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DOI:

[10.1080/08870440903225892](https://doi.org/10.1080/08870440903225892)

Document Version

Early version, also known as pre-print

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Citation for published version (APA):

Dittner, A. J., Rimes, K., & Thorpe, S. (2011). Negative perfectionism increases the risk of fatigue following a period of stress. *Psychology & health*, 26(3), 253 - 268. <https://doi.org/10.1080/08870440903225892>

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Negative perfectionism increases the risk of fatigue following a period of stress

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Pre-print version

Dittner, Antonia J., Rimes, Katharine and Thorpe, Susan (2011) 'Negative perfectionism increases the risk of fatigue following a period of stress', *Psychology & Health*, 26: 3, 253 — 268,

<http://dx.doi.org/10.1080/08870440903225892>

Abstract

Cognitive-behavioural models of excessive fatigue suggest that people who believe that failure to meet high standards indicates unacceptability to others (a form of 'negative perfectionism') are at risk of fatigue after a period of illness or stress. The present study investigates this using a prospective design and possible mediating factors between such beliefs and fatigue were also investigated.

Undergraduate students completed questionnaires at the beginning of the academic year (time 1; $n=436$) and again following a time of academic pressure, 16 weeks later (time 2; $n=206$). Participants were significantly more fatigued at time 2 than at time 1. Negative perfectionism was positively associated with all measures of fatigue and predicted subsequent levels of physical fatigue after controlling for time 1 fatigue. Time 1 negative perfectionism was not associated with time 2 perfectionist studying behaviours, distress about academic work or specific health behaviours, but was associated with time 2 depression. Results also indicated that time 2 depression may account for the relationship between baseline negative perfectionism and subsequent fatigue. This is the first prospective study to demonstrate a significant relationship between perfectionism and *subsequent* fatigue.

Keywords: cognitive-behavioural, chronic fatigue, depression, fatigue, perfectionism, chronic fatigue syndrome.

Introduction

Fatigue is common in the general population as well as in both primary and secondary care (David et al., 1990; Gallagher et al., 2004; Pawlikowska et al., 1994). If excessive fatigue is a persistent condition, associated with a number of other symptoms and is medically unexplained it may be labelled 'chronic fatigue' or 'chronic fatigue syndrome' (CFS). It has been suggested that both fatigue as a symptom and chronic fatigue syndrome often have multi-factorial aetiologies (Wessely et al., 1998). Although stress or infectious illnesses are thought to frequently precipitate fatigue, various predisposing factors have also been suggested.

A cognitive-behavioural model of CFS suggests that negative beliefs about consequences of not meeting high standards may be a vulnerability factor for developing persistent and severe fatigue in the context of increased stress and/or illness (Surawy et al., 1995). The beliefs proposed in the model resemble some items in existing measures developed to assess perfectionism. Retrospective reports from people with CFS suggest that pre-morbidly they were very active and high-achieving (Van Houdenhove et al., 1995; Van Houdenhove et al., 2001). Still, results of studies investigating the relationship between scores on measures of perfectionism and fatigue have varied; while some have found a relationship (Magnusson et al., 1996; Saboonchi & Lundh, 2003; White & Schweitzer, 2000), others have not (Arpin-Cribbie & Cribbie, 2007; Blenkiron et al., 1999; Luyten et al., 2006; Wood & Wessely, 1999). A recent review of personality and CFS (van Geelen et al., 2007) concluded that there was inconsistent evidence for the role of factors such as perfectionism in the development of CFS.

One possible reason for the apparent inconsistency may be the mix of retrospective and cross-sectional methodologies. Once people have developed CFS, they may be forced to modify their standards since the fatigue prevents them from achieving previous levels of performance. Another reason may be the variability in the assessment of perfectionism.

There is a debate in the research literature as to the nature of the perfectionism construct. For example, distinctions have been made between socially-prescribed perfectionism (i.e. the perception that others have unrealistically high standards for the individual and exert pressure on them to be perfect) and self-oriented perfectionism (Hewitt and Flett, 1991). Some investigators have maintained that the construct of perfectionism is multidimensional and has both positive and negative components (Hewitt and Flett 1991, Frost et al 1990) while others have held that it is unidimensional and that some of the multidimensional perfectionism subscales assess not perfectionism but related constructs (e.g. see Shafran 2002, Dunkley et al. 2006).

Factor analytic studies of the Hewitt and Flett and the Frost multidimensional perfectionism scales have consistently revealed two factors in both college student and clinical populations. While one factor involves the setting of goals for oneself, the other reflects concerns about negative evaluation. Striving to meet high standards has been found to be associated with positive outcomes such as high self-esteem and conscientiousness (Campbell & Di Paula, 2002; Enns et al., 2002; Stumpf & Parker, 2000). Concerns about negative evaluation, on the other hand, are consistently associated with depression, anxiety and low self-esteem (Antony et al., 1998; Campbell & Di Paula, 2002; Dunkley & Blankstein, 2000; Enns & Cox, 1999).

Links between perfectionism and fatigue have been found more consistently where this distinction between 'positive' and 'negative' perfectionism has been made. For example, Magnusson et al. (1996) found that negative perfectionism (as measured by the "unhealthy" dimension of the Frost Multidimensional Perfectionism Scale) was associated with higher levels of state and trait mental fatigue in female nurses while positive perfectionism was, in some cases, negatively correlated with fatigue.

Perfectionism could lead to increased fatigue via various mechanisms. Behavioural and cognitive coping responses associated with perfectionism, such as working longer hours or being preoccupied with the standards of one's performance (Bieling et al., 2003; Frost et al., 1990), may lead to fatigue. If the person feels they are not meeting their standards, this may result in stress or depression, both of which have a well-established relationship with fatigue (American Psychiatric Association, 1994; Chen, 1986; Hewitt & Flett, 1993; Iversen & Wessely, 2003; Pawlikowska et al., 1994). Stress and depression are also implicated in other maladaptive health behaviours e.g. over- or under-eating, excess alcohol and drug use (Mueller et al., 1995) and fewer adaptive behaviours such as exercise (Hayes & Ross, 1986) which can in turn also lead to increased fatigue (Tench et al., 2000).

So, in support of the cognitive-behavioural model of chronic fatigue, there is some evidence to suggest that a relationship between perfectionism and fatigue may exist. This relationship could be clarified by a prospective study investigating: firstly the specific prediction made by the cognitive-behavioural model that negative perfectionist beliefs predispose people to develop fatigue after a period of stress or

illness; and secondly, the possible mechanisms involved in the association between perfectionism and fatigue. The current study aims to do this by investigating whether negative perfectionist beliefs (in particular beliefs that one's acceptability to others is contingent on the attainment of high standards) serve as a vulnerability factor for the development of fatigue in the context of increased stress.

There are practical difficulties in conducting prospective studies investigating the onset of CFS, for example the large numbers of healthy participants necessary to ensure an adequate number (in statistical terms) who subsequently develop condition. However, there is evidence that fatigue is continuously distributed in the population (e.g. Pawlikowska et al., 1994) and therefore some of the factors contributing to CFS may also be expected to operate in fatigue at the less severe part of the spectrum (Lewis & Wessely, 1992). This suggests that it should be possible to test aspects of the cognitive-behavioural model by investigating processes influencing fatigue in people who do not meet criteria for chronic fatigue syndrome. Previous research such as Magnusson et al.'s 1996 cross-sectional study of perfectionism and fatigue in nurses supports the suggestion that cognitive-behavioural models of fatigue may be helpful in understanding fatigue in non-clinical populations.

The main hypothesis for the study therefore was that stress activates negative perfectionist beliefs which then contribute to the development of fatigue. This hypothesis is operationalised in the present study by examining students under conditions of first low and then high academic pressure (the first formal academic evaluation, either an exam or coursework). It was hypothesised that the 'high academic pressure' condition activates beliefs as to the importance of academic

achievement and students with higher levels of such beliefs would be more vulnerable to experiencing subsequent fatigue than students without such characteristics. A further hypothesis was that the expected association between negative perfectionism and subsequent fatigue would be mediated by maladaptive behaviours – in this case unhelpful academic behaviours, distress and changes in health behaviours. In line with previous research (Magnusson et al., 1996) it was not expected that measures of positive perfectionism would be significantly positively correlated with fatigue.

Method

Participants

Participants were first-year undergraduate students at the Psychology Department in a London University (n=200) and in a school of Biomedical Sciences at another London University (n=401). Four hundred and thirty-six undergraduates returned the questionnaire at time 1 (response rate of 73%). Of those 206 also returned the questionnaire at time 2 (response rate of 47% of time 1 sample).

The total sample at time 1 consisted of 308 women and 128 men and the mean age was 20.4 years (sd=5.3). Forty-two percent of the sample described their ethnic background as white/white British (n=182), 27% Asian/Asian British (n=116), 13% black/black British (n=58) and 18% as mixed/other (n=79).

Those who returned the questionnaires at time 1 only were significantly more likely than those who returned them at both time points to be experiencing a current psychological problem ($\chi^2(1)= 4.7, p<0.05$), and scored higher on measures of both

mental and physical fatigue ($t(434)=2.2, p<0.05$; $t(434)=2.4, p<0.05$) as well as on the Conditional Acceptance (negative perfectionism) scale ($t(428)=2.1, p<0.05$). There were no significant differences on any demographic variables.

Measures

Visual analogue fatigue scales

Visual analogue scales, adapted from a previous study investigating fatigue in a non-clinical population (Magnusson et al., 1996) were used to assess mental and physical fatigue over the past week. The scales were scored from 0 (“not at all tired”) to 100 (“total exhaustion”).

Chalder Fatigue Scale

The *Chalder Fatigue Scale* (Chalder et al., 1993) consists of 11 items measuring fatigue-related symptoms over the last month. It can be scored both on a four-point Likert scale and on a bimodal scale (0 or 1); a higher score indicates greater fatigue. The cut-off for ‘excessive’ or ‘substantial’ fatigue is a score of 4 or higher when using the bimodal scoring method. (Chalder et al., 1993).

Perfectionistic self-beliefs scales

A previous factor analysis of Hewitt and Flett’s Multidimensional Perfectionism Scale (Hewitt & Flett, 1991) indicated four factors (Campbell & Di Paula, 2002): Conditional Acceptance, Others’ high standards (from the Socially Prescribed dimension of Hewitt and Flett’s scale), Perfectionist Striving and Importance of being perfect (from the Self-Oriented dimension of Hewitt and Flett’s scale). High scores on the Conditional Acceptance subscale were found to be associated with lower

academic performance, less effective pursuit of goals, increased psychological distress and low self-esteem (Campbell & DiPaula, 2002). Perfectionist Striving was associated with mainly positive outcomes including higher self-esteem, goal stability and conscientiousness, and lower levels of depression and anxiety. The items on the Conditional Acceptance subscale (e.g. “people around me think I am still competent even if I make a mistake”; reverse-scored) resemble the conditional beliefs proposed by Surawy et al. (1995) as vulnerability factors to CFS. Therefore this subscale was chosen as a measure of negative perfectionism in the current study, as the main aim was to investigate the role of such conditional beliefs in the development of CFS. As a comparison, the Perfectionist Striving subscale was included as a measure of positive perfectionism. The scales have good internal consistency (Conditional Acceptance $\alpha = 0.71$, Perfectionist Striving $\alpha = 0.75$ (Campbell & Di Paula, 2002).

Centre for Epidemiological Studies–Depression Scale (CES-D)

The scale consists of 20 items scored on a four-point Likert scale from 0 (“rarely or none of the time”) to 3 (“most or all of the time”). The CES–D has high reliability and validity to detect depressive symptoms across a wide range of populations (Radloff LS, 1977).

Perfectionist Studying Behaviours Questionnaire (PSBQ)

The Perfectionist Studying Behaviours Questionnaire (PSBQ) was designed specifically for this study. The scale contains 30 items, rated on a four-point Likert scale. The respondent rates the frequency of various behaviours over the past month in relation to methods of working or coping with the work (e.g. ‘I checked my work for mistakes more than once’).

Items were generated by researching the literature for theories of perfectionism, associated unhelpful thoughts and behaviours (Alden et al., 1994; Brown et al., 1999; Campbell & Di Paula, 2002; Frost & Marten, 1990; Hewitt & Flett, 1991) and reports of clinical observations of behaviours related to perfectionism (Shafran et al., 2004).

The questionnaire was sent at time 2. It was completed by 206 people who had also participated at time 1, as well as a further 108 who had not, giving a total sample of 314. Factor analysis revealed six factors: Care and effort (eight items), Rumination about work standards (six items), Emotional suppression (three items), Time/balance (four items), Work support (two items) and Perseverance and procrastination (three items). The factors accounted for 51% of the variance with eigenvalues of 6.28, 3.02, 1.88, 1.55, 1.40 and 1.36 respectively. The full scale was found to have adequate internal consistency ($\alpha = 0.69$). Care and Effort and Rumination about work standards had good internal consistency ($\alpha = .86$ and $\alpha = .78$ respectively) however values for the other subscales were in the borderline or low range (Emotional Suppression $\alpha = .58$, Time/balance $\alpha = .45$, Work support $\alpha = .55$, Perseverance and Procrastination $\alpha = .17$). Each of the six factors were associated with at least one measure of perfectionism in cross-sectional analyses (r s range from -0.29 to 0.51, all p s < 0.05; Dittner, 2006). In an earlier pilot study the scale was administered to 25 students and found to have good test-retest reliability over a two-week period ($r = 0.81$, $p < 0.001$).

Feelings about Studying Questionnaire

The Feelings about Studying Questionnaire, also developed for the study, consists of seven items relating to emotional distress in response to workload. The items were generated following a review of the literature regarding emotional responses in people

with perfectionism (Blatt, 1995; Fedewa et al., 2005; Hewitt & Flett, 1991). An example is 'I felt ashamed when my work didn't reach the standards I was aiming for'. Response choices range from 0=never to 3=almost always. This scale was also sent to the whole sample at time 2 (n=314) and found to have high internal consistency (Cronbach's Alpha = 0.86).

Health behaviours relating to fatigue

Nine questions relating to physiological or health-related changes that have an established relationship with fatigue were generated after a review of the literature. These related to 'the last month' and included items such as 'I slept less than usual' and 'I exercised more than usual'. Response choices range from 0 ("never") to 3 ("almost always"). In addition, participants were asked how many hours per week they engaged in moderate physical exercise, the number of days they missed at university as a result of illness and the number of hours per week they spent on university work, all over the past month.

Perceived Stress Scale

The Perceived Stress Scale assesses the degree to which respondents appraise situations in their lives over the past month as unpredictable, uncontrollable, and overloading. Responses range from 0 ("never") to 4 ("very often"). The scale is well validated (Cohen, 1983).

Demographic and health information questions

A questionnaire containing items relating to age, sex, marital status, ethnicity, past and current mental and physical health was administered. On the basis of judgment by an independent physician, medical conditions reported by the participants were

categorized as either likely or not likely to cause fatigue. Examples of conditions rated as likely to cause fatigue were anaemia and thyroid disorders, and conditions judged unlikely to cause fatigue included psoriasis and shoulder injury.

Procedure

Participants were asked to complete a pack of questionnaires at two time points:

Time 1: the end of their first week at university.

Time 2: the week after a time of increased academic pressure (first exams or course assessment), 16 weeks into their first year.

At time 1 the following questionnaires were given: Demographic and health information questions; Visual analogue fatigue scales; Perfectionistic self-belief scales; Center for Epidemiological Studies - Depression scale

At time 2 the same questionnaires were given, and in addition: Perfectionist Studying Behaviours Questionnaire; Feelings about Studying Questionnaire; Health behaviours questions; Perceived Stress Scale

Informed consent was obtained prior to questionnaire completion. The study was approved by the Research Ethics Committees at each institution.

Statistical analyses

Preliminary Pearson's correlation analyses were performed. Fisher's r - z transformation was used to convert correlation coefficients to z scores and the

significances of the differences between the z's for the two sites were tested. No significant differences were found, indicating that analyses could be carried out on the combined data set (Kendall & Stuart A, 1979). Hochberg's improved Bonferroni method was used to correct for multiple comparisons where necessary.

Group characteristics were compared using chi square analyses for dichotomous variables and independent samples t-tests for continuous variables. Associations between variables were investigated using Pearson's correlations and paired samples t-tests were used to investigate change over time.

Hierarchical multiple linear regression analyses were used to investigate whether measures of perfectionism at time 1 were significantly associated with fatigue at time 2, after controlling for time 1 fatigue. The relevant time 1 fatigue variable was entered in step 1 and time 1 negative perfectionism was entered as step 2. To investigate whether additional variance in time 2 fatigue was accounted for by other time 1 variables, regression analyses were carried out with time 1 fatigue as step 1 and other time 2 variables entered stepwise in step 2.

Possible mediating factors in the relationship between time 1 negative perfectionism and subsequent fatigue were investigated using the steps outlined by Baron and Kenny (Baron & Kenny, 1986). The steps require that a) the independent variable (negative perfectionism) should be associated with the dependent variable (time 2 fatigue), b) the independent variable should be associated with the mediator, c) the mediator should significantly affect the dependent variable and d) to establish that the mediator completely mediates the relationship between the independent and

dependent variables, when controlling for the effect of the mediator variable, there should be no significant effect of the independent variable on the dependent variable. The steps were investigated using hierarchical multiple linear regression analyses. In order to test steps c and d, a multiple regression analysis was performed with time 2 fatigue as the dependent variable. Time 1 fatigue was entered in step 1, possible mediators (variables associated with negative perfectionism in stage b) were entered in step 2 and negative perfectionism was entered in step 3. A post-hoc Sobel test was carried out to test for the significance of mediation.

The level of significance was set at $p < 0.05$. The data was analysed using SPSS for Windows version 13.0.

Results

Fatigue, depression, stress and negative perfectionism at times 1 and 2

Paired samples *t*-tests indicated statistically significant increases in both fatigue and depression between time 1 and time 2 (see table 1). At time 1, 16.4% ($n=35$) scored above the cut-off for moderate depression on the CES-D. At time 2, 24.9% ($n=53$) scored above the cut-off for moderate depression. The equivalent percentages for those scoring above cut-off for 'excessive' fatigue on the Chalder Fatigue Scale (≥ 4) were 37.6% ($n=80$) at time 1 and 49.3% ($n=105$) at time 2. Results also indicated that Conditional Acceptance scores were significantly higher at time 2 than at time 1 (see Table 1).

Table 1 about here

Perceived stress was only measured at time 2. The mean score on the Perceived Stress Scale was 28.4 (sd = 6.9). Mean scores on the CPSS in a previous validation study for two first year undergraduate samples (Cohen 1983) were 23.18 (sd = 7.31) and 23.67 (sd = 7.79). In the validation study specific stressors were not reported.

The association between negative perfectionism and fatigue

Time 1 Conditional Acceptance was significantly correlated with time 1 mental fatigue ($r=0.16, p<0.01$), physical fatigue ($r=0.12, p<0.05$) and Chalder Fatigue Scale ($r=0.15, p<0.01$). Time 2 Conditional Acceptance was also significantly correlated with time 2 mental fatigue ($r=0.17, p<0.05$), physical fatigue ($r=0.25, p<0.01$) and Chalder Fatigue Scale ($r=0.19, p<0.01$).

The association between positive perfectionism and fatigue

For positive perfectionism, the only statistically significant association was a significant *negative* correlation between the Chalder Fatigue Scale and Perfectionist Striving ($r=-0.13, p<0.01$).

The association between fatigue at time 2 and baseline negative perfectionism

Negative perfectionism predicted 2% of the variance in physical fatigue at time 2 over and above the 13% predicted by physical fatigue at time 1 ($F_{(2,203)}=18.3, p<0.001$). Please see Table 2, regression 1. Baseline negative perfectionism did not significantly predict any of the other time 2 fatigue measures once the corresponding variable at time 1 had been entered into the regression equation. Supplementary exploratory stepwise multiple regression analyses carried out to investigate the relationship between demographic, mental and physical health variables (age, gender, marital

status, ethnicity, depression (CES-D score), past visit to the GP because of fatigue, current psychological problem, or a current medical condition likely to cause fatigue) and fatigue did not indicate any other significant time 1 predictors of time 2 physical fatigue, after controlling for time 1 fatigue. The regressions investigating the relationship between baseline negative perfectionism and fatigue were repeated controlling for gender and this did not alter the pattern of results.

Table 2 about here

Possible mediating factors in the relationship between negative perfectionism and subsequent fatigue

Regression analyses were carried out to investigate whether there was an association between time 1 negative perfectionism and variables hypothesised to mediate the relationship between negative perfectionism and fatigue: 1) stress (score on Perceived Stress Scale) and depression (time 2 CES-D score), 2) unhelpful academic behaviours, assessed by subscales of the PSBQ, 3) total score on the feelings about studying questionnaire and 4) individual health behaviours. The only significant association found was between time 1 negative perfectionism and time 2 depression ($F_{(1,204)}=9.4, p<0.01$). Please see Table 2, regression 2.

Because depression was the only variable significantly associated with baseline negative perfectionism, this was the only variable included in the regression analysis to test for mediation. Physical fatigue was the dependent variable since this was the measure that was found to be significantly predicted by time 1 negative perfectionism. Results indicated that time 2 depression was significantly associated with time 2 physical fatigue even when time 1 physical fatigue was entered first into the analysis

($F_{(3,202)}=22.60$, $p<0.001$). Negative perfectionism did not account for a significant amount of the variance in physical fatigue scores beyond those variables ($p=0.018$). This suggests depression is mediating the relationship between negative perfectionism and subsequent physical fatigue. Significant predictors are shown in Table 2, regression 3. A post-hoc Sobel test indicated that the indirect effect of negative perfectionism on subsequent fatigue through time 2 depression was statistically significant ($z=2.74$; $p<0.01$). Please see table 3 for correlations between variables.

Table 3 about here

Discussion

The main hypothesis, that negative perfectionism at the beginning of a university term would be significantly associated with subsequent fatigue, was met. One of the proposed variables, depression, was found to be a mediating factor in this relationship; other proposed variables such as academic behaviours, distress about work or health behaviours, were not.

This study found that negative perfectionism predicted subsequent physical fatigue levels in a prospective analysis even when controlling for time 1 fatigue. As far as the authors are aware, this is the first prospective study to demonstrate a significant relationship between perfectionism and *subsequent* fatigue. It is unclear why a similar relationship was not found for mental fatigue, since negative perfectionism was significantly associated with mental fatigue in the cross-sectional analyses.

Further analyses indicated that depression was a probable mediator in the relationship between negative perfectionism and subsequent fatigue. This is consistent with

previous research that has found a robust association between negative perfectionism and depression (Hewitt & Flett, 1993) as well as previous evidence that psychological distress is associated with increased fatigue (Pawlikowska et al., 1994). Arpin-Cribbie and Cribbie found that in undergraduate students, fatigue was significantly correlated with depression while perfectionism was correlated only with emotional distress and cognitive difficulties (Arpin-Cribbie & Cribbie, 2007). The current findings are consistent with recent evidence that 'emotional instability' or negative affectivity was a significant predictor of the development of fatigue 25 years later (Kato et al., 2006).

It had also been expected that negative perfectionism would predispose individuals to carry out more perfectionist behaviours aimed at ensuring that their performance was acceptable to others (e.g. increased rumination about performance), to become more distressed about their work or to make unhelpful changes in their health behaviours. Cross-sectional analyses carried out to validate the Perfectionist Studying Behaviours Questionnaire indicated that negative perfectionism was indeed associated with such behaviours (Dittner, 2006). It had been predicted that these perfectionist behaviours would act as additional mediators in the relationship between time 1 perfectionism and subsequent fatigue. Results of prospective analyses, however, indicated that negative perfectionism at the beginning of the course was associated with only depression and not these other factors when assessed four months later, so the requirements for mediation were not met for these factors.

Perfectionist Striving, an aspect of perfectionism previously found to be associated with more positive outcomes, was negatively associated with one of the measures of fatigue in cross-sectional analysis. These findings are consistent with the Magnusson

study, which found inverse associations between measures of positive perfectionism and fatigue, although in that study none of the associations reached statistical significance (Magnusson et al., 1996). Together the findings suggest that positive perfectionism is either not associated with fatigue or may be a protective factor against fatigue.

While negative perfectionism does predict subsequent fatigue, it accounts for only a further 2% of the variance over time 1 physical fatigue. This is consistent with previous research which suggests there are multiple factors involved in the development of fatigue (Wessely et al., 1998). Furthermore, since responses can change over time, associations will clearly be stronger between measures given on the same day than the same measures given several months apart. Consistent with this, negative perfectionism scores significantly increased over time and the strength of the association between negative perfectionism and fatigue was higher when the two factors were measured concurrently.

It may be that students' beliefs change over time but another possibility is that, in line with cognitive-behavioural models, negative perfectionistic beliefs, already present but latent become 'activated' by particular stressful events such as academic evaluation. If this is the case, then if it were possible to assess underlying beliefs more effectively at time 1, the association between negative perfectionism and subsequent fatigue would be expected to be stronger. Previous research in depression has found that scores on the Dysfunctional Attitudes Scale (Weissman & Beck, 1978) in formerly depressed patients are more predictive of relapse if the scale is administered after induced low mood (Segal et al., 1999). Similar mood-induction techniques (either sad

music to induce low-mood or an evaluated task to activate beliefs regarding evaluation by others) could be used in a prospective study to investigate whether negative perfectionistic beliefs are more predictive of subsequent fatigue when activated at baseline.

Implications for interventions

The results suggest that attempts to identify students vulnerable to subsequent fatigue using these measures of negative perfectionism are unlikely to be successful, since negative perfectionism at the beginning of term predicted only a small amount of the variance in fatigue four months later, over and above time 1 physical fatigue. However, high rates of depression were found in this population and depression was also found to mediate the relationship between negative perfectionism and subsequent fatigue. This suggests that it may be of benefit to have some routine means of identifying excessive distress promptly so that the student can be directed towards sources of help such as student counselling or resources within the National Health Service. It may also be of benefit to provide information about strategies that promote mental and physical health, stress management, and even specific cognitive-behavioural techniques such as identifying and modifying negative thoughts and thinking patterns.

The findings are consistent with the cognitive-behavioural approach to fatigue and CFS. The findings also suggest that it is the *distress* associated with the negative perfectionism (rather than the associated behaviours) that was the most important factor in the relationship between perfectionism and fatigue in this student sample.

This suggests that important components of interventions should be enabling the individual to cope differently with distress and low mood as well as addressing underlying unhelpful beliefs, such as those relating to high standards, which may have made the individual vulnerable to developing fatigue.

Limitations of the study

All of the measures were self-report, which rely on the individual's knowledge and insight into their beliefs and behaviours and the choice to report such information. New questionnaires had to be devised to assess perfectionistic studying behaviours and feelings about studying, and one of the subscales of the former questionnaire had low internal consistency. In addition, objective measures of academic performances, physical fitness and weight could have been used. The health questions asked about changes from usual behaviour rather than the behaviours themselves (i.e. amount of sleep per night) because it was of interest to see how negative perfectionism predicted behaviour *change* at times of academic stress. However, additional questions focusing on the degree of the behaviour in question rather than changes may have helped to predict further variance in fatigue. Another limitation is that although there is anecdotal evidence that undergraduates report increased stress at the time of their first exams or coursework, as the Perceived Stress Scale was only given at the second time-point it cannot be confirmed that stress levels were actually higher at time 2.

Furthermore, the current study was carried out in a non-clinical sample, and while the cognitive-behavioural model assumes fatigue is on a continuum and that the some of the same contributory factors may operate at different levels of fatigue, caution is

necessary in extrapolating the results to the development of CFS. Individuals with chronic fatigue syndrome experience a variety of other symptoms in addition to fatigue (such as muscle and joint pain, tender lymph nodes), and it is also important not to ignore the potential role of many other factors (e.g. sleep disturbance) in the development of fatigue.

Finally, some people completed questionnaires at time 1 only or time 2 only. The response rate at time 2 from those who had participated at time 1 was 47%. This is consistent with response rates of 48% in other perfectionism questionnaire studies in students and other groups (Henning et al., 1998; Magnusson et al., 1996) even though these other studies only involved one time-point. From results concerning the characteristics of the people who returned the questionnaires at time 1 only, it seems likely that, if anything, this has led to an underestimation of levels of fatigue and depression in this population. However, there were also students who did not reply at either time point and there is no information available as to the characteristics of these groups or whether they may have contributed differently.

Conclusion

This is the first study known to the authors that investigates the role of negative perfectionism in the development of fatigue using a prospective design. In line with the cognitive-behavioural model of CFS, negative perfectionism was found to be associated with subsequent levels of fatigue at a time of stress, even when controlling for time 1 fatigue. Results indicated that depression was a probable mediator in the relationship between negative perfectionism and subsequent fatigue. Health

professionals helping to treat individuals with fatigue should assess for depression and perfectionist beliefs and provide interventions for these issues where appropriate.

Acknowledgments

We would like to thank the students and staff at King's College London and the University of Greenwich who helped with this research, and also Professor Richard Brown. This paper is based on Antonia Dittner's dissertation submitted in partial fulfilment of her Doctorate in Clinical Psychology. Katharine Rimes acknowledges financial support from the Department of Health via the National Institute for Health Research (NIHR) Specialist Biomedical Research Centre for Mental Health award to South London and Maudsley NHS Foundation Trust (SLaM) and the Institute of Psychiatry at King's College London.

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Table 1. Fatigue, depression and negative perfectionism at time 1 and time 2

	Time 1		Time 2		Results of paired t-test
	Mean	(SD)	Mean	(SD)	
n=209					
Physical fatigue	47.0	(23.3)	53.7	(23.9)	t(208) = -3.7***
Mental fatigue	42.0	(25.5)	56.1	(26.1)	t(208) = -7.1***
Chalder Fatigue Scale, bimodal scoring ^a	3.0	(2.9)	4.0	(3.1)	t(208) = -3.9***
Depression (CES-D) ^b	15.8	(10.4)	19.3	(10.7)	t(206) = -4.9***
Negative Perfectionism (Conditional Acceptance)	14.3	(4.7)	15.7	(4.7)	t(205) = -4.8***

*** corrected value using Bonferroni-Hochberg corrections p <0.001

** corrected value using Bonferroni-Hochberg corrections p <0.01

^a a score of 4 or more using bimodal scoring indicates 'excessive' fatigue (28)

^b mild depression is indicated by a score of 16 or more; moderate to severe depression is indicated by a score of 27 or more

Table 2: Series of multiple linear regressions investigating the relationship between time 1 negative perfectionism and time 2 fatigue, and time 2 depression as a possible mediator.

Variables in the regressions	Change in R ² adj	B	SE B	β
Regression 1 negative perfectionism (IV) on time 2 physical fatigue (DV), controlling for time 1 physical fatigue				
1. Physical fatigue T1	0.13	0.36	0.07	.35***
2. Negative perfectionism T1	0.02	0.71	0.326	.14*
Regression 2 negative perfectionism (IV) on time 2 depression (MV)				
1. Negative Perfectionism T1	0.04	0.49	0.16	0.002**
Regression 3 negative perfectionism (IV) and depression (MV) on time 2 fatigue (DV), also controlling for time 1 physical fatigue				
Step 1. Physical fatigue T1	0.16	0.32	0.07	.31***
Step 2. Depression (CES-D) T2	0.08	0.64	0.14	.29***
Step 3. Negative perfectionism T1	0.01	0.42	0.31	.08

* p<0.05, ** p< 0.01, *** p<0.001

Table 3: Correlations between time 1 negative perfectionism, time 1 depression, time 1 physical fatigue, time 2 depression, time 2 fatigue, time 2 studying behaviours, time 2 feelings about studying and time 2 health behaviours. N=206

Correlation coefficients r	1. Negative Perfectionism T1	2. Physical fatigue T1	3. Depression (CES-D) T1	4. Cohen Perceived Stress Scale	5. Negative Perfectionism T2	6. Physical fatigue T2	7. Depression (CES-D) T2	8. PSBQ Care and effort	9. PSBQ Rumination about work standards	10. PSBQ Emotional suppression	11. PSBQ Time/ balance	12. PSBQ Work support	13. PSBQ Perseverance and Procrastination
1. Negative Perfectionism T1													
2. Physical fatigue T1	.07												
3. Depression (CES-D) T1	.31**	.35**											
4. Cohen Perceived Stress Scale	.11	.19**	.42**										
5. Negative Perfectionism T2	.60**	.11	.25**										
6. Physical fatigue T2	.17*	.40**	.20**	.36**	.26**								
7. Depression (CES-D) T2	.21*	.26**	.53**	.75**	.36**	.39**							
8. PSBQ Care and effort	.10	-.14	.09	.10	-.01	.01	.02						
9. PSBQ Rumination about work standards	.10	.13	.22**	.47*	.20**	.42**	.17*	.31**					
10. PSBQ Emotional suppression	.07	.13	.14	.26**	.30**	.34**	.20*	-.23**	.22*				
11. PSBQ Time/balance	-.10	-.10	-.14*	-.29**	-.24**	-.29**	-.21**	-.38**	-.29**	-.11			
12. PSBQ Work support	.01	-.04	.08	-.04	-.17*	-.14*	.05	.25**	.12	-.25**	-.06		
13. PSBQ Perseverance and Procrastination	.06	.14*	.23**	.16*	.12	.27**	.19**	-.10	.32**	.24**	-.09	-.01	
14. Negative Feelings about studying	.12	.18*	.34**	.54**	.28**	.54**	.25**	.21**	.71**	.24**	-.36**	-.01	.38**

* $p < 0.05$, ** $p < 0.01$