# Predictors of outcome following treatment for chronic fatigue

LUCY DARBISHIRE, PAUL SEED and LEONE RIDSDALE

**Summary** We explored the role of baseline characteristics of 105 patients who presented with fatigue in primary care in determining outcome following either graded exercise or cognitive–behavioural therapy. Meeting the criteria for chronic fatigue syndrome was the most powerful predictor of poor outcome and this negative effect was enhanced by greater functional impairment or greater perceived negative consequences, but was not further enhanced by both.

**Declaration of interest** None. Funding detailed in Acknowledgements.

We investigated predictors of outcome in a previously reported (McCrone *et al*, 2004; Ridsdale *et al*, 2004) group of patients who presented to general practitioners (GPs) with fatigue. We hypothesised that fatigue score following therapeutic intervention with either cognitive–behavioural therapy (CBT) or graded exercise would be predicted by baseline fatigue severity (including chronic fatigue syndrome status and functional impairment), psychological morbidity and illness beliefs.

## METHOD

The group was drawn from patients recruited to a multicentre randomised trial comparing CBT with graded exercise for patients with chronic fatigue in primary care (Ridsdale *et al*, 2004). Inclusion criteria were age 16–75 years; fatigue as a main or important problem lasting for 3 months or more; and a score of at least 4 on the fatigue questionnaire – bimodal scoring (Chalder *et al*, 1993). Further inclusion and exclusion criteria are detailed in Ridsdale *et al*, 2004. Of the 123 patients included, 60 were randomised to graded exercise therapy and 63 to CBT. This report describes the 105 patients (85%) who remained in the study at the 8-month follow-up.

### Measures

Fatigue was measured with a Likert-scored scale (Chalder *et al*, 1993). Chronic fatigue syndrome status was determined using criteria defined by Fukuda *et al* (1994): fatigue with a definite onset, of a minimum duration of 6 months, with substantial functional impairment, and four or more additional symptoms from a list of eight. Additional measures included scores on the Hospital Anxiety and Depression scale (Zigmond & Snaith, 1983); degree of functional impairment scored on the Work and Social Adjustment Scale (WSAS; Marks, 1986); illness beliefs, including perceived negative consequences (Weinman *et al*, 1996); and illness attributions (physical/psychological) (Powell *et al*, 1990). For more information on the measures used, see Ridsdale *et al* (2004). Patients performed a step test at baseline assessment (stepping on to a bench for 1 min). Patients were also asked to report whether they had previously consulted a doctor for an emotional problem, had been referred to a psychiatrist, or were members of a myalgic encephalomyelitis (ME) support group. Information on prior psychological diagnoses and consultation frequency was extracted from general practice records.

### Analysis

Predictors of fatigue outcome were investigated using linear regression analysis. Univariate regression coefficients were calculated for each of the 15 independent variables (10 continuous, 4 binary and 1 categorical). The continuous variables are shown in Table 1. The binary variables were meeting criteria for chronic fatigue syndrome; past history of anxiety or depression; membership of an ME support group; and type of therapy. The categorical variable was duration of fatigue (five ordered categories). Independent variables reaching a significance level of $P \leqslant 0.05$ were entered into a multiple regression model. The results of the regression analyses are shown as the mean increase in final fatigue associated with having *v.* not having the exposure (binary variables) or with each additional scale point (continuous variables).

**Table 1** Initial scores on continuous predictor variables and their correlation with final fatigue

| Predictor variable | Baseline score Mean (s.d.) | Correlation | *P* |
|---|---|---|---|
| Initial fatigue score (range 0–33) | 25.17 (5.09) | 0.280 | 0.002 |
| Number of other symptoms (range 0–12) | 9.44 (1.99) | 0.191 | 0.026 |
| Functional impairment (WSAS) (range 0–32) | 19.28 (8.14) | 0.377 | <0.001 |
| Number of steps performed (range 10–50) | 26.87 (6.82) | −0.196 | 0.023 |
| Depression score (HAD) (range 0–21, score > 10 indicates depression) | 8.27 (3.61) | 0.265 | 0.003 |
| Anxiety score (HAD) (range 0–21, score > 10 indicates anxiety) | 10.50 (4.53) | 0.055 | 0.288 |
| Belief in a psychological cause of illness (range 1–5; 1 physical, 5 psychological) | 2.50 (1.00) | −0.147 | 0.068 |
| Perceived negative consequences (range 1–5; 1 fewer consequences, 5 more consequences) | 3.53 (0.67) | 0.326 | <0.001 |
| Perceived control over fatigue (range 1–5; 1 less control, 5 more control) | 3.56 (0.50) | −0.137 | 0.082 |
| Perception of exertion required to perform step test (range 6–20; 7 very very light, 19 very very hard) | 14.55 (2.64) | 0.061 | 0.268 |

HAD, Hospital Anxiety and Depression scale; WSAS, Work and Social Adjustment Scale.



https://doi.org/10.1192/bjp.186.4.350 Published online by Cambridge University Press

## RESULTS

The participants' scores are shown in Table 1. Thirty-one per cent ($n$=33) met chronic fatigue syndrome criteria, 5% ($n$=5) were members of an ME support group, and 60% ($n$=63) had a history of psychological diagnosis. The dependent variable, final fatigue score, was normally distributed (mean 15.03, skewness 0.137), with a significant improvement following therapy of 10.14 (s.d.=8.69) points (95% CI 8.46–11.82, skewness 0.209).

When entered in separate univariate regression analyses, seven of the variables were associated with a higher final fatigue score: greater initial fatigue (b=0.44; 95% CI 0.16–0.79); meeting chronic fatigue syndrome criteria (b=7.74; 95% CI 4.46–11.01); greater functional impairment (b=0.40; 95% CI 0.21–0.59); fewer steps performed (b=−0.25; 95% CI −0.49 to −0.01); higher depression score (b=0.63; 95% CI 0.18–1.08); greater perceived negative consequences (b=4.15; 95% CI 1.80–6.51); and membership of ME support group (b=8.79; 95% CI 1.12–16.46).

In a second model with these seven variables, only chronic fatigue syndrome status (b=4.50; s.e.=2.02; 95% CI 0.49–8.51) contributed significantly (model $R^2$=0.24, adjusted $R^2$=0.19, $F$=4.36; $P<0.001$). Following this, six bivariate analyses that each included chronic fatigue syndrome status and one of the other six variables showed that only functional impairment ($R^2$=0.22, adjusted $R^2$=0.20) and greater perceived negative consequences ($R^2$=0.21, adjusted $R^2$=0.19) added significantly to the model when entered alongside chronic fatigue syndrome status. When all three variables were entered simultaneously into the model, it was not enhanced by a greater degree than by adding functional impairment or greater perceived negative consequences alone ($R^2$=0.22, adjusted $R^2$=0.20).

## DISCUSSION

We expected to find that fatigue severity, illness beliefs, psychological state and physical fitness would affect outcome. In fact, chronic fatigue syndrome status, a known marker of fatigue severity, was the most robust predictor of final fatigue following therapy. Only three variables explained more than 10% of the variance in final fatigue when considered alone: baseline chronic fatigue syndrome status (18%), functional impairment (14%) and perceived negative consequences (11%). Relationships between recovery and each of these variables have been found previously for patients with fatigue in primary and secondary care (Bentall *et al*, 2002; Chalder *et al*, 2003). Membership of an ME support group might also be important and has been reported as being so in previous studies (Bentall *et al*, 2002), but the size of the subgroup in our study provided insufficient power to support a relationship.

The results suggest that, individually, functional impairment and greater perceived negative consequences add to the power of chronic fatigue syndrome status to predict final fatigue, but add no more power when combined. This is partly explained by the relatively high correlation observed between them, which at 0.690 is larger than that between any of the other variables (0.656 between functional impairment and baseline fatigue; 0.419 between chronic fatigue syndrome status and final fatigue). Chalder *et al* (2003) also found the latter two variables of predictive value, but did not find that chronic fatigue syndrome status was associated with a poor outcome. The data presented here are the first to suggest that meeting criteria for this syndrome is likely to predict a poor outcome following treatment in primary care.

Levels of fatigue can fluctuate considerably between visits; our study deals with the information that would be available to a GP at a single consultation. Any of the measures used in predicting fatigue could have been repeated at subsequent visits, and any predictive power would have been increased.

Patients with chronic fatigue syndrome are likely to have a poorer prognosis and may require a greater amount or a different type of therapy. In view of this, we believe that it will be useful for GPs to know and apply the criteria for the syndrome when they assess patients with fatigue in primary care. It should help them advise on prognosis and management.

LUCY DARBISHIRE, PhD, PAUL SEED, MSc, LEONE RIDSDALE, PhD, FRCP, Guy's, King's and St Thomas' School of Medicine, London, UK

Correspondence: Lucy Darbishire, Department of General Practice and Primary Care, Guy's, King's and St Thomas' School of Medicine, 5 Lambeth Walk, London, SE11 6SP, UK. E-mail: lucy.clark@kcl.ac.uk

(First received 11 November 2003, final revision 29 September 2004, accepted 5 October 2004)

## ACKNOWLEDGEMENTS

We thank the patients, GPs and their teams, therapists and many colleagues who provided feedback at different stages, including Professors Peter White and Roger Jones. The study was supported by a grant from the Linbury Trust.

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https://doi.org/10.1192/bjp.186.4.350 Published online by Cambridge University Press