mediator by considering separately the relation between control of resources and risk control and time management control respectively. The structural relations between control of resources and risk control (ß = .08) and time management (ß = -.56) are not significant, respectively t (771) = .51, P = NS and t (771) = -.48, P = NS. Moreover, when we consider a global model including these three additional relations, only the relation between control of resources and task management control is significant. Planning control is then a partial mediator in this model.

The goodness of fit statistics for the three models are presented in table 5. Strictly considering the chi-square leads to the conclusion that model 3 is the only model that fits the data. In general, models 2 and 3 seem to fit the data better than model 1. There are few differences between model 2 and model 3 in goodness of fit statistics. Unfortunately, the chi-square difference cannot be tested statistically since our models are not nested models. Model 3 seems slightly better if we consider the other goodness of fit indices: the P value for test of close fit is higher and nearly perfect, the RMSEA is lower, the AGFI slightly higher and the parsimony index (AIC) and the ECVI value are in favour of model 3. As far as theoretical and empirical points of views are concerned, model 3 meets our expectations more. The job control subscales influence subjective stress. There is a direct effect for four job control subscales and an indirect effect for control of resources and planning control. Future control is an exogenous variable, in the same way as control of resources. The last point concerns covariance errors. Since model 3 does not allow covariance errors, it will probably be easier to replicate it in other samples of workers.

DISCUSSION

The aim of this paper was to develop a theoretical job control-stress model with the development of a multifaceted job control questionnaire covering important job aspects concerning stress (i.e. the WOCCQ, WOrking Conditions and Control Questionnaire). Testing the fit of this theoretical model to our data sample could enable us to know if all job control facets influence stress in the same way (first research question) and to have indications about the relative importance of job control aspects in the prediction of stress (second research question). First, we observe that not all of the facets of job control influence stress in the same way. A linear regression seems insufficient to account for the richness of our job control subscales. Clearly, it appears that the resources available are important and influence other aspects of work. Planning seems to be a partial mediator for the control of time management and the risks inherent in work. The indirect effect of control of resources and planning control is then confirmed whatever model we use, i.e. model 2 or model 3. Only four facets of the WOCCQ directly influence stress: task management, time management, risk control and, finally, future control. However, this latter facet intervenes independently of the others. Since it is related to the concept of job insecurity, it influences the direct control that workers have within their jobs. The other question concerns the extent of the influence of the job control facets on stress. As far as direct effects of job control on subjective stress are concerned, structural coefficients are almost the same and vary between -.22 and -.25. We can conclude that the effect of the four job control subscales on stress is identical since their percentage explanation of stress is practically the same.

It is also important to emphasize that our final model enables us to better explain stress than those proposed in the literature. This is an important result, which should allow us to move forward in our understanding of the phenomenon being studied. The transactional definition of stress is reinforced to the extent that the control of resources is actually the starting point of the

process. The model also shows that planning, judged to be important in the contemporary context of firms, plays a major role in the stress process.

In addition to the answers to the two basic research questions, three main observations emerged from the analysis of the final model we propose in this paper. First of all, future control was considered as an exogenous variable in the final structural model. These results support Carayon's (1993) assumption which considers future and career dimensions as exogenous variables. Future control can be understood as a variable closed to the concept of job insecurity as defined by Hellgren, Sverke and Isaksson (1999). These authors generally define job insecurity as a feeling of incapacity to maintain sufficient motivation in order to attain the defined objectives in an uncertain work environment. This definition is directly linked to the concept of control. De Witte (1999) also mentions that this concept of job insecurity has been rarely studied as a chronic stressor. Nevertheless, in the three studies illustrated by the author, this concept has a strong effect in the explanation of psychological stress. Our study confirms the important role of this concept because in our model this facet influences subjective stress in the same way as the other facets. Our model also allows us to prove that this control subscale also has a direct effect on the way in which workers perceive their working conditions. It is noted that the scale of control over the future has an influence on the control over risks inherent in work and on the management of tasks on a day-to-day basis. Hence the interest that this concept has for intervention, especially in the current context of uncertainty. The more the worker feels secure regarding his professional future, the better he will perform in order to manage not only all his tasks on a day-to-day basis, but also the risks and responsibilities within his job.

Subsequently, we notice that planning control does not act as a total mediator between the control of resources and the other job control subscales. Planning control is only a partial mediator for risk control and time management control because control of resources has a direct effect on task management. This result is not surprising as we know the importance of work planning in actual organizational functioning. Having the necessary resources is not sufficient. The worker needs to plan his activities himself to some extent in order to decrease the risks in his job and to manage all of the time constraints that the organisation requires. On the other hand, to fulfil all his tasks on a daily basis, the worker needs to directly control the informational, relational and material resources at his disposal.

Finally, the last observation concerns the unexpected negative relation between task management and time management. But this can be partly explained, if we refer to the hierarchical level of the task. If a worker has a high control over his tasks on a daily basis, insofar as work objectives, task procedures and work sharing are clearly defined, this means that he or she is probably dependent on a higher hierarchical level. In this case, it could be that the worker has less autonomy as far as time constraints are concerned. For instance, in the Taylorism approach, task management is clearly defined to the worker but he or she has a low control on the required work pace and standard production in a definite working time.

But we can offer another interpretation of this result. In the construct validity analyses of the WOCCQ (Hansez, 2001), the correlations between the six control subscales of the WOCCQ and the job control subscales of Karasek (1979), i.e. authority decision and skill discretion and the empowerment subscales of Spreitzer (1995), i.e. meaning, self-determination, competence and impact have been calculated respectively. We have noticed that time management control was not strongly correlated with the authority decision subscale of Karasek (1979) and the self-

determination subscale of Spreitzer (1995). We can conclude that this time management subscale did not adequately represent the job control concept. Since we know that these items are closed to the items of demands in the job control-demand model of Karasek (1979), these items have certain similarities to a measure of demands.

Nevertheless, it is necessary to be careful when interpreting the score. The higher the score, the more the time constraints decrease. Therefore, according to our model 3, the negative relationship between the task management control and the time constraints should be interpreted as follows: the higher the score for the task management control, the greater the time requirements. The explanation linked to the hierarchical level remains relevant. Model 3 also supposes that the control of planning is positively correlated to time constraints. This would suppose the idea that "the more I plan my work myself, the lower my time constraints." Finally, the relationship between time constraints and stress could be expressed as follows: "the lower my time constraints, the less I am stressed out." But even in this case, considering control according to the Frese's (1989) stressor reduction mechanism remains plausible even if other models of control can be considered.

In 1989, Ganster and Fusilier revealed a number of problems related to research on job control, especially in terms of interactive effects. The effects of job control, it seemed, were difficult to separate from other characteristics of the work situation. It is true that the results of this study prove just how difficult it is to create a scale of control that deals with the different aspects of work without mixing up closely-related concepts. In this case, it is a matter of the concepts of job insecurity and the notion of job demands. Given the complexity of the relationships between job control subscales, we can ask whether or not it is a good strategy to position ourselves within the perspective of stressor reduction (Frese, 1989) when considering the different facets of

control. The answer to this question probably presupposes the necessity of complementary research, especially at the level of possible interactive effects. In any case, this underscores the interesting side of quantitative research for a more theoretical reflection on the process of stress.

CONCLUSION

We conclude that the causal model contains very few contradictions in relation to the existing literature. It allows us to respond to certain questions, which have been left open until now. Furthermore, it also brings up questions that would be interesting to test in the future. It would be beneficial to be able to verify the extent to which the theoretical model brought to light by the data from the public institution, can be applied to other work environments. A multi-group analysis in LISREL should allow us to respond to this question.

Another study should focus on other variables besides stress, which has, nevertheless, only a limited relationship to control. According to the literature, job satisfaction, for example, seems to be a good path to explore. Spector's (1986) meta-analysis and more recent studies (e.g. Sargent & Terry, 1998; Elovainio et al. 2000) clearly show that this variable is linked more to control than the stress variable. But the confusion surrounding studies of job satisfaction is just as important as that surrounding studies of stress. Therefore, a preliminary conceptual study would be indispensable. Organizational variables such as job challenge and work commitment would also be interesting. The upcoming studies could also take into account individual objective characteristics such as the hierarchical level, or more subjective ones such as negative affectivity. Specific job characteristics could also contribute to the explanation of stress.

One important limitation of our study has to do with the same-source self-report data and the cross-sectional nature of the study. A longitudinal study and objective stress measures are also needed.

Apart from the recognition of the concept of job control in explaining the well-being of workers, the study of the process whereby job control influences well-being seemed to us to be an important step in understanding how to orient the action for combating stress. The structural model on the six control dimensions of the WOCCQ enables us to formulate recommendations in this respect. Three conditions seem to be essential in helping job control have a positive effect on well-being. First of all, the worker has to control the resources he needs to carry out his work. This implies having the necessary information, the possibility to make decisions, the potential help of colleagues or supervisors, or benefiting from sufficient cognitive resources underlining the important role of continuous training. Secondly, the worker must have the possibility to plan his/her work in a sufficiently autonomous manner in order for him/her to be efficient, especially in changing work environments. This autonomy of planning should help him/her to manage the many time constraints imposed on him/her and the risks inherent to his/her work. Finally, the management should ideally also provide the worker with job security regarding his/her future. But in this context of changing work environments, the margins of freedom are obviously narrow. Prevention at this level probably involves continuous information being given about the changes made in the company and adequate social support from the supervisor.

Beyond these practical recommendations about the content of the intervention, we have also evaluated the potential of intervention of the WOCCQ. In a preliminary study of 24 interviews of users of the diagnosis WOCCQ, the results are positive regarding the form and the structure of the questionnaire, the readability of the items and their fit to reality. The real problem lies in the

next stage when one goes from diagnosis to intervention. The study offers some evidence about the brakes and incentives of intervention. Among the stimulating factors, the first one is the fact of being informed about the results of the diagnosis and secondly that the results are clearly diffused. Only in the third position is the participation of the workers, a success factor often cited in the scientific literature. As far as the brakes on intervention are concerned, we found organizational changes but also the fact of focusing the intervention on a specific department instead of the whole company. In conclusion, a diagnosis such as the WOCCQ must be considered as the necessary first stage in the process of preventing stress at work. It is also necessary to give importance to the communication of the results of the diagnosis, especially in a context of organizational change. This is as significant, or even more significant, than the active participation of the workers in the process of preventing stress at work.

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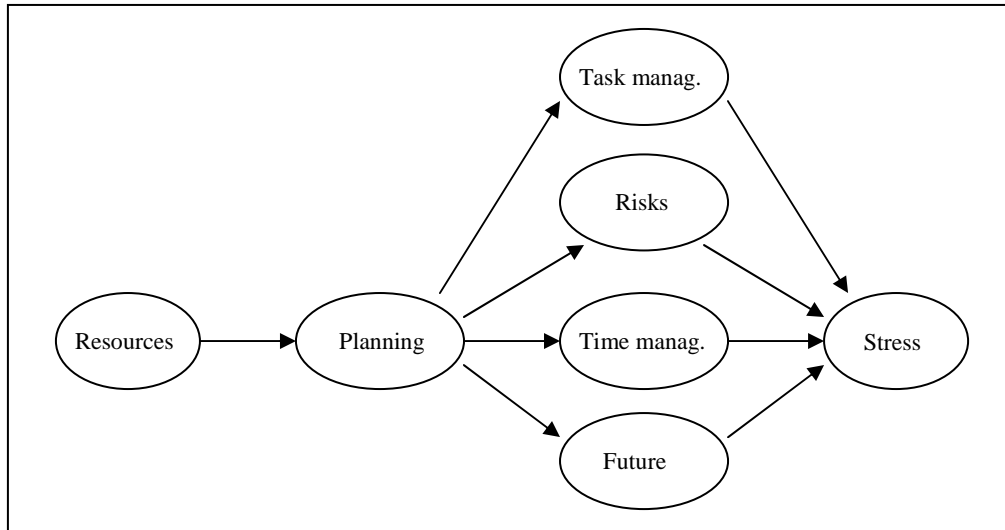
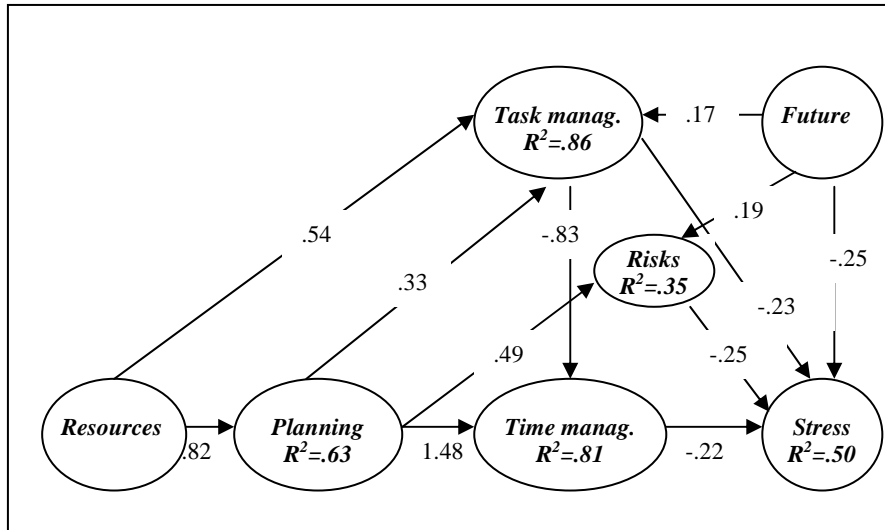Figure 1. Theoretical model of job control and stress

Figure 2. Final model of job control facets and stress

Table 1

Overview of job control multidimensional scales in the scientific literature

Author(s)	Year of publication	Dimensions	N items	Response format	α Cronbach
Breaugh	1985	Work method autonomy	3	agreement	.91
		Work scheduling autonomy	3	7 points	.81
		Work criteria autonomy	3		.83
McLaney & Hurrell	1988	Task control	7	intensity	.85
		Decision control	4	5 points	.74
		Control over the physical environment	2		.79
		Resource control	2		.82
Jackson et al.	1993	Timing control	4	importance	.85/.79
		Method control	6	5 points	.77/.80
Jimmieson & Terry	1993	Task control	6	importance	.81
		Decision control	5	7 points	.83
De Jonge, Landeweerd & van Breukelen	1994	Control within a situation	4	opportunities	.75
		Control over a situation	6	5 points	.82
Widerszal-Bazyl & Zolnierczyk	1995	Basic control	3	Not	.62
		Control over time frame	3	communicated	.85
		Control related to skill level	3		.69
		Control related to participation	3		.77
Sargent & Terry	1998	Task control	6	importance	.84
		Decision control	3	5 points	.76
		Scheduling control	5		.80

Table 2

Descriptive statistics and intercorrelations of job control facets and subjective stress (Rasch parameters)

	N	Mean	SD	Min	Max	1.	2.	3.	4.	5.	6.
1. Resources	783	0.64	0.73	-1.60	3.14	-	-	-	-	-	-
2. Task management	786	0.72	0.76	-1.62	3.31	.59**	-	-	-	-	-
3. Risks	786	0.66	0.54	-1.20	3.64	.31**	.38**	-	-	-	-
4. Planning	786	0.32	0.61	-1.56	2.76	.47**	.61**	.35**	-	-	-
5. Time management	786	0.44	0.74	-1.46	4.14	.29**	.30**	.28**	.54**	-	-
6. Future	785	0.44	0.82	-1.76	3.78	.32**	.43**	.26**	.30**	.08*	-
7. Subjective Stress	776	-0.84	1.12	-10.0	2.07	-.39**	-.50**	-.39**	-.41**	-.38**	-.37**

Note. ** $P < .01$ * $P < .05$

Table 3

Linear regression of job control facets on subjective stress

Model	Std. Coef. (Beta)	t	Sig.	Correlations			VIF [1]
				Zero-order	Partial	Part	
(Constant)		-1.73	.08				
Resources (res)	-.04	-1.17	.24	-.34	-.04	-.03	1.64
Task management (exi)	-.20	-4.44	.00	-.44	-.16	-.13	2.17
Risks (ris)	-.16	-4.87	.00	-.36	-.17	-.15	1.24
Planning (pla)	-.03	-.66	.51	-.38	-.02	-.02	2.10
Time management (tem)	-.17	-4.76	.00	-.32	-.17	-.14	1.47
Future (ave)	-.20	-5.85	.00	-.36	-.21	-.17	1.27

[1] Collinearity Statistic VIF = Variance Inflation Factor (ideal value = 1; worrying if > 18)

Note. Dependent variable = Subjective stress

Table 4

Observed variables and latent variables in the structural models

	Rasch parameter ("Observed variable")	Variance error (δ)	Latent variable	λ parameter
Control of resources	RASRES	0.22	Res	0.77
Task management control	RASEXI	0.12	Exi	0.89
Risk control	RASRIS	0.11	Ris	0.79
Planning control	RASPLA	0.12	Pla	0.82
Time management control	RASTEM	0.13	Tem	0.87
Future control	RASAVE	0.16	Ave	0.88
Subjective stress	RASMSP	0.32	Msp	0.86

Table 5

Goodness of fit statistics

	χ^2	df	P valeur	χ^2/df	RMSEA	Test for close fit	Std. RMR	GFI	AGFI	CFI	ECVI	AIC
Model 1	198.50	12	.000	16.54	0.14	.00	.053	.93	.84	.90	.30	230.50
Model 2	8.36	4	.07	3.32	.038	.66	.012	1	.98	1	.07	56.36
Model 3	11.23	8	.18	1.4	.023	.94	.011	1	.99	1	.06	51.23

Note. Model 1 is the basic theoretical model. Model 2 authorizes some error correlations. Model 3 modifies the basic model mainly by considering future control as an exogenous variable. RMSEA = Root Mean Square Error of Approximation; Std. RMR = Standardised Root Mean Square Residual; GFI = Goodness of Fit Index; AGFI = Adjusted Goodness of Fit Index; CFI = Bentler's Comparative Fit Index; ECVI = Expected Cross-Validation Index; AIC = Akaike's Information Criterion .

Table 6

R-square for latent variables in the three models

Variable	R-square		
	Model 1	Model 2	Model 3
Task management	.80	.60	.86
Risks	.35	.66	.35
Planning	.79	.60	.67
Time management	.36	.26	.81
Future	.26	.13	--
Subjective stress	.51	.48	.50