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Sick and tired: psychological and physiological aspects of work-related stress

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9 Investigating the process of recovery of work-related stress; a study assessing predictors of complaints reduction and work-resumption*

Abstract

Background: In the process of recovery from work-related stress, complaint reduction and work-resumption are processes that are not yet fully understood. The aim of this study was to investigate work-, person-, and illness-related predictors of complaint reduction and work-resumption, with specific attention for potential mediation of complaint reduction in the association between predictors and work-resumption. *Method*: Seventy-one patients on sickness-leave because of work-related stress complaints were followed during a period of 13 months. Predictors comprised personal (demographics, coping, dysfunctional cognitions), work-related (job-characteristics, social support), and illness-related (complaint duration, absence duration) variables. Dependent variables were distress complaints, burnout complaints, and work-resumption. *Results*: Complaints reduced considerably over time to borderline clinical levels and work-resumption increased to 68% at 13 months. Predictors of stronger reduction of distress complaints were male gender, lower working hours, lower decision authority, more co-worker support, and shorter absence duration. Predictors of stronger reduction of burnout complaints were male gender, lower age, high education, lower avoidant coping, lower decision authority, higher job security, and more co-worker support. Predictors of work-resumption were lower age and stronger reduction of burnout complaints. No indication for a mediating role of burnout complaints between the predictor age and work-resumption was found. *Conclusion*: Symptom reduction is influenced by individual and work-related characteristics, which gives rise to a multidisciplinary treatment approach. Furthermore, burnout complaints reduction and work-resumption appear to be loosely related processes.

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Work-related stress and associated sickness absence is prevalent (e.g. European Communities, 2004; Houtman, Smulders & Hesselink, 2004; Spreeuwers, Pal & van der Laan, 2005). Various models describe risk factors for work-related stress and its developmental mechanisms. The Job-Demand Control Support (JDCS) model (Karasek, 1979; Karasek & Theorell, 1990; Karasek, Triantis & Chaudry, 1982) for example states that high job-demands in combination with low job-control and/or low support elevate the risk on health problems and impaired daily functioning. Alternatively, the Transactional Model (Lazarus & Folkman, 1987) declares that when external demands exceed a person's perceived ability to cope with these demands for a lasting period, health problems and impaired functioning develop. In short, and applied on work-related stress in particular, these models state that durable exposure to high work-load results in a state of work-related stress, which affects daily functioning and results in sickness absence. Until now, the recovery process is not yet fully understood. The aim of this study was to examine the process of recovery by investigating predictors of complaint reduction and work-resumption.

As little is known about determinants of symptom reduction and work-resumption, a range of variables regarding a) personal characteristics, b) work-related variables, and c) illness-related variables was investigated. Selection of the variables age, gender, and education was among others based on predictors of complaint reduction and/or work-resumption found in other studies among patients absent from work because of fatigue and/or work-related stress (Nieuwenhuijsen, Verbeek, de Boer, Blonk & van Dijk, 2006; Huibers et al., 2004a; Eshøj, Jepsen & Nielsen, 2001). Furthermore, predictors associated with the development of stress-related complaints were included. These predictors are: a) work-characteristics as specified in the JDCS-model (Karasek & Theorell, 1990); b) inadequate coping, which has been associated with stress in the Transactional Model of Lazarus and Folkman (1987); and c) dysfunctional cognitions, which are considered a risk factor for mood disorders (Beck, Rush, Shaw & Emery, 1979). It was assumed that more extreme values on these predictors would be associated with more severe complaints and/or less optimal conditions for recovery (e.g., low support may enhance distress). Finally, the predictors duration of complaints and duration of sickness absence were included. Duration of illness was used as an indicator of severity of complaints and/or an indirect indicator of adverse conditions for recovery (e.g., presence of an ongoing stressor such as a conflict with the employer); hence, a longer duration of either illness and/or absence duration was expected to negatively predict recovery.

In the process of recovery, it may seem apparent that a reduction or disappearance of complaints precedes work-resumption. Consequently, one would expect that complaint reduction predicts work-resumption. Various findings suggest, though, that once absent from work, subsequent work-resumption and complaint reduction are relatively independent processes. For example, it has been shown that work-resumption frequently takes place before symptoms have reduced to normal levels (Blonk, Brenninkmeijer, Lagerveld & Houtman, 2006; de Vente, Kamphuis, Blonk & Emmelkamp, 2008; van der Klink, Blonk, Schene & van Dijk, 2003). Also in chronic fatigue, a condition that is characterised by similar complaints and aetiology, recovery and work-resumption are predicted by different variables (Huibers et al., 2004a). Finally, work-resumption was success-

fully promoted by short cognitive behavioural interventions conducted by caregivers in the work environment (e.g., occupational physician; Blonk et al., 2006; van der Klink et al., 2003), while complaint reduction was not achieved by these interventions (Blonk et al., 2006; van der Klink et al., 2003). Nevertheless, it was predicted that complaint reduction would predict work-resumption to some extend.

Finally, in order to examine potential mechanisms involved in the process of complaint improvement and work-resumption, a mediation model was tested. The model tested mediation of complaints improvement in the association between predictors and work-resumption. Identification of predictors of recovery and/or evidence for mediation processes could provide valid information that could serve to improve treatment efficacy.

This study was conducted among individuals absent from work because of work-related stress. It was part of a comprehensive project in which the effectiveness of individual and group stress-management training (SMT) was investigated. SMT did not have additional effects to care as usual on complaints or sickness absence, except for indications of superior effectiveness of individual SMT in the subgroup with lower depressive complaints (de Vente et al., 2008).

Method

Participants

Eighty-two patients with occupational stress were included in the study. Patients were recruited through two occupational health services ($n = 62$), general practitioners ($n = 7$), and by self-referral in reaction to advertisements ($n = 13$). Eligibility was based on an intake procedure that consisted of a screening interview by telephone and a semi-structured diagnostic interview. In the screening interview, which was conducted by a clinical psychologist, presence of work-related stress complaints was examined. During the semi-structured diagnostic interview, also conducted by a clinical psychologist, the complaint history was assessed and the short version of the Composite International Diagnostic Interview (CIDI; World Health Organisation [WHO], 1997) was administered. In addition, the patient filled out the Beck Depression Inventory (BDI; Beck & Steer, 1967).

Inclusion criteria were: 1) fulfilment of the symptoms of neurasthenia, i.e., continuous mental and/or physical fatigue and increased fatigability, and at least two other stress complaints out of the following: dizziness, dyspepsia, muscular aches or pains, tension headaches, inability to relax, irritability, and sleep disturbance; 2) a by the referring clinician, the clinical psychologist, and the patient considered major role of (a) work-related stressor(s) in the development of complaints; and 3) presence of impaired daily functioning as indicated by (partial) sickness absence which had lasted at least two weeks but less than six months. Exclusion criteria were: 1) a primary diagnosis of major depression, social phobia, panic disorder, somatoform disorder other than undifferentiated, posttraumatic stress disorder, obsessive-compulsive disorder, hypomania, or psychotic disorders, assessed with the short version of the CIDI (WHO, 1997); 2) severe depressive complaints (i.e., conservatively defined as ≥ 25 on the BDI; Beck & Steer, 1987); 3) a traumatic event in the past six

months; and 4) a medical condition that is commonly associated with fatigue (e.g. diabetes); 5) excessive alcohol and/or drug use; and 6) pregnancy.

Dependant variables

Distress complaints

Fatigue was measured with the Checklist Individual Strength (CIS; Beurskens et al., 2000), which consists of 20 items, divided over four subscales. Items are scored on a 7-point Likert scale ranging from 1 (false) to 7 (true). The subscale General fatigue consists of eight items. A higher score means a higher level of fatigue. Internal consistency of the subscale is high (e.g. van der Ploeg, Kleber & van der Velden, 2000); Internal consistency in the current sample was also high, Cronbach's alpha = .91.

Depressive, anxiety, and stress-complaints were measured using the Depression, Anxiety, and Stress Scales (DASS; de Beurs, van Dyck, Marquenie, Lange & Blonk, 2001). The DASS consists of three subscales that comprise 14 items each. Severity of complaints during the past week is rated on 4-point Likert scales that range from 0 (not at all/never applicable) to 3 (very much/most of the time applicable). Higher scores represent higher levels of complaints. Psychometric properties are adequate to good (de Beurs et al., 2001; Nieuwenhuijsen, de Boer, Verbeek, Blonk & van Dijk, 2003a). Cronbach's alphas in the present sample were high: .87 for Anxiety, .94 for Depression, and .93 for Stress.

Burnout complaints

Burnout complaints were measured with the Maslach Burnout Inventory-General Survey (MBI-GS; Schaufeli & van Dierendonck, 2000). The MBI-GS consists of 15 items regarding Emotional exhaustion (5 items), Depersonalisation (4 items), and Professional competence (6 items). Items are scored on 7-point Likert scales ranging from 0 (never) to 6 (always/daily), and mean subscale scores are calculated. Higher scores indicate higher levels of work-related emotional exhaustion, depersonalisation/a cynical attitude towards work, and professional competence. Psychometric properties are adequate to good (Schaufeli & van Dierendonck, 2000). Internal consistencies of the subscales in the present sample were adequate to good: Cronbach's alphas were .85 for Emotional exhaustion, .81 for Depersonalisation, and .77 for Professional competence.

Work-resumption

The extent of work-resumption was assessed by self-reported hours sickness absence from work. Weekly information was obtained by using standardised diaries covering four weeks. Percentage sickness leave was dichotomised into 'completely absent/partial work-resumption' = 0, and 'complete work resumption' = 1.

Predictor variables

Person related variables

Demographic characteristics, such as age, gender, and education were assessed by questionnaire at baseline. Education level was defined as the highest completed education on a six-point scale ranging from 1 (Primary school) to 6 (University grade). Education was dichotomised in low-medium level (1-4) = 0, and high-level (5-6) = 1.

Coping was measured with the subscales Active coping (7 items) and Avoidant coping (8 items) of the Utrecht Coping Scale (UCL; Schreurs, van de Willige, Tellegen & Brosschot, 1988). Items are scored on four-points scales ranging from 1 (seldom/never) to 4 (very often). Higher scores indicate a stronger tendency of using active, or confronting and avoidant, or passive coping strategies. Psychometric properties of these subscales are adequate (Sanderman & Ormel, 1992). Internal consistencies in the current sample were adequate to good: Cronbach's alphas were .81 for Active coping, and .77 for Avoidant coping.

Dysfunctional attitudes were measured with the Dysfunctional Attitude Scale (DAS-24, Power, Katz, McGuffin, Duggan, Lam & Beck, 1994). The DAS-24 consists of three subscales: Achievement, Dependency, and Self-control, referring to absolutist or perfectionist beliefs about achievement, interpersonal relationships, and self-control, respectively. Items are scores on 7-points Likert scales and subscales consist of eight items each. Higher scores are indicative of stronger beliefs and more extreme scores are thought to reflect a cognitive vulnerability for psychopathology, in particular depression. Psychometric properties are adequate to good (Power et al., 1994). Internal consistencies in the current sample were adequate to good: Cronbach's alphas were .89 for Achievement, .80 for Dependency, and .73 for Self-control.

Work-related predictors

The amount of official working hours at baseline was assessed by a single question about the official hours of employment. Work-related psychosocial factors were measured by means of the Job Content Questionnaire (JCQ, Karasek, Pieper & Schwartz, 1985). Items are scored on four-point scales ranging from 1 (totally disagree) to 4 (totally agree). Subscale scores of Psychological job demands, Physical exertion, Decision authority, Skill discretion, Supervisor support, and Co-worker support were calculated according to Karasek et al. (1985). Job security was based on two items ('My job security is good'; 'How likely is it that during the next couple of years you will lose your present job?'), the latter being scored on a three-point scale. For calculation of the Job security total score, the former item was rescaled to a three-point scale and the latter was inversely recoded. Psychological job demands and physical exertion measure different types of workload. Decision authority and skill discretion measure two aspects of job control, or decision latitude. Supervisor support and co-worker support tap two types of social support. Job security is an extra measure of a specific work-related stressor. Higher scores indicate higher levels of psychological job demands, physical exertion, decision authority, skill discretion, supervi-

sor support, co-worker support, and job security. Psychometric properties of the subscales are generally adequate to good (Karasek et al., 1998; Pelfrene et al., 2001). Cronbach's alphas in the present sample were .82 for Psychological job demands, .84 for Physical exertion, .76 for Decision authority, .78 for Skill discretion, .84 for Supervisor support, .68 for Co-worker support, and .84 for Job-security.

Illness-related predictors
Duration of absenteeism was calculated from the start of the episode of absenteeism during which the participant was included in the study. Therefore, duration of sickness absence at baseline was added to duration of sickness absence during the study. Duration of sickness leave at baseline was assessed with a single question about the duration of absenteeism. Duration of sickness leave during the study was measured using standardised diaries covering four weeks, in which the extent of sickness absence was reported in hours per week.

Duration of complaints at baseline was measured with a single question with the following response categories: a) < 3 months, b) > 3 and < 6 months, c) > 6 and < 12 months, d) > 12 months). Complaints duration was dichotomised into non-chronic duration, i.e., < six months, and chronic duration, i.e., > six months. This categorisation is for example consistent with the criterion to discriminate adjustment disorder from undifferentiated somatoform disorder (American Psychiatric Association, 1994).

Procedure
The ethics committee of the Department of Psychology, University of Amsterdam, approved the research protocol and all participants signed informed consent. Questionnaire data were collected five times: at baseline (T0), at the end of the treatment phase (at 4 months; T1), and at three follow-up occasions (at 7, 10, and 13 months after baseline; T2 – T4). Data on sickness absence were gathered using the monthly diaries during the whole research period of 13 months. Extensive information about the project's procedures, the treatment content, and the definition of care as usual is provided elsewhere (de Vente et al., 2008).

Statistical analysis
To reduce the number of outcome measures, the seven subscale scores of distress and burnout complaints measured at baseline (Professional competence recoded inversely) were subjected to a factor analysis (oblique rotation). Examination of the Eigenvalues revealed two factors with a value above 1.00. Factor I (Eigenvalue: 3.26) consisted of Fatigue (rotated loading: .74), Anxiety, (rotated loading: .87), Depression (rotated loading: .87), and Stress (rotated loading: .87). Factor II (Eigenvalue: 1.42) comprised Emotional exhaustion (rotated loading: .64), Depersonalisation (rotated loading: .88), and Professional competence (rotated loading: .73). The two factors can be interpreted as distress and burnout complaints, respectively. Composite scores for Distress and Burnout complaints were created by summing up *z*-scores of individual complaints (inversely recoded for

Professional competence). In order to be able to detect change between measurements, *z*-scores were calculated per complaint for all data of all measurements at once.

Predictors that were bi-variately associated with complaints or work-resumption ($p < .20$) were entered in the regression models. Multiple longitudinal regression analyses were performed to identify baseline predictors for change of complaints (linear regression), and for change of sickness absence (logistic regression), separately. Therefore, auto-regression models were analysed, in which each dependent variable at time T was predicted by itself at time T-1 (Twisk, 2003). Predictors were eliminated in a backwards procedure until the model consisted of significant predictors only ($p < .05$). Coefficients were adjusted for treatment condition. For work-resumption, first baseline predictors were included and eliminated, followed by improvement of distress and burnout complaints. In this manner, a potential mediating role of complaint improvement could be investigated. Regression analyses were conducted with Generalised Estimating Equations (GEE; Zeger & Liang, 1986) in SPSS 15.0. An exchangeable correlation matrix was used to adjust for the dependency of observations. As no collinearity diagnostics are implemented for GEE in SPSS 15.0, we inspected bi-variate correlations between predictors to detect potential collinearity.

Results

Descriptive results

Data of 71 participants were available on baseline characteristics and at least two consecutive measurements on either complaints or sickness absence. Per measurement numbers of participants with valid data on any complaint and/or sickness absence were 71 at T0, between 58-70 at T1, 45-63 at T2, 45-61 at T3, and 45-60 at T4. Sample characteristics at baseline concerning predictors are presented in Table 1. In Table 2, descriptive statistics of complaints and work-resumption are listed.

Prediction of complaint reduction

Predictors of change of complaints are presented in Table 3. For Distress complaints, absolute bi-variate intercorrelations between predictors were < .70, and for Burnout complaints they were < .60. Hence, no indications for collinearity were found. Change of Distress complaints was predicted by personal, work-related, and illness-related variables. Reduction of Distress complaints was less among females, participants employed more hours a week, participants with more decision authority, participants with less co-worker support, and participants with longer sickness absence duration. Change of Burnout complaints was predicted by personal and work-related variables. Reduction of Burnout complaints was less among females, less educated participants, older participants, and participants with a stronger tendency of avoidant coping. In addition, more decision authority, less job security, and less co-worker support predicted less reduction of Burnout complaints.

Table 1: *Descriptive information of baseline-predictors (N = 71).*

Predictors	M (SD) / n (%)
Person-related	
sex (0 = females, 1 = males)	41 (58) / 30 (42)
age (years)	41.61 (9.48)
education (0 = low/medium, 1 = high) [a]	44 (62) / 27 (38)
active coping (7-28)	19.37 (3.75)
avoidant coping (8-32)	16.11 (3.98)
achievement (8-56)	28.55 (10.50)
dependency (8-56)	30.99 (8.85)
self-control (8-56)	33.96 (7.21)
Work-related	
working hours (official hrs/wk)	36.14 (5.19)
psychological job demands (9-36)	26.55 (4.70)
physical exertion (4-16)	7.52 (2.81)
skill discretion (6-24)	18.14 (3.39)
decision authority (3-12)	8.57 (2.11)
supervisor support (4-16)	8.89 (2.61)
co-worker support (4-16)	11.31 (1.97)
job-security (2-6)	4.52 (1.29)
Illness-related	
absence duration (wks)	9.07 (7.76)
complaints duration (0 = non-chronic, 1 = chronic)	33 (46) / 38 (54)

Notes: [a] low/medium = 1-4, and high = 5-6 on a 6-point scale ranging from 1 = Primary school – 6 = University.

Table 2: *Descriptive information [M (SD) / frequency (%)] of dependent variables in the course of 13 months.*

Outcome (range)	T0	T1	T2	T3	T4
Fatigue (8-56)	42.41 (9.47)	29.21 (12.49)	30.51 (12.30)	26.09 (12.23)	25.60 (12.24)
Anxiety (0-42)	8.36 (6.80)	3.78 (5.65)	5.68 (6.19)	4.83 (6.26)	4.92 (6.69)
Depression (0-42)	12.84 (8.28)	5.56 (6.56)	6.97 (7.35)	5.56 (6.27)	5.89 (7.59)
Stress (0-42)	18.68 (8.78)	8.79 (7.50)	11.93 (7.83)	10.65 (8.11)	10.17 (8.41)
Emotional exhaustion (0-6)	4.17 (1.22)	2.65 (1.53)	2.84 (1.61)	2.47 (1.60)	2.21 (1.52)
Depersonalisation (0-6)	2.93 (1.42)	2.27 (1.41)	2.43 (1.47)	2.09 (1.55)	2.14 (1.44)
Prof. competence (0-6)	3.79 (1.04)	3.97 (0.96)	4.00 (1.13)	3.99 (1.12)	4.25 (1.09)
Work-resumption (0-1)	0 (0%)	27 (39%)	34 (54%)	38 (61%)	41 (68%)

Note: Prof. competence = Professional competence.

Table 3: *Regression coefficients and test results of predictors of change [a] of complaints, adjusted for treatment condition.*

	B	CI B	p
Distress complaints [b]			
gender (0 = female, 1 = male)	-0.459	-0.823 – -0.095	.013
working hours (official hrs/wk)	0.051	0.021 – 0.082	.001
decision authority	0.061	0.004 – 0.118	.037
co-worker support	-0.090	-0.149 – -0.030	.003
absence duration (wks)	0.020	0.002 – 0.038	.026
Burnout complaints [c]			
gender (0 = female, 1 = male)	-0.392	-0.717 – -0.068	.018
age	0.017	0.005 – 0.029	.007
education (0 = low-medium, 1 = high) [d]	-0.433	-0.769 – -0.097	.011
avoidant coping	0.044	0.013 – 0.075	.005
decision authority	0.130	0.061 – 0.198	<.001
job security	-0.230	-0.366 – -0.093	.001
co-worker support	-0.096	-0.160 – -0.033	.003

Note: B: unstandardised regression coefficient; CI: Confidence interval
[a] Change was analysed by including the time-varying dependent variable at T-1 as a covariate in the model. Test results of these covariates are not reported in the table.
[b] Full model: Gender, Age, Education, Achievement, Dependency, Self-control, Absence duration, Complaint duration, Employment (hrs/wk), Skill discretion, Decision authority, Psychological job demands, Physical exertion, Supervisor support, Co-worker support.
[c] Full model: Gender, Age, Education, Active coping, Avoidant coping, Achievement, Complaint duration, Employment (hrs/wk), Skill discretion, Decision authority, Physical exertion, Job security, Supervisory support, Co-worker support.
[d] low/medium = 1-4, and high = 5-6 on a 6-point scale ranging from 1 = Primary school – 6 = University.

Prediction of work-resumption

For Work-resumption, absolute bi-variate intercorrelations between predictors were < .70. Hence, no indications for collinearity were found. Age was the only baseline-predictor that was significantly associated with work-resumption; higher age was associated with lower odds of work-resumption. After inclusion of Distress and Burnout complaints, age was still a statistically significant predictor, and only improvement of Burnout complaints predicted work-resumption. Less reduction of burnout complaints was associated with lower odds of work-resumption. Since the odds ratio of age changed minimally (< 1%) after addition of Burnout complaints, no support for mediation of the association between age and work-resumption by improvement of Burnout complaints was obtained. Outcomes of the two models are presented in Table 4.

Table 4: *Predictors of duration of work-resumption, adjusted for treatment.*

	OR	CI OR	*p*
Work-resumption			
Model I: baseline predictors [a]			
age	0.944	0.902 – 0.989	.014
Model II: baseline predictors and complaints [b]			
age	0.938	0.898 – 0.980	.004
burnout complaints [c]	0.431	0.238 – 0.778	.005

Note: OR: Odds ratio; CI: Confidence interval
[a] Full model: Gender, Age, Education, Dependency, Skill discretion, Physical exertion, Job-security, Complaint duration.
[b] Full model: Age, Distress complaints, Burnout complaints.
[c] The coefficient is adjusted for Burnout complaints at T-1 and thus indicates a change-score.

Discussion

This study aimed to identify variables that predict reduction of work-related stress complaints and work-resumption and explore the association between these two aspects of recovery through a mediation model among patients with work-related stress. Distress and burnout complaints reduced considerably over the 13-months period, reaching borderline clinical levels (for a definition of clinical levels see for example Huibers, et al., 2004b; Nieuwenhuijsen et al., 2003a; Schaufeli & van Dierendonk, 2000). After 13 months, work was completely resumed by 68% of the sample. Predictors of stronger recovery of distress complaints were being a male, working less hours per week, having less decision authority, having more co-worker support, and being absent from work for a shorter period. Predictors of recovery of burnout complaints were being a male, being higher educated, being younger, having a weaker tendency for avoidant coping, having less decision authority, having more job security, and having more co-worker support. Regarding baseline predictors, work-resumption was only predicted by age. In addition, work-resumption was predicted by a reduction of burnout complaints in the past three months. No evidence for substantial mediation of the association between age and work-resumption by a reduction of burnout complaints was found.

Our results were in line with studies in related fields. For example, the variables gender, age, and co-worker support were associated with stress-related complaints in the same direction as found in the current study (Cushway & Taylor, 1996; de Jonge et al., 2000; Magnusson Hanson, Theorell, Oxenstierna, Hyde & Westerlund, 2008). Regarding decision authority, positive associations with stress-related complaints have been reported by others (e.g., de Jonge et al., 2000), despite the fact that according to the JDCS model (Karasek, 1979; Karasek & Theorell, 1990; Karasek et al., 1982) decision authority is considered to be negatively associated with health. Furthermore,

less avoidant coping has been associated with less stress complaints (Cushway & Taylor, 1996) and recovery of depression (Rohde, Seeley, Kaufman, Clarke & Stice, 2006). Unexpectedly, none of the dysfunctional attitudes predicted reduced complaint reduction, though mean values of the attitudes at baseline were elevated (Bartak & Kamphuis, 2001; Power, Duggan, Lee & Murray, 1995) and irrational cognitions have shown associations with distress complaints (Nieuwenhuijsen, Verbeek, de Boer, Blonk & van Dijk, 2007). Inclusion of treatment in the models was not the reason for not findings effects; analyses without treatment in the model resulted in similar, non-significant coefficients (results not shown). Regarding sickness absence, higher age appears to be a consistent predictor of long-term absenteeism in patients with mental health problems, adjustment disorder, or chronic fatigue (Nieuwenhuijsen et al., 2006; Huibers et al, 2004a).

Since little is known about predictors of recovery of complaints in samples with a clinical level of work-related stress, we can only speculate about explanations for the observed associations. Females, for example, generally have more other obligations such as care of the household and children (e.g., Krantz, Berntsson & Lundberg, 2005), which may slow down recovery as compared to males. Lower educated individuals generally have more other stressors such as financial problems (e.g., van Oort, van Lenthe & Mackenbach, 2005), and are less healthy (e.g., Mackenbach et al., 2008), which may impair their recovery. Older individuals may recover in a slower pace just because of their age. Older workers indeed need more time to recover than younger workers (e.g., Kiss, De Meester & Braekman, 2008). Regarding working hours, findings suggest that working more hours is associated with poorer health, which may impair subsequent recovery. To illustrate, working hours is associated with more psychosomatic complaints (e.g., Umehara, Ohya, Kawakami, Tsutsumi & Fujimura, 2007), with an unhealthier life style and with more adverse physiological changes (e.g., Caruso, 2006; van der Hulst, 2003). Among individuals with more decision authority, who generally have jobs with higher responsibilities, continuous worrying on their responsibilities during their absence may hinder recovery. Individuals with less job security are likely to remain distressed while absent from work due to their uncertain future, which may prevent recovery. In support of this suggestion is that job insecurity is associated with more health complaints (e.g., Mohren, Swaen, van Amelsvoort, Borm & Galama, 2003; Størseth, 2006). Reporting less co-worker support may indicate conflicts with colleagues. Conflicts with co-workers may continue to affect health during absence. It has been demonstrated that conflict with co-workers is indeed associated with more health complaints (e.g., De Raeve, Jansen, van den Brandt, Vasse & Kant, 2000) and with delayed onset of recovery of fatigue complaints (Huibers et al. 2004c). A stronger tendency of avoidant coping may prevent recovery since problems at work or during absence are less likely to be adequately solved, which may result in continuation of negative affect (Folkman & Lazarus, 1988). In addition, a stronger avoidant coping style may result in unhealthier life style behaviours (Folkman & Lazarus, 1988; Frone & Windle, 1992) that may in their turn delay recovery. Finally, being absent for a longer time may result in less recovery due to diminished hope on a positive outcome, reduced self-confidence, reduced positive attitudes towards work, or an increased sense of detachment to the workplace.

This study demonstrated that different predictors exist for complaints reduction and work-resumption. This suggests that complaints reduction and work-resumption are distinct processes. However, the association between a reduction of burnout complaints and work-resumption illustrates that the processes of complaint reduction and work-resumption are related to some extent. Factors that are likely to influence work-resumption to a larger extent than complaints reduction are procedural measures undertaken by the company and the occupational physician to promote work-resumption. Such measures are for example regular communication and developing a time-path for return to work. Nieuwenhuijsen et al. (2003b) indeed found that communication between the occupational physician and the supervisor promoted first return to work. Whether this communication also reduced complaints was not assessed, though. Future research may include procedural measures to investigate their share in predicting complaints reduction and work-resumption.

This study also showed that it is relevant to distinguish between distress and burnout complaints. Reductions of these complaints were predicted by different variables. In addition to the common predictors sex, decision authority, and co-worker support, reduction of distress complaints was uniquely predicted by working hours and absence duration. Unique predictors of reduction of burnout complaints were education, avoidant coping, and job-security. Moreover, only change of burnout complaints was associated with work-resumption. Post-hoc analyses (results not shown) revealed that distress complaints were also associated to work-resumption but in a different manner. Instead of change of distress complaints, it appeared that lower distress complaints measured three months earlier predicted work-resumption. This finding still illustrates that distress and burnout complaints are separate indicators of recovery.

With respect to the mediation analysis, the association between age and work-resumption was almost entirely independent of reduction of burnout complaint. Hence, more gradual work-resumption among older participants cannot be ascribed to slower complaint reduction. An explanation for this finding may be that older patients have different attitudes towards work, which may reduce their motivation to return to work. Alternatively, employers may have different attitudes towards reintegrating older employees as compared to younger ones.

More predictors were found for complaint reduction than for work-resumption. This may be a consequence of the dichotomous nature of the sickness absence data. Alternatively, it may indicate that relevant predictors were lacking. For example, the earlier discussed procedural measures by the occupational physician and the company and other care-related variables, such as number of consultations of the occupational physician or other caregivers, were not included in the models. Other researchers have demonstrated that such variables were indeed associated with work-resumption (Nieuwenhuijsen, Verbeek, Siemerink & Tummers-Nijsen, 2003b; Nieuwenhuijsen et al., 2006).

Interestingly, work-related predictors that influence stress among working people, such as level of decision authority and co-worker support (e.g., Cushway & Tyler, 1996; de Jonge, Reuvers, Houtman, Bongers & Kompier, 2000; Väänänen et al., 2003; Tyson, Pongruengphant & Aggarwal, 2002),

also appear to play a role in the process of complaint improvement among ill and non-working people. Work-characteristics thus continue to affect well-being during sickness absence. For some predictors (e.g., co-worker support) an alternative explanation may be that the variables measured at baseline are correlated with co-worker support later in time, which is actually affecting well-being. Future research including repeated measures of work-related variables may resolve this issue.

Various predictor variables are candidates for treatment purposes. Person-related variables, e.g., coping, are already involved in cognitive-behavioural treatment (CBT). Job-related variables are less easily influenced in psychological treatments aimed at the individual such as CBT. However, regarding co-worker support, employers may encourage co-workers to support an absent patient. Other researchers have observed a positive association between supervisor communication and shorter absence duration (Nieuwenhuijsen, Verbeek, de Boer, Blonk & van Dijk, 2004), supporting a more active role of the supervisor in the process of work-resumption. Furthermore, influence on job-characteristics such as working hours and decision authority may be increased by more involvement of the occupational physician in the treatment-process. Occupational physicians may add to the insight in a potential misfit between the patient and his/her work, and could stimulate the employer to make certain adjustments to the working conditions.

The association between the illness-related variable absence duration and general complaint recovery may also be informative for intervention purposes. Longer absence duration may lead to aggravation of certain complaints, e.g. anxiety, or loss of day structure. Patients with longer absence duration did not have more severe complaints at baseline; associations between absence duration and complaints were low (< .20) and non-significant. This finding suggests that (partial) work-resumption may be beneficial, even though complaints may not have abated completely. However, further research is required to investigate processes associated with the association between absence duration and general complaints reduction, and investigate potential beneficial effects of earlier work-resumption.

Finally, the predictors that cannot, or with great difficulty, be changed through interventions, such as gender, age, education, and job security, can be considered as indicators of groups at risk, for whom specific interventions may be designed. Other researchers, for example, have proposed a practically applicable prediction rule based on the predictors such as age and education level that occupational physicians could use in order to identify cases at risk for unfavourable outcomes (Nieuwenhuijsen et al., 2006).

This study knows some weaknesses and limitations. First, potential mediating variables, e.g., dysfunctional attitudes and work-related social support, were only measured at baseline, thus limiting the possibilities of testing mediation models. Another limitation concerns generalisability. Participants in this study were predominantly employees working in small and medium size companies, and willing to participate in this intervention study, limiting generalisation to other groups of employees or the self-employed.

Future research may aim to map the processes of recovery and work-resumption in more detail. In order to reach more detailed mapping, both predictors and potential mediator variables may

be repeatedly measured. With repeatedly measured variables, different prediction models can be compared. For example, models of change or time-lag models may be investigated in addition to marginal models. With a model of change, it could for example be investigated whether change of work-conditions such as perceived job demands is a predictor work-resumption. In addition to measuring perceived work-related psychosocial conditions, predictors reflecting more objective psychosocial characteristics may be assessed. Support for a better prediction of sickness absence by actual job demands and control rather than perceived job demands and control has been reported (Roelen, Weites, Koopmans, van der Klink & Groothoff, 2008). In addition to repeatedly measuring predictors known to be related to stress complaints, even more detailed insight in the process of symptom reduction and work-resumption may be obtained by examining process-indicators such as provided care and illness-related cognitions. Illness related cognitions have proven to be associated with outcome in patients with chronic fatigue (Huibers et al., 2004a).

In conclusion, this study is an initial step in analysing the role of individual, work-related, and illness-related variables in symptom reduction and work-resumption. Our findings illustrate that symptom recovery and work-resumption are influenced by multiple variables, which may give rise to a multidisciplinary treatment approach. This study also highlights that work-related symptom reduction and work-resumption among patients with work-related stress are loosely related processes.

Acknowledgement

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