

Exploring the relationship between job stress and psychosomatic complaints: the role of negative affectivity

by

Verhoogen R¹, Van den Bergh O², Moens G^{1, 3},
De Wit R.^{1, 2}

Abstract

Objectives. *In the present study the relationship between job related stress, psychosomatic complaints and negative affectivity (NA) is investigated. It was predicted that, controlling for the effects of NA, the association between job stress and psychosomatic complaints would be reduced considerably.*

Methods. *A questionnaire tapping job stress, psychosomatic complaints and NA was filled out by 177 employees from an occupationally heterogeneous population. Analysis of variance and nonparametric tests were performed to examine gender-, age- and company-related differences. The relationship between job stress, psychosomatic complaints and NA was studied using correlation and regression analyses.*

Results. *Male- and female subjects did not differ in self-reported job stress, but significant gender differences were found on the reporting of psychosomatic complaints and NA. Employees from different companies did not differ in the prevalence of self-reported complaints or NA. They did however respond differently to most of the job characteristics. It was*

Mailing address: Rein De Wit, IDEWE, Interleuvenlaan 58, B-3001 Leuven, Belgium.

¹ Occupational Health Services IDEWE, Leuven.

² Department of Psychology, Catholic University of Leuven.

³ Department of Occupational Medicine, Catholic University of Leuven.

shown that controlling for NA reduced the observed correlations between psychosomatic complaints and job characteristics considerably.

Conclusions. *Using self-report questionnaires in studying the relationship between jobstress and health, controlling for the confounding effects of NA seems essential. Nevertheless, after controlling for NA, job stress remained significantly correlated with the reporting of psychosomatic complaints.*

Key-words

Job Content Questionnaire, job stress, cross-sectional study, occupation.

Introduction

In the past twenty years, numerous investigators have been able to link stress to unfavourable health-outcomes: health is believed to be negatively affected by stress through a number of processes such as increased vulnerability to infection and increased risk for heart disease or hypertension (1). The relationship between job stress and cardiovascular morbidity is still the subject of ongoing investigation. Some studies yield no evidence for a relationship (2), yet job-related stressors have repeatedly been identified as important predictors of coronary heart disease, depression, alcohol abuse, etc. Moreover, studies have frequently reported a consistent relationship between stress and life expectancy (1). The mechanism remains unclear, yet job stress is currently considered a health-problem of major importance. Recognizing the relationship between job strain and health, rather similar models of job stress have flourished. Likewise, an impressive number of self-report stress-scales have been constructed (for an overview of job stressors, see 3).

One of the most widely used stress-models is the 'demand/ control/social support' model developed by Karasek and Theorell (1,4). This model deals with three major mechanisms: psychological and physical job demands, decision latitude and social support. The various aspects of the model are measured by the Job Content Questionnaire (JCQ, 5). Interactions of levels of workload and decision latitude lead to four different kinds of psychosocial work experience, and precisely these combinations have been shown to have predictive value for health. The combination of high job demands and low control over the work

environment should increase job strain and is likely to be harmful to health (1).

In 1989 Watson and Pennebaker (6) reviewed the literature about the link between stress and health complaints. They postulated that the frequently observed relationship between stress and illness has been strongly overestimated. Studies demonstrating a link between stress and illness typically use subjective self-report measures of psychosocial job characteristics and health complaints. The correlation might be confounded by the association of these variables, with a third variable which could be the true predictor. 'Negative affectivity' (NA), a general dimension of subjective distress, has been shown to correlate with both reported levels of stress and subjective health. NA reflects a predisposition to experience a broad range of aversive mood states (e.g. anger, disgust, fearfulness, depression) and to focus on negative aspects of persons and the world. Watson and Pennebaker have been able to show that NA is strongly related to reporting complaints. Because NA was not consistently related to actual health status, nor to health-related behaviours (e.g. physician visits, absences from work), the authors suggested that NA is a confounder, influencing measures of stress as well as subjective health complaints.

Several personality traits (e.g. Type A-personality, Neuroticism, trait anxiety) may impact upon this relationship. Watson and Clark, however, point out that these traits are all facets of the general and broader predisposition NA (7).

In the 'occupational medicine' literature little attention has been paid to this issue. Furthermore, Watson and Pennebaker based their conclusions upon studies among samples of students reporting little variability in health complaints. Moreover, the association between NA and disease has been examined by Watson and Pennebaker, emphasizing serious health problems (i.e., cancer, cardiac diseases, functioning disorders of the endocrine system, etc.). There are only few studies exploring the relationship between job strain, NA and psychosomatic complaints. These complaints (such as hyperventilation) are hard to objectify in a laboratory situation. Hyperventilation (HVS) (8) is an episode of breathing beyond the metabolic requirements of the organism. We were especially interested in the relationship between hyperventilation, stress and NA. Hyperventilation is a frequently observed stress-response and an increased workload results in hyperventilation-related complaints. Stressful conditions might evoke hyperventilation and hypocapnia, caus-

ing respiratory and atypical complaints (e.g., headaches, dizziness, lump in throat, etc.) (9). NA may potentially be a true physiological mediator of jobstress-health outcomes. Moreover, it has been suggested that high NA individuals are more reactive to episodes of stress-related events. As a result of an increase in physiological reactions in response to such events, an enhanced perception and reporting of somatic and psychological sensations might occur (8).

A number of investigators have shown, using alternative measures of job stress, that NA inflates the relationship between stress and health complaints (10). However, in very few of these studies the JCQ was used as an instrument to measure job stressors¹. The aim of the present study was to estimate the effect of NA on self-reported job stress (measured by the JCQ) and psychosomatic complaints in a non-student sample of subjects. It was expected that reported job stress would relate significantly to hyperventilation-related complaints. In addition it was predicted that, controlling for the effects of NA, the association between job characteristics and psychosomatic complaints would be reduced considerably. Including NA as a predictor of complaints in addition to job characteristics thus could increase the predictive value of the model considerably.

Subjects and methodes

Subjects

Participants were employees from four different companies: a petrochemical factory, two institutions for mentally disabled people and a soft drink company. The questionnaire was handed out to 205 employees, they voluntarily participated in the study. Responses were received from 177 participants (response rate of 86%) with very heterogeneous occupations (cleaning personel, laboratory workers, educators, clerical staff, salesmen, etc.)

¹ In studying the relationship between job stress and NA, Parkes (11) measured perceived 'work support' and 'work demand'. Assessing workdemand, 7 items drawn from Karasek's JCQ were used.

Sixty-five percent of the respondents were men, the average age of the subjects was 33. Respondents were guaranteed complete confidentiality.

Variables

Negative Affectivity

NA was measured using 14 items, taken from the Tellegen's Multidimensional Personal Questionnaire (MPQ, Tellegen, 1982, unpublished manuscript). This Negative Emotionality (NEM) scale includes items such as 'I am too sensitive for my own good' and 'I worry a lot'. The scale contains no health-related items. High test-retest reliability (12-week retest $r = .72$, $n = 109$) of the scale has been shown (6) and in the present sample of subjects the scale was internally consistent (Cronbach's $\alpha = .87$). The number of times a respondent answered 'true' to the questions was added up into a final score. Thus high scores reflect high levels of NA.

Job-related stress

Forty-three items taken from the Job Content Questionnaire (5) were used to measure occupational stress. The questionnaire assessed the following job characteristics: decision latitude (skill discretion and decision authority), psychological stressors (psychological job demands and job insecurity), social support (by supervisors and coworkers), physical stressors (physical exertion, hazardous conditions, toxic exposures) and job dissatisfaction. The responses were scored, according to the criteria developed by Karasek (5).

Psychosomatic complaints

Hyperventilation was measured using 16 items taken from the 'Nijmegense Vragenlijst voor Hyperventilatie', a commonly used and well-validated instrument for diagnosing the hyperventilation syndrome (12). For each item, the respondent was asked to indicate how often he or she experienced the specific complaint (never, seldom, sometimes, frequently, very frequently). Also included were 5 dummy complaints.

Respondents were to indicate how often they experienced joint pain, colds, tingling stomach, obstipation and mictalgia.

The ordering of the questionnaires was randomized over the study participants

To examine gender-, age- and company-related differences in job stress and psychosomatic complaints, ANOVA's and post hoc-analyses (Scheffé) were performed (SPSS version 6.0). NA did not appear to be normally distributed; the distribution was skewed to the left (tail toward smaller values). As a consequence, nonparametric tests were used (Mann-Whitney and Kruskal-Wallis tests). The associations between job stress, NA and psychosomatic complaints were studied using Pearson- and non parametric Spearman rank correlation. To estimate the influence of NA upon the relationship between job characteristics and self-reported psychosomatic complaints, partial correlations were calculated. To assess the contribution of NA in the prediction of complaints, regression analysis was performed with hyperventilation as the dependent variable.

Results

Gender-, age- and company-related differences

Job stress. Men and women did not differ in self-reported job stress. As expected, employees from the four companies did respond differently to most of the job characteristics: decision authority ($F(df = 3;173) = 5.37, p = .0015$), psychological job demands ($F(df = 3;173) = 3.82, p < .015$), supervisor support ($F(df = 3;173) = 6.06, p = .0006$) hazardous conditions ($F(df = 3;173) = 4.21, p = .0001$) and toxic exposure ($F(df = 3;173) = 9.8, p = .0001$).

Hyperventilation-related and dummy complaints. Women reported significantly more complaints of hyperventilation (mean score = 15, SD = 8.26) than men (mean score = 10, SD = 7.67), $t(df = 175) = 4.21, p < .001$. Likewise, women were more likely to report dummy complaints (mean score = 6, SD = 2.51) than men (mean score = 4, SD = 2.36), $t(df = 175) = 3.23, p = .001$. Complaints of hyperventilation were significantly related to age, $F(df = 6;170) = 3.43, p < .005$: employees between 20 and 24 years old reported most complaints. Employees from different companies did not differ in the prevalence of self-reported complaints.

TABLE 1
 Pearson correlation coefficients between NA, job characteristics, hyperventilation-related and dummy complaints (N=177)

	NA(a)	Hyper-ventilation	Dummy complaints	Job-demands	Decision latitude	Job insecurity	Social support	Physical stressor	Jobdissatisfaction
NA(a)									
Hyperventilation	.53**								
Dummy complaints	.39**	.66**							
Jobdemands	.12	.12	.05						
Decision latitude	.21**	-.30**	-.30**	.06					
Job insecurity	.27	.32**	.24*	-.05	-.50				
Social support	-.24*	-.23*	-.16*	-.05	.47**	-.45			
Physical stressors	.04	.04	.11	-.12	-.20*	.15*	-.15*		
Jobdissatisfaction	.28	.24**	.22*	.02	-.53**	-.44**	-.51**	.04	

Note. ** $p < .0001$; * $p < .05$ (a) Spearman rank correlation coefficients

Negative affectivity. The only effect that reached significance, was an effect of gender. Females reported higher levels of NA (mean rank=100) than males (mean rank=83) ($p < .05$).

Association between job stress, psychosomatic complaints and NA

The correlations between NA, Karasek's job characteristics and psychosomatic complaints (hyperventilation- and dummy complaints) are presented in Table 1. Several job characteristics were significantly correlated with hyperventilation-related complaints: less decision latitude, less social support, more job insecurity and more job dissatisfaction were associated with more complaints. Psychological jobdemands and physical stressors were not associated with hyperventilation-related complaint. Job characteristics also correlated significantly with dummy complaints.

NA was associated with complaints and with most of the job stressors. The extent to which NA affected the relationship between job characteristics and self-reported psychosomatic complaints was estimated using partial correlations (Table 2). Most of the job characteristics (except psychological jobdemands and physical stressors) were significantly related to both hyperventilation and dummy complaints. Controlling for NA, however, reduced this correlation substantially. Social support and job dissatisfaction were no longer significantly related to hyperventilation when NA was controlled for in the analysis (Table 2). Moreover, the associations with decision latitude and job insecurity were reduced considerably. Only the correlation with decision latitude appeared to hold with the five dummy complaints.

TABLE 2

Pearson correlations and partial correlations between job characteristics, hyperventilation –related and dummy complaints when NA has been taken into account

Job characteristic	Hyperventilation		Dummy complaints	
	Correlation	Partial correlation	Correlation	Partial correlation
Psychological demands	.12	.06	.05	-.01
Decision latitude	-.30***	-.22**	-.30***	-.23**
Job insecurity	.32***	.18*	.24**	.12
Social support	-.23**	-.07	-.16*	-.04
Physical stressors	.04	.02	.11	.08
Job dissatisfaction	.24**	.07	.22**	.10

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

Finally, a regression analysis was performed using hyperventilation as the dependent variable. Psychological job demands, decision latitude, job insecurity, social support, physical stressors and job dissatisfaction were included as predictor variables (stepwise selection). Job insecurity (beta coefficient=.28, $p<.0007$) and decision latitude (beta coefficient=-.16, $p<.05$) were found to be significant predictor variables of hyperventilation-related complaints (multiple $R=.39$, $p<.0001$). However, only 14 % of the variance in hyperventilation-related complaints was accounted for by the dimensions of job stress. When NA was included as an additional predictor variable, the model accounted for 36% of the variance in hyperventilation-related complaints (Multiple $R=.61$, $p<.0001$). NA (beta coefficient=.52, $p<.0001$) and jobinsecurity (beta coefficient=.20, $p<.02$) made significant contributions to the prediction of the complaints.

Discussion

In a selected population of employees in various occupations and industrial trades, job stress (as measured by Karasek's Job Content Questionnaire) appeared to be significantly related to psychosomatic complaints. Also, the reporting of complaints not specifically referred to stress-related responses (dummy-complaints), was also highly correlated with hyperventilation complaints. The strong association between dummy complaints and hyperventilation shows that job stressors seem to affect complaints of a rather divers nature. As a consequence, the specificity of the influence of job stress in the development of hyperventilation complaints could be questioned. The present results are, however, inconclusive, since some of the dummy complaints that were used might be related to chronic stress complaints. At this point it also has to be noted that the data were collected using a cross-sectional design. As a consequence, results have to be interpreted with great care; no causal conclusions can be drawn.

Although disagreement exists about the degree to which NA impacts upon the relationship (13), the results of the present study are congruent with the findings of several other investigators (10, 14-17). Watson and Pennebaker's conclusion that NA inflates the relationship between job stress and self-reported health, can be extended to psychosomatic complaints. From the present findings it can be suggested that it is of great importance to include a measure of NA in questionnaires assessing self-reported job stress and complaints. Recent findings (18) seem

to indicate that the role of NA varies as a function of the jobdimension that is being measured. NA should play a major role in person-based dimensions (e.g., psychological strain), but a lesser role in job-based dimensions (e.g., workload). Nevertheless, the present study has shown that Karasek's JCQ, an instrument specifically designed to measure job characteristics, was sensible to NA. However, we'd like to stress, once more, that no causal conclusions can be drawn from the study. Moreover, the results are limited due to the specific job indicators that were measured in our study.

After controlling for NA, job stress remained a significant predictor of psychosomatic complaints. Ascertaining that job characteristics are perceived differently in different companies, adds to the validity of the questionnaire. The finding that some of the job characteristics were more related to NA than others, is in accordance with findings presented elsewhere (18). Also, the finding that women tend to report more psychosomatic complaints is congruent with recent findings (19). In the present study, it was shown that women reported higher levels of NA. Evidence indicating that women score higher on a measure of NA has been reported by Parkes (20). Other investigators, however, did not observe gender-related differences (Tellegen, 1982, unpublished manuscript; 21).

Considering the evidence, it is important to note that NA should not be regarded solely as a response style. The effect of NA on the relationship between self-reports of stressors and complaints should remain a major concern in stress research. The evidence with respect to the relationship between NA and objective health is not conclusive. Whereas Watson and Pennebaker reported no relationship between NA and objective health status, recent studies suggest that the nature of the association between NA, health behaviour and objective health status might be more complex than the authors suggested (19). Several investigators (22) reported significant correlations between NA, number of sick days and health visits. Moreover, Parkes (11,20) has presented evidence, showing that NA could have an interactive effect on health. The influence of work stress on health depended upon the level of NA: when high-NA individuals perceived high levels of demand, they responded with high levels of distress. On the contrary, low-NA subjects did not show such reactivity. NA has been proven to be an important index of one's vulnerability to work stress, because high NA subjects will show more reactivity to work demand. These findings show that the precise function of this variable in the nature of the association between complaints and actual disease outcomes should be further explored.

Acknowledgments

The authors wish to thank prof. D. Lahaye and Dr. P. Jacques for their helpful comments on an earlier draft of this paper.

Resume

But/objectif. Dans la présente étude nous avons examiné le lien entre le stress lié au travail, les troubles psychosomatiques et l'affectivité négative. Nous vérifions l'hypothèse qu'en tenant compte de l'affectivité négative, la relation entre le stress au travail et les troubles psychosomatiques serait considérablement affaiblie.

Methodes. 177 travailleurs, sélectionnés d'une population hétérogène, ont rempli un questionnaire concernant le stress au travail, les troubles psychosomatiques et l'affectivité négative. L'analyse de variances et des tests non-paramétriques ont été utilisés pour analyser les différences selon le sexe, l'âge et les conditions de travail. Les associations ont été examinées par des analyses de corrélation et de régression.

Résultats. Nous avons trouvé des différences statistiquement significatives entre les deux sexes concernant les troubles psychosomatiques et l'affectivité négative. Les travailleurs des différentes entreprises ne différaient pas quant à la prévalence des troubles ni de cette disposition. D'autre part, la perception des caractéristiques examinées différait de façon significative. Le contrôle de l'affectivité négative affaiblissait considérablement la corrélation entre les plaintes psychosomatiques et les caractéristiques de l'emploi.

Conclusion. Quand on utilise des questionnaires pour examiner la relation entre le stress au travail et la santé, il est essentiel de tenir compte d'une correction pour l'affectivité négative. Après contrôle de cette variable, le stress au travail reste associé aux troubles psychosomatiques.

Samenvatting

Doelstelling. In voorliggende studie wordt het verband tussen jobgerelateerde stress, psychosomatische klachten en negatieve affectiviteit (NA) onderzocht. We voorspelden dat door controle voor NA de relatie tussen job stress en psychosomatische klachten gevoelig zou verzwakken.

Methodes. Een vragenlijst waarin job stress, psychosomatische klachten en NA werd bevraagd, werd ingevuld door 177 werknemers uit een heterogene populatie. Variantie-analyse en niet-parametrische tests werden gebruikt om geslachts-, leeftijds- en job-gereleerde verschillen na te gaan. De relatie tussen job stress, psychosomatische klachten en NA werd nagegaan door middel van correlatie- en regressie-analyse.

Resultaten. Er werden significante geslachtsverschillen gevonden voor de rapportering van psychosomatische klachten en NA. Werknemers uit verschillende bedrijven verschilden niet wat betreft de prevalentie van psychosomatische klachten, noch voor NA. We vonden wel significante verschillen voor de perceptie van de bevraagde jobkarakteristieken. Controle voor NA verzwakte de correlatie tussen psychosomatische klachten en de jobkarakteristieken gevoelig.

Besluit. Wanneer vragenlijsten gebruikt worden bij het bestuderen van de relatie tussen job stress en gezondheid, is het essentieel om te corrigeren voor NA. Na controle voor deze variabele blijft job stress echter gerelateerd aan de rapportering van psychosomatische klachten.

References

1. KARASEK R, THEORELL T. Healthy work. Stress, productivity and the reconstruction of working life. New York: Basic book inc, 1990.
2. ALTERMAN T, SHEKELLE RB, VERNON SW, BURAU KD. Decision latitude, psychologic demand, job strain and coronary heart disease. *Am J Epidemiol* 1994; 139: 620-7.
3. HURELL JJ, MURPHY LR. An overview of occupational stress and health. In Rom MW, ed. *Environmental and occupational medicine*. Boston, MA: Little Brown, 1992: 675-684.
4. KARASEK R. Job demands, job decision latitude and mental strain: implications for job redesign. *Adm Sci Q* 1979; 24: 285-308.
5. KARASEK R. *Job Content Questionnaire and User's Guide*. University of Southern California; Los Angeles, 1985.
6. WATSON D, PENNEBAKER JW. Health complaints, stress and distress: exploring the central role of NA. *Psychological Review* 1989; 96: 234-254.
7. WATSON, D, CLARK, L. Negative affectivity: the disposition to experience aversive emotional states. *Psychological Bulletin* 1984; 96: 465-490.
8. GROSSMAN P, WIENTJES JE. Respiratory disorders: asthma and hyperventilation syndrome. In Turpin G, ed. *Handbook of Clinical psychophysiology*. New York; Wiley & Sons, 1989.
9. GARSSEN B. De rol van stress en leren bij het ontstaan van het hyperventilatiesyndroom (Stress and learning in the development of the hyperventilation syndrome). In Defares P, Grossman P, eds. *Het hyperventilatiesyndroom (The hyperventilation syndrome)*. Stafleu, 1984.
10. BURKE MJ, BRIEF AP, GEORGE JM. The role of Negative Affectivity in understanding relations between self-reports of stressors and strains: a comment on the applied psychology literature. *J Applied Psych* 1993; 78: 402-412.
11. PARKES KR. Coping, Negative Affectivity and the work environment: additive and interactive predictors of mental health. *J Applied Psych* 1990; 75: 399-409.
12. VAN DIXHOORN J, DUIVENVOORDEN HJ. Efficacy of the Nijmegen Questionnaire in the recognition of the hyperventilation syndrome. *J Psychosom Res* 1985; 29: 199-206.
13. CHEN PY, SPECTOR PE. NA as the underlying cause of correlations between stressors and strains. *J Applied Psych* 1991; 76: 398-407.
14. BRIEF AP, BURKE MJ, GEORGE JM, ROBINSON BS, WEBSTER J. Should Negative Affectivity remain an unmeasured variable in the study of job stress? *J Applied Psych* 1988; 73: 193-198.
15. COSTA PT, MCCRAE RR. Neuroticism, somatic complaints and disease: is the bark worse than the bite? *J Personality* 1987; 55: 299-316.
16. PAYNE R. A longitudinal study of the psychological well-being of unemployed men and the mediating effect of neuroticism. *Human Relations* 1988; 41: 119-401.
17. SCHROEDER DH, COSTA PT. Influence of life event stress on physical illness: substantive effects or methodological flaws. *J Pers Soc Psych* 1984; 46: 853-863.

-
18. DECKER PJ, BORGEM FH. Dimensions of work appraisal: stress, strain, coping, job satisfaction and NA . *J Counseling Psych* 1993; 40: 470-478.
 19. VASSEND O, WATTEN R, MYHRER T, SYVERTSEN JL. NA and intellectual ability: a study of their relation to self-reported physical symptoms, perceived daily stress and mood and disciplinary problems in military recruits. *Soc Sci Med* 1994; 39: 583-590.
 20. PARKES KR. Personality and coping as moderators of work stress processes: models, methods and measures. *Work and Stress* 1994; 8: 110-129.
 21. WATSON D, CLARK LA, TELLEGEN A. Development and validation of brief measures of positive and NA : the PANAS scales. *J Pers Soc Psych* 1988; 54: 1063-1070.
 22. VASSEND O. Dimensions of NA , self-reported somatic symptoms and health-related behaviors. *Soc Sci Med* 1989; 28: 29-36.