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Predictors of outcome in fatigued employees on sick leave Results from a randomised trial

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Abstract

Objective: The main objective of this study was to identify predictors of fatigue caseness, work resumption and chronic fatigue syndrome (CFS)-like caseness in a sample of fatigued employees on sick leave. **Methods:** For 12 months, 151 fatigued employees on sick leave, 44% of whom met research criteria for CFS at baseline, were followed. Measures included fatigue, health aspects, psychological problems, burnout, causal attributions and self-efficacy. Logistic regression analysis was used to determine associations between predictor variables at baseline and outcome at follow-up. **Results:** After 12 months, 43% of the patients were no longer fatigue cases, and 62% had resumed work. Recovery from fatigue caseness was predicted by stronger psychological attributions and other perception-related factors, whereas work resumption was predicted by lower age, male sex, CFS-like caseness and less cognitive difficulties. Lower physical functioning scores were predictive of (the development of) CFS-like caseness. **Conclusion:** Recovering from persistent fatigue and work resumption seem to result from different underlying processes and do not necessarily fall together. As many factors associated with outcome in fatigue reflect illness perception, the prevention of persistent fatigue and CFS may partly be achieved by the modification of perception.

Keywords: Chronic fatigue syndrome; Fatigue; Predictor analysis; Primary care; Recovery; Sick leave

Introduction

Fatigue is a common complaint in the general, primary care and working population, with a reported prevalence varying from 7% to 45% [1–3]. In most cases, fatigue lacks a clear somatic cause [4] and appears to be a functional symptom [5,6]. Fatigue can best be understood as a continuum, ranging from mild complaints frequently seen in the community to severe, disabling fatigue like chronic fatigue (syndrome; [1]). When fatigue becomes severe and persistent, it may lead to long-term sick leave [7] and work disability [8].

In the present study, we report predictors of outcome in a sample of persistently fatigued employees absent from work on sick leave. To our knowledge, predictors of outcome have never been studied in this particular group of patients. The study sample was originally selected to assess the efficacy of brief cognitive behaviour therapy (CBT) by general practitioners in fatigued employees on sick leave. Despite favourable effects of CBT for chronic fatigue syndrome (CFS) in previous studies [9,10], CBT had no detectable effect on the course and duration of fatigue and absenteeism compared with usual GP care [11]. One explanation for this finding might be that impairment in our sample was too advanced for a short treatment in a

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primary care setting. At baseline, 44% of the patients already met research criteria for CFS [12].

Previously, we studied the relation between persistent fatigue among employees and CFS and found that the two conditions share many characteristics [13]. Interesting in this context is the potential role of causal attributions. Studies have shown that outcomes in CFS patients are predicted by the extent to which patients attribute their illness to a somatic or psychological cause [14–20]. In a recent study, Chalder et al. [21] found that fatigue caseness and social disability after CBT or counselling were predicted by stronger somatic causal attributions in a sample of fatigued primary care patients, 28% of whom met research criteria for CFS [12].

We examined the role of several factors, among which causal attributions, as predictors of outcome after 1 year. Outcome was defined in terms of (recovery from) fatigue caseness, work resumption and CFS-like caseness (meeting research criteria for CFS) at follow-up. As fatigued employees who meet criteria for CFS may differ from fatigued employees who do not meet CFS criteria in important clinical ways [13], we hypothesized that different predictors of outcome would be found in CFS-like cases and non-CFS cases at baseline.

Methods

Design

We conducted a prospective study as part of a randomised controlled trial. Data were collected on four occasions: at baseline and posttreatment assessments (4 months), using computerized questionnaires, and twice at follow-up (8 and 12 months), using postal questionnaires. The ethics committee of Maastricht University approved the study protocol, including the present analysis.

Subjects

Patients were recruited in collaboration with a local occupational health service (OHS) that monitors a working population of 80,000 employees. On a monthly basis, employees monitored by the OHS who were on sick leave were sent limited study information (including a screening list) by the OHS, irrespective of the reason for sick leave, followed by a reminder 2 weeks later. Based on the screening lists sent back to the research team, we invited potential candidates who were willing to participate to visit the university research centre.

Inclusion criterion was severe fatigue [a score of 35 or more on the Checklist Individual Strength (CIS) [22,23]] for 4 months or more as one of the main health problems, in combination with complete absenteeism from work for 6 weeks or more. Patients were excluded from participation if they had medical conditions that explained fatigue, received co-interventions for fatigue, had a previously classified psychiatric disorder, or received psychological treatment. In addition, absenteeism should not be caused by problems unrelated to health (e.g., work conflict that obstructs work resumption, even after recovery). In total, 151 fatigued employees were thus selected for participation; the flow of patient recruitment is described elsewhere [11].

Study variables

Checklist Individual Strength (CIS)

Fatigue severity was measured with the subscale fatigue severity of the CIS [22,23]. Higher scores indicate a higher severity of fatigue; a score of 35 or higher is indicative of severe fatigue [22,24].

Short Form Health Survey (SF-36)

Three subscales of the SF-36 [25] were used: physical functioning, pain and self-rated health. Higher scores on these scales indicate higher levels of physical functioning and pain and a better self-rated health.

Symptom Checklist 90 (SCL-90)

Three subscales of the SCL-90 [26] were used: depression, cognitive difficulties and somatisation. Higher scores on these scales indicate higher levels of depression, cognitive difficulties and somatisation.

Maslach Burnout Inventory-General Survey (MBI-GS)

Aspects of burnout were measured with two subscales of the MBI-GS [27]: exhaustion and professional efficacy. Higher scores on these subscales indicate higher levels of work-related emotional exhaustion and (perceived) professional efficacy.

Self-efficacy scale and Causal Attributions List

To measure self-efficacy (sense of control in relation to complaints) and psychological (beliefs regarding the psychological cause of complaints) and somatic attributions (beliefs regarding the somatic cause of complaints), two scales administered in our previous fatigue studies [9,19] were used: the self-efficacy scale (SES) and a modified version of the Causal Attributions List (CAL). The CAL consists of two subscales: psychological and somatic attributions. Higher scores on these (sub)scales indicate higher levels of self-efficacy and stronger causal attributions.

Other measures

Other variables included self-reported duration of fatigue complaints and self-reported duration of absenteeism, both assessed at baseline.

Definition of outcome

We defined two types of *recovery* based on fatigue caseness and work resumption. Recovery A (no fatigue caseness) was defined as having a CIS score *lower* than 35

[22,24]. Recovery B (work resumption) was defined as self-reported work resumption.

In addition, subjects were identified as *CFS-like cases* if they met all of the following research criteria: a CIS score of 40 or higher [9], a duration of fatigue complaints of 6 months or more and an SF-36 score on the subscale physical functioning of 60 or lower. These research criteria were based on the CDC criteria for CFS [12].

It is emphasized that participants who met CFS criteria did not necessarily qualify as CFS patients: A final diagnosis of CFS can only be made by a physician after a sufficient physical examination. None of the fatigued employees had a CFS diagnosis made by a physician at entry in the study. Therefore, those who met research criteria will be referred to as CFS-like cases (the suffix "like" was used to clarify that participants met criteria by self-report only; [12]). A CFS-like status is widely regarded as a good proxy for true CFS [28,29].

Statistical analysis

Analyses were conducted for the entire sample and for the sample stratified according to CFS-like caseness at baseline. To test whether differences in proportions were significant, the chi-square test and McNemar's test for related samples were used.

Multiple logistic regression models were used to determine associations between potential predictors at baseline and the two types of recovery or CFS-like caseness at 12-month follow-up. After evaluation of the distribution of variables, predictors were chosen based on their univariate association with the dependent variable. Treatment was not associated with outcome [11]. However, we controlled for it by including 'group allocation' (experimental CBT = 1, control = 0) in all regression models, although the effects of this control were only marginal. In a first step, predictors were entered in the model and eliminated in a backward procedure until the model consisted of significant predictors only (P value <.05). Variables were omitted from the analysis after the interpretation of the Wald test. In a second step, sex, age, education and group allocation were entered, and the backward elimination procedure was continued. In addition to the main analyses, we also conducted a forward stepwise selection procedure of variables. In a first block, sex, age, education and group allocation were entered. In the following steps, predictor variables were added to the model, with the order of variables based on the strength of their univariate association with outcome. These ancillary analyses yielded similar results and are therefore not reported. Analyses within subgroups stratified according to CFS-like caseness were low on statistical power and should therefore be regarded as explanatory.

To take into account observed fluctuations in time, an explanatory regression analysis using Generalized Estimating Equations (GEE) was performed to identify the factors that were associated with CFS-like caseness in time (yes = 1, no = 0), which enabled us to use all data available at each measurement (0, 4, 8 and 12 months) most efficiently.

Odds ratios were standardized to represent change per SD on the scale. Logistic regression analysis was performed using SPSS (Version 11.0). Regression analysis using GEE was performed using the GENMOD procedure in SAS, with the correlation matrix defined as 'unstructured'.

Results

Characteristics of the study sample

In Table 1, the demographic and clinical variables that were entered in multivariate models are presented. Sixty-six patients (44%) met the research criteria for CFS at baseline. Data were available for 146 patients at 4 months, 143 patients at 8 months and 138 patients at 12 months.

Recovery and CFS-like caseness

Recovered cases and CFS-like caseness among the patients in the course of 12 months are presented in Table 2. After 12 months, 43% of the participants were no longer fatigue cases, and 62% had resumed work. The percentage of

Table 1
Characteristics of fatigued employees at baseline

	151 Fatigued employees according to CFS-like caseness	
	CFS+ (n = 66)	CFS− (n = 85)
Demographic variables		
Sex (m/f)[a]	26/40 (40%)	42/43 (50%)
Age in years	42.9 (8.6)	43.8 (8.1)
Education (1 = *low* to 7 = *high*)	3.3 (1.4)	4.2 (1.6)
Clinical variables (scale)		
CIS, fatigue severity (8–56)	50.9 (4.9)	46.9 (6.5)
Duration of fatigue complaints in months	33.4 (30.9)	22.7 (27.6)
Duration of absenteeism in weeks	12.3 (4.5)	12.3 (5.2)
SF-36, physical functioning (0–100)	43.2 (13.7)	76.4 (19.9)
SF-36, pain (0–100)	40.5 (26.6)	63.7 (29.7)
SF-36, self-rated health (0–100)	44.6 (16)	57.6 (17.5)
SCL-90, depression (16–80)	35.7 (12)	37.4 (11.4)
SCL-90, cognitive difficulties (9–45)	23.4 (7.9)	23.9 (7.7)
SCL-90, somatisation (12–60)	30.6 (8)	26.3 (7.3)
MBI-GS, exhaustion (0–6)	3.6 (1.5)	3.1 (1.4)
MBI-GS, professional efficacy (0–6)	4.0 (1.1)	3.9 (1.2)
SES, self-efficacy (5–24)	14.3 (3.7)	15.7 (3.2)
CAL, somatic attributions (4–16)	10.5 (2.1)	8.3 (2.4)
CAL, psychological attributions (7–28)	18.3 (4.6)	19.3 (4.1)

Data are mean (S.D.).
CFS + = fatigued employees who met research criteria for CFS at baseline.
CFS − = fatigued employees who did not meet research criteria for CFS at baseline.
[a] Number of patients (%).

Table 2
Recovered cases and CFS-like cases among fatigued employees ($n = 151$) in the course of 12 months

	Definition of outcome		
Follow-up	Recovery A (no fatigue caseness)	Recovery B (work resumption)	CFS-like caseness (CFS research criteria)
4 months			
Total group ($n = 146$)	50 (34%)	81 (55%)	46 (31%)
CFS+ ($n = 63$)	13 (21%)	28 (44%)	33 (52%)
CFS− ($n = 83$)	37 (45%)	53 (64%)	13 (16%)
8 months			
Total group ($n = 143$)	56 (37%)	87 (61%)	38 (27%)
CFS+ ($n = 62$)	15 (24%)	26 (42%)	24 (39%)
CFS− ($n = 81$)	41 (51%)	61 (75%)	14 (17%)
12 months			
Total group ($n = 138$)	63 (43%)	85 (62%)	28 (20%)
CFS+ ($n = 57$)	18 (32%)	27 (47%)	19 (33%)
CFS− ($n = 81$)	45 (56%)	58 (72%)	9 (11%)

All values are number of valid cases (%) available at follow-up.
Recovery A = number of cases who were no longer fatigue cases (CIS score below 35); Recovery B = number of cases who had resumed work; CFS-like caseness = number of cases who met research criteria for CFS at follow-up; CFS+ = fatigued employees who met research criteria for CFS at baseline; CFS− = fatigued employees who did not meet research criteria for CFS at baseline.

CFS-like cases dropped significantly from 44% at baseline to 20% at 12-month follow-up (McNemar's test, $\chi^2 = 16.7$, $P < .0005$). In total, 60 participants (40%) did not meet CFS criteria at any point in time, while only 11 CFS-like cases at baseline (7%) remained CFS-like cases throughout the 12-month follow-up (not in the table). Overall, CFS-like employees at baseline (CFS+) had significantly worse outcomes in the course of 12 months compared with non-CFS employees (CFS−; P values for differences in proportion in Table 2 ranging from .019 to <.0005).

Predictors of recovery

Table 3 presents the factors at baseline that were significantly associated with the two types of recovery after 12 months, for the entire sample (total group) and stratified according to CFS-like caseness at baseline (CFS+ and CFS−). It should be noted that the odds ratios of continuous variables were standardized to represent change per SD on the scale.

Recoveries A (no fatigue caseness) and B (work resumption) were associated with different predictors at baseline. Whereas Recovery A in the total group was predicted by psychological attributions, pain, self-rated health, professional efficacy and cognitive difficulties, Recovery B was predicted by sex, age, CFS-like caseness at baseline and cognitive difficulties.

As hypothesized, predictors of the two types of recovery were different for the CFS-like (CFS+) and non-CFS employees (CFS−) at baseline. Recovery A (no fatigue caseness), for example, was predicted by higher scores on

Table 3
Significant baseline predictors of recovery at 12-month follow-up

	Recovery A (no fatigue caseness)[a]			Recovery B (work resumption)[b]		
Predictors	Total group	CFS+	CFS−	Total group	CFS+	CFS−
Sex (male = 1)	–	–	–	3.25 (1.34 to 7.86)	4.31 (1.07 to 17.39)	–
Age	–	–	–	0.41 (0.25 to 0.65)	0.50 (0.25 to 0.84)	0.34 (0.17 to 0.71)
Psychological attributions	1.62 (1.04 to 2.43)	–	1.75 (1.05 to 3.08)	–	–	–
Self-efficacy	–	2.50 (1.19 to 5.18)	–	–	–	–
Pain (SF-36)	0.54 (0.40 to 0.74)	0.40 (0.22 to 0.74)	–	–	–	–
Self-rated health (SF-36)	1.69 (1.19 to 2.39)	–	–	–	0.39 (0.22 to 0.83)	–
Professional efficacy (MBI)	0.61 (0.39 to 0.94)	–	–	–	–	–
Cognitive difficulties (SCL)	0.57 (0.37 to 0.92)	–	–	0.51 (0.33 to 0.78)	–	0.47 (0.28 to 0.85)
Somatisation (SCL)	–	–	0.33 (0.17 to 0.66)	–	0.36 (0.17 to 0.78)	
CFS-like caseness (yes = 1)	–	–	–	0.32 (0.14 to 0.72)	–	–
Nagelkerke R^b (model)	.31	.30	.25	.29	.32	.25

Predictor values are significant odds ratios (95% CI) adjusted for all other predictors in the model. Values of continuous predictors are expressed as OR per SD.
CFS+ = fatigued employees who met research criteria for CFS at baseline; CFS− = fatigued employees who did not meet research criteria for CFS at baseline.
[a] Factors entered in the full model included self-efficacy, somatic attributions, psychological attributions, fatigue severity, duration of fatigue complaints, physical functioning, CFS-like caseness, pain, self-rated health, somatisation, cognitive difficulties and professional efficacy (Step 1) and age, sex, education and allocated condition (Step 2).
[b] Factors entered in the full model included duration of absenteeism, physical functioning, CFS-like caseness, pain, self-rated health, depression, somatisation, cognitive difficulties and emotional exhaustion (Step 1) and age, sex, education and allocated condition (Step 2).

self-efficacy and lower scores on the SF-36 pain scale in CFS-like employees, while higher scores on psychological attributions and lower scores on somatisation were predictive of recovery in non-CFS employees.

Predictors of CFS-like caseness

In the logistic regression analysis, lower baseline scores on physical functioning were found to predict CFS-like caseness 12 months later, in the total group (OR per SD 0.27; 95% CI: 0.15 to 0.46) and in the subgroup of non-CFS employees at baseline (OR per SD 0.15; 95% CI: 0.06 to 0.46). In the CFS-like employees at baseline, however, CFS-like caseness at follow-up was predicted by higher fatigue (OR per SD 2.25; 95% CI: 1.06 to 5.31) and pain scores (OR per SD 2.56; 95% CI: 1.37 to 4.76).

Differences between CFS-like and non-CFS employees in time

An explanatory GEE regression analysis was used to identify the factors that were associated with CFS-like caseness in the course of 12 months. Because CFS-like caseness is based on fatigue (CIS), physical functioning (SF-36) and duration of fatigue complaints, these variables were left out of the analysis. Nine factors were significantly associated with CFS-like caseness (OR per SD): sex (male vs. female, OR 0.48), psychological attributions (OR 0.57), somatic attributions (OR 1.61), self-efficacy (OR 0.71), pain (OR 1.88), self-rated health (OR 0.57), somatisation (1.58), and work-related exhaustion (OR 1.91). A decreasing trend over time was also found (OR 3.4, 1.94 and 1.40 on, respectively, 0, 4 and 8 months vs. 12 months), illustrating that participants were less likely to be a CFS case as time proceeded.

Discussion

Predictors of recovery

We found that a substantial portion of the fatigued employees in our sample did not recover in the course of 12 months, which indicates the advanced level of chronicity and impairment in this group of patients. It is interesting to find that the chances of work resumption plummet dramatically after 4 months. Fifty-five percent of the participants had resumed their work after 4 months, while only an additional 7% resumed work in the following 8 months, if we assume that those who resumed work did not relapse in time.

Subsequently, we assessed predictors of recovery. We found that recovery from fatigue caseness (Recovery A) was predicted by stronger psychological attributions and other perception-related factors, like a better perception of health and lower professional efficacy. Work resumption, on the other hand (Recovery B), was predicted by male sex, lower age, CFS-like caseness and lower levels of cognitive difficulties. Surprisingly, selection variables, like fatigue severity, duration of complaints and duration of absenteeism, were no longer associated with recovery after adjustment for other determinants.

CFS-like caseness

We examined the role of CFS-like caseness, both as determinant and outcome, and found that the proportion of patients who met research criteria for CFS decreased significantly in time, with 67% of the CFS-like cases at baseline no longer meeting criteria for CFS 1 year later. This illustrates that CFS-like caseness was not a stable condition for all who met the criteria at some point. CFS-like caseness as baseline predictor was univariately associated with worse outcomes (i.e., no recovery, CFS-like caseness at follow-up) in time. In the GEE regression analysis, causal attributions and other perception-related factors were found to differentiate CFS-like and non-CFS cases in the course of 12 months. This finding suggests that fatigued employees who met CFS criteria at some point and those who did not also differed on important characteristics other than CFS criteria. Our hypothesis that predictors of outcome would be different for CFS-like and non-CFS patients at baseline was confirmed. In the CFS-like subgroup at baseline, the perpetuation of, or reappearance of, CFS-like caseness 1 year later was predicted by higher levels of fatigue and pain, while becoming a CFS-like case after an initial non-CFS status at baseline was predicted by lower levels of physical functioning.

Methodological considerations

Our prospective study offered us the unique opportunity to observe the development of CFS in a sample of fatigued employees. As stated, a CFS-like status is regarded as a good proxy for true CFS [28,29]. Nevertheless, caution should be exercised in the interpretation of our findings relating to the differences between CFS-like and non-CFS, not in the least because these analyses were explanatory.

A major limitation pertains to the generalization of findings to other populations. We investigated a highly selected sample of fatigued employees who chose to participate in a clinical trial with rather stringent entry criteria. Accordingly, the key characteristics of the sample might not be representative for the entire spectrum of persons suffering from fatigue due to selection bias, although our findings are consistent with findings from other studies of fatigue.

The role of causal attributions

Previous studies have provided ample evidence that most CFS patients do not recover spontaneously [16,19,20,30–32], with stronger somatic or weaker psychological attributions

predicting worse outcomes [14–20]. In the present study, recovery in the subgroup of CFS-like cases at baseline was significantly worse compared with that in the subgroup of non-CFS cases, while stronger somatic and weaker psychological attributions differentiated CFS-like from non-CFS cases. In addition, stronger psychological attributions were found to predict recovery from fatigue caseness in non-CFS cases. This raises questions on the role of causal attributions: Are they modified by the nature, persistence and duration of complaints, or do they determine illness outcome [13]? Butler et al. [33] have suggested that the tendency to make somatic attributions might be a vulnerability factor for the development of CFS. Chalder et al. [21] have suggested that a more pessimistic view of the illness may encourage symptom focusing, which, in turn, may lead to the perpetuation of fatigue. Future cohort studies free from selection bias may clarify causal relationships of this kind.

Conclusions

Several conclusions can be drawn from the findings in this study. First, recovering from persistent fatigue and going back to work seem to entangle different underlying processes. Consequently, recovering from health complaints and resuming work after a period of sickness absence do not necessarily fall together.

Furthermore, our findings suggest that CFS and persistent fatigue, although different, are no distinct categories but rather stages of a fatigue severity continuum [1] on which people can actually shift back and forth.

Third, our findings fit the notion that many key factors associated with persistent fatigue and CFS reflect the perception of illness or condition (e.g., causal attributions, health perception, self-efficacy and professional efficacy). Possibly, the prevention of persistent fatigue and CFS can partly be achieved by the modification of cognitions and perception, an approach that has shown to be effective in the specialist treatment of CFS [9,10]. This is not disputed by the fact that brief CBT by general practitioners, which aims at changing perception, did not work in our trial [11]. Findings from the present report may very well indicate that the severity of fatigue and the duration of sickness absence were too advanced in our study population for a potential response to brief CBT by inexperienced therapists in primary care.

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