

Impact of work variables and safety appraisal on well-being at work

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Abstract

Work environments have been encountering tremendous changes since the early 1990s. The enlargement of flexibility practices has raised concerns about well-being at work but also about safety. These two research areas, i.e. safety and well-being at work, have a strong tradition of diagnosis and research but there are few examples in the literature that attempt to link the two areas. Our goal in this study was to analyze the impact of both work variables and safety appraisal on well-being within a context of organizational changes. We used questionnaires on 4297 workers from a large company in the energy sector that has encountered big organizational changes these last years. Job control dimensions, safety appraisal, eustress and distress were measured using existing questionnaires. The results give some evidence for an additive explanation of eustress when adding safety appraisal in the hierarchical regression analysis. The additive effect of safety appraisal on distress was also significant but not enough strong to be considered seriously. A path analysis has shown that the effect of management safety climate on distress was rather an indirect effect through the job control dimensions.

Keywords: safety appraisal, job control, distress, eustress

1. Introduction

Work environments have been encountering tremendous changes since the early 1990s. In the cover of international competitiveness, most of these changes have led to more job demands, time pressure and flexible work arrangement including the increase of sub-contracting and outsourcing. The enlargement of these practices has raised concerns about well-being at work but also about safety. These two research areas, i.e. safety and well-being at work, have a strong tradition of diagnosis and research but there are few examples in the literature that attempt to link the two areas mainly because they use different techniques (observation and accident analyses - questionnaires).

In this paper, through a survey methodology, we used the theoretical framework of job control and stress to explore the relationships between job control, safety appraisal and well-being at work.

Job control is one of the most popular construct in the occupational psychology literature. More particularly in the perspective of stress studies, the feeling of uncontrollability on job factors is hypothesized to influence the generation of stress. Swedish research on job control (Aronsson [1]) maintains that in order to cope successfully with stressors, individuals must have the possibility and resources to exert individual and/or collective control over external events, conditions and processes. High job control also has an impact on health and well-

being, i.e. fewer somatic complaints and higher satisfaction (e.g. Spector [2]; Smith, Tisak, Hahn, & Schmieder [3]).

Our goal in this preliminary study was to explore which role safety appraisal can play in the stress process. In other words, is safety appraisal a significant construct in the explanation of the stress variance, in addition to job control dimensions.

2. Method

1.1. Sample

The organisation in which the study was conducted was a large company in the energy sector that has encountered big organizational changes these last years. This organisation employs approximately 10 000 workers. Questionnaires were available either in a paper format or in an online format. As a whole, 5893 people responded, giving a response rate of 58%. In this paper, administrative, financial and marketing divisions were not included in the analyses. The final sample used is composed of 4297 workers directly concerned with safety problems. Approximately 84% of respondents were male. Most of the respondents (63%) were aged between 36 and 55 years old, with only 7,4 % of the workers under 25 years old and 11,5% above 55 years old. The length of service was distributed as follows: less than 1 year (5,9%), between 1 and 5 years (12,2%), between 6 and 10 years (7,3%), between 11 and 20 years (27,8%), between 21 and 30 years (30,8%) and more than 30 years (15,3%).

1.2. Questionnaires

Work variables and well-being were measured using the Working Conditions and Control Questionnaire (WOCCQ, 80 items, Hansez [4]) and the 'Positive and Negative Occupational Stress' scale (SPPN, 19 items, Grisard, Mahy, Hansez and De Keyser [5]) respectively.

The WOCCQ questionnaire (Hansez [4]) includes 80 items grouped together in six control dimensions: items concerning control over resources needed to perform the tasks involved in the job, items concerning control over task management (clarity of the tasks, role and procedures), items concerning risks for oneself and for others, items concerned with planning control, items concerned with time management, items about control over the future. Each item makes reference to a job characteristic phrased in the first person, such as '*I see my work piling up without being able to resolve*

latencies', '*I believe in the future of my job*', '*I can say something about the way work should be done*', '*I can adapt my work pace as I want*'. The questionnaire response format is a four-point frequency Likert scale. The formulation of the items could easily be interpreted in terms of control. High scores reflect more 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 [4]).

The participants also completed the Positive and Negative Stress Inventory (PNSI), which contained 19 items (Grisard et al. [5]). Eight items assessed the positive stress (PSI) (e.g., "*I feel stimulated by my work*", "*My work gives me a lot of satisfaction*") and 11 items assessed the negative stress (NSI) (e.g., "*I feel overload by what I have to do*", "*I feel nervous when at work*") on a four level scale from 1 (*never or rarely*) to 4 (*almost always or always*). In our sample, the alpha coefficients for SPN and SPP are .86 and .83 respectively.

Safety appraisal was measured using questionnaires developed by Chmiel [6] including a 'working safety' scale (6 items), a 'bending rules' scale (4 items) and a 'management safety climate' (MSC) scale (13 items). The response format was a 5 point Likert type scale (strongly disagree, disagree, neither agree/disagree, agree, strongly agree). Principal components of 23 items produced three usable factors explaining 51.17% of the total variance (27.3%, 13.17% and 10.69% for working safely, bending rules and management safety climate respectively). The 'working safely' scale ($\alpha = .79$) contained items such as 'I always carry out my work in a safe manner' and 'I always use safety equipment, even when it is not easily available'. The 'bending rules' scale ($\alpha = .78$) contained items such as 'I sometimes cut corners if it makes the task easier' and 'When my boss is not around I can be more flexible with which procedures I follow'. The 'Management safety climate' scale ($\alpha = .91$) contained items such as 'Management has a positive attitude towards safety' and 'I am happy with the level of safety training for my job'.

3. Results

Means and standard deviations are presented in Table 1. Intercorrelations among variables are displayed in Table 2. Distress and eustress are significantly correlated with working safely, bending rules and even more strongly with management safety

climate. The correlations are weaker with distress than eustress. Another interesting result is that management safety climate is strongly correlated to job control dimensions (except risks control and time management control). The results give evidence for a link between job control dimensions and management safety climate. Finally, strong and significant correlations between job control dimensions and distress are observed, except for the risks control dimension.

Table 1
Descriptive statistics

	N	Mean	SD	Min	Max
1. Resources	4227	51.39	9.24	14.81	84.51
2. Task management	4203	53.25	8.84	.00	83.67
3. Risks	4207	49.86	9.66	16.01	87.73
4. Planning	4185	52.90	8.16	23.05	84.06
5. Time management	4203	52.11	9.14	12.26	85.67
6. Future	4193	52.87	9.33	12.27	82.26
7. Working safely	3907	3.82	.63	1.00	5.00
8. Bending rules	3969	2.39	.81	1.00	5.00
9. Man. Saf. Climate	3899	3.89	.59	1.00	5.00
10. Distress	4241	48.88	9.12	28.04	86.62
11. Eustress	4221	50.06	8.49	18.79	74.70

Note. All variables except safety appraisal are presented in t-scores (with an average score of 50 and a standard deviation of 10).

Table 2
Intercorrelations between job control dimensions, safety appraisal and positive/negative stress.

	7.	8.	9.	10.	11.
1. Resources	.15**	-.18**	.38**	-.41**	.31**
2. Task management	.21**	-.25**	.47**	-.53**	.35**
3. Risks	.19**	-.22**	.26**	-.22**	.19**
4. Planning	.15**	-.17**	.32**	-.45**	.17**
5. Time management	-.04*	-.03*	.10**	-.52**	-.15**
6. Future	.22**	-.27**	.34**	-.41**	.48**
7. Working safely	-	-.49**	.39**	-.11**	.26**
8. Bending rules		-	-.28**	.19**	-.20**
9. Management safety climate			-	-.22**	.34**
10. Distress				-	-.17**
11. Eustress					-

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

The second step of this exploratory study was to perform standard hierarchical regression analyses (Table 3). Gender, age and tenure were entered in the

first step as a predictor of distress (eustress); job control dimensions were added in the second step; and safety appraisal factors were entered in the third step to assess the additive effect of safety appraisal on distress (eustress).

Table 3
Hierarchical regression analysis for eustress and distress as a function of job control and safety appraisal

Variable	Eustress	Distress
Block 1 :		
Gender	-.01	-.01
Age	.04	-.06
Tenure	-.05	.20***
ΔR^2	.00	.02***
Block 2 :		
Gender	.02	.02
Age	.01	-.01
Tenure	-.01	.08***
Resources control	.09***	-.04*
Task management control	.20***	-.23***
Risks control	.00	.01
Planning control	.08***	-.02
Time management control	-.34***	-.36***
Future control	.34***	-.23***
ΔR^2	.33***	.42***
Block 3 :		
Gender	.03	.02
Age	.00	-.01
Tenure	-.02	.08***
Resources control	.08***	-.04**
Task management control	.15***	-.24***
Risks control	-.01	.01
Planning control	.06***	-.02
Time management control	-.31***	-.36***
Future control	.32***	-.23***
Working safely	.10***	-.01
Bending rules	.02	.05***
Management safety climate	.12***	.04**
ΔR^2	.02***	.004***
R^2	.35	.45
	F(12, 3626) =	F(12, 3627) =
	164.27***	246.36***

Note. Entries are regression standardized coefficients.

* $p < .05$; ** $p < .01$; *** $p < .001$.

As shown in Table 3, controlling for gender, age and tenure, all job control dimensions (except risks and planning control) and safety appraisal (bending rules and management safety climate) were reliably related to distress. There is no additive effect of safety appraisal in explaining distress even if the ΔR^2 is

significant. For eustress, all variables except risks control and bending rules were significant. The additive effect of safety appraisal is significant and more reliable ($\Delta R^2=.02$).

If we consider in a linear regression a model in which all job control subscales influence stress at the same level, i.e. a saturated model ($F(6, 4063) = 528,7$, $P < .000$, $R^2 = .45$), the t values for the 'risks' and 'planning' job control subscales are not significant. The other subscales (task management, resources, 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. In this sense, the partial correlation between the resources, the risks and the planning subscales and distress is low (respectively, = $-.07$; $.03$; $-.01$).

So, on the basis of these preliminary results, a path analysis was used to understand the impact of significant job control dimensions and management safety climate on distress. Goodness of fit statistics for the model presented in Figure 1 are acceptable ($\chi^2 = 317.83$, $df = 10$, $p < .000$; $RMSEA = .08$; $RMR = .03$; $GFI = .98$; $AGFI = .94$; $CFI = .97$). In this path analysis, management safety climate has a positive direct effect on resources control ($\beta=.38$), future control ($\beta=.14$) and task management control ($\beta=.27$). Moreover, the more the resources at the worker's disposal, the more planning ($\beta=.24$) and task management ($\beta=.54$) are high. Task management plays a central role: it has a positive direct effect on planning ($\beta=.44$) and future control ($\beta=.45$). Planning has a positive direct effect on time management ($\beta=.55$). Three control facets have a direct effect on distress. Distress will be all the more low since task management ($\beta = -.26$), time management ($\beta = -.39$) and future control ($\beta = -.25$) increase. This model allows explaining 44% variance of distress but also 14% of the resources control, 28% of the future control, 47% of the task management control, 39% of the planning control and 30% of the time management control.

4. Discussion

This paper is concerned with a preliminary study exploring the relationships between job control, safety appraisal and eustress/distress. We used questionnaires on 4297 workers from a large company in the energy sector that has encountered big organizational changes these last years. Job control dimensions, safety appraisal, eustress and distress were measured using

existing questionnaires. The results give some evidence for an additive explanation of eustress when adding safety appraisal in the hierarchical regression analysis. The additive effect of safety appraisal on distress was also significant but not enough strong to be considered seriously. A path analysis has shown that the effect of management safety climate on distress was rather an indirect effect through the job control dimensions.

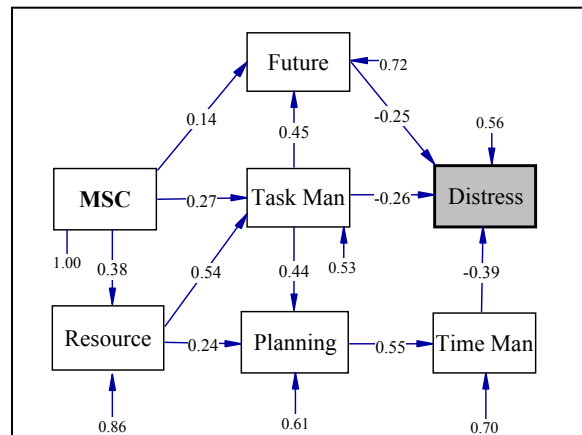


Fig. 1: Path analysis of management safety climate, job control dimensions and distress

One of the most important limit of our study is concerned with the same-source self-report data and the study's cross-sectional nature of the study. A longitudinal study and objective accident rates are needed. Multilevel analysis including safety appraisal at the individual level and accident rates at the group level would be interesting to determine if individual appraisals of safety can be important in the occurrence of accidents.

In the path analysis examined in this study, only management safety climate has been included. Even if the correlations between eustress/distress and safety appraisal are not really strong, it would be interesting to include the working safely and bending rules subscales of safety appraisal as dependent variables and eustress/distress as independent variables in order to check if high level of stress or work pressure can lead workers to work unsafely and to bend the safety rules.

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