

**Direct and indirect relationships between emotional intelligence  
and subjective fatigue in university students**

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Running title: Relationship between fatigue and emotional intelligence

## **Abstract**

**Objective:** The aim of this study was to examine the direct and indirect relationships between emotional intelligence and subjective fatigue. **Methods:** One hundred and sixty seven university students completed questionnaires assessing subjective fatigue, emotional intelligence and a range of other psychosocial factors. A series of regression analyses were used to examine the direct and indirect relationships between subjective fatigue and psychosocial factors. **Results:** Higher emotional intelligence was associated with less fatigue. The psychosocial variables depression, anxiety, optimism, internal health locus of control, amount of social support and satisfaction with social support each partially mediated between emotional intelligence and fatigue. Additionally, sleep quality partially mediated between emotional intelligence and fatigue. **Conclusion:** These findings regarding the association between subjective fatigue and emotional intelligence and other psychosocial factors may facilitate an understanding of the aetiology of fatigue and contribute to future research examining interventions aimed at helping individuals cope with fatigue.

**Keywords:** emotional intelligence, fatigue, psychosocial factors

## INTRODUCTION

Fatigue is defined as a pervasive sense of tiredness or lack of energy that is not related exclusively to exertion. Fatigue syndromes lie along a continuum of severity from transient and mild states to more severe and prolonged fatigue disorders.<sup>1</sup> Prolonged fatigue states are characterized by disabling fatigue of more than 1-month duration in association with non-restorative sleep, headaches and other musculoskeletal and neuropsychiatric symptoms.<sup>2</sup> Prolonged fatigue is reported by as many as 10-25% of patients attending primary care,<sup>3-7</sup> making it one of the commonest symptoms in medical practice. Without treatment, the prognosis of patients with idiopathic fatigue is surprisingly poor; half of those seen in general practice with fatigue are still fatigued 6-months later.<sup>8</sup>

Fatigue often has a physiological basis; for example, it may be caused by a viral infection<sup>9-12</sup> or medical illness. Previous research indicates that psychosocial factors may interact with these physical factors to determine how an individual will ultimately experience fatigue. Thus, psychosocial factors are thought to be important risk factors for the development of persistent fatigue.

Behavioural, cognitive and affective factors are known to perpetuate fatigue.<sup>13,14</sup> For example, concurrent psychological disorder (e.g. depression) is commonly associated with prolonged fatigue,<sup>15,16</sup> and longitudinal studies show that fatigue is a common sequelae of depressive disorders.<sup>17</sup> Moreover, those who suffer from emotional stress and anxiety are much more likely to feel fatigued than those who are free from psychological symptoms.<sup>15,18</sup> However, other researchers have found no influence of anxiety, depression or general emotional distress on chronic fatigue outcomes.<sup>19</sup>

Little is known about the relationship of other psychosocial factors to fatigue. Self-efficacy has predicted chronic fatigue syndrome (CFS) symptoms,<sup>20</sup> as has a low internal locus of control,<sup>19</sup> and optimism is associated with a lower illness burden in CFS patients.<sup>21</sup> Less social support also appears to be associated with fatigue, although the findings are not wholly consistent. For example, fatigue and persistence of fatigue are associated with a lack of social support,<sup>22,23</sup> and a lower illness burden in CFS patients is related to high levels of social support,<sup>21</sup> as is fatigue improvement.<sup>24</sup> However, Buchwald, Rea, Katon et al.<sup>25</sup> found that self-assessed failure to recover from acute mononucleosis (a common cause of fatigue) by 6-months was associated with greater family support.

Emotional intelligence consists of the adaptive perception of emotion, use of emotion to facilitate decision-making, understanding of emotion, and regulating of emotion.<sup>26</sup> It is a hierarchical concept in that the processes comprising emotional intelligence are inter-related and combine to create an overall level of adaptive emotional functioning.<sup>26,27</sup> There has been debate over whether emotional intelligence should be conceptualized as a latent ability that is best assessed through performance measures or as typical performance assessed through self-report individual difference measures.<sup>28</sup> Research evidence suggests that emotional intelligence is a latent ability<sup>27</sup> as well as a manifested trait<sup>29</sup> and can be successfully assessed through both of these measurement approaches.<sup>27, 30, 31</sup>

The aggregate of adaptive emotional characteristics that comprise emotional intelligence may be a platform for the development of other positive psychosocial characteristics. Various empirical studies have found that higher emotional intelligence is related to positive intra-personal qualities such as greater general psychological well-being,<sup>30</sup> greater optimism,<sup>31</sup> more positive mood,<sup>29</sup> and less depressed mood.<sup>31</sup> Other empirical studies have found that higher

emotional intelligence is related to positive interpersonal qualities such as greater empathy<sup>32</sup> and greater relationship satisfaction.<sup>32,33</sup> The relationship between emotional intelligence and fatigue, however, has not previously been evaluated.

Life-history and lifestyle factors both appear to be associated with fatigue; for example, a number of authors have examined the relationship between abuse history and chronic fatigue. Childhood sexual abuse is significantly more likely to be related to symptoms in chronic fatigue patients compared to healthy controls,<sup>34</sup> and CFS and fibromyalgia patients show a higher prevalence of emotional neglect/abuse and physical abuse, compared to chronic disease patients and healthy controls.<sup>35</sup> Chronic fatigue outcomes are also significantly predicted by childhood sexual abuse and the total number of different childhood abuse events.<sup>36</sup>

Sleep and exercise abnormalities are also associated with persistent fatigue. For example, disturbed sleep strongly predicts fatigue in healthy workers.<sup>37</sup> CFS twins report more subjective sleepiness but similar mean sleep latencies compared to healthy co-twins.<sup>38</sup> Sleep disturbances are also commonly associated with depressed mood, and depressed mood is frequently co-morbid with fatigue symptoms.<sup>39</sup> In addition, reduced exercise tolerance and elevated ratings of perceived exertion are shown in CFS patients,<sup>40,41</sup> and lower exercise levels in childhood are associated with a greater risk of later CFS/myalgic encephalomyelitis.<sup>42</sup>

The purpose of the present study was to examine the role of emotional intelligence in fatigue. Emotional intelligence may be conceptualized as a basic function that influences a variety of other emotional and social characteristics. Several of these other characteristics in turn, have in previous research been found to be associated with fatigue. The present research set out to examine the following hypotheses:

- (1) Emotional intelligence involves adaptive perception and management of emotions, which may help individuals buffer the effects of conditions leading to fatigue. Thus, higher emotional intelligence may be associated with less fatigue.
- (2) Emotional intelligence may influence a number of other psychosocial characteristics, which in turn may influence fatigue; thus these characteristics may mediate the relationship between emotional intelligence and fatigue. The specific proposed mediators are mood factors (depression & anxiety), dispositional cognitive factors (internal & chance health locus of control, optimism, general self-efficacy), and social support (amount & satisfaction with social support).
- (3) The self-management aspects of emotional intelligence may result in individuals high in this quality adopting a lifestyle that buffers against fatigue. The specific proposed life-style mediators were sleep quality, aerobic exercise, and use of relaxation techniques.
- (4) Certain life-history factors such as abuse have been associated with the development of fatigue. It could be that one way in which a history of abuse influences fatigue is by inhibiting the development of adaptive emotional function. Thus, it may be that emotional intelligence mediates between a history of abuse and fatigue.

## **METHODS**

### **Participants**

This project was conducted with full human research ethics committee approval. Participants were recruited from among mature-aged and younger first-year Psychology students enrolled at the University of New England, Australia. Students were required to participate in a research study to satisfy the practical requirements for this course but could choose from a large

pool of potential studies. Participants were eligible to participate in this study if they were over 18 years old. 176 students were approached, and 167 agreed to participate, representing a recruitment rate of 95%. The mean age of the 167 participants was 27.95,  $SD=10.72$  and of the 165 participants reporting their gender, 125 were women and 40 were men. Sixty-three participants were full-time students, the others worked full or part-time in a variety of occupations, including teaching, sales, police work, and nursing.

### **Procedure**

Participants were asked to complete and return a short questionnaire asking about subjective fatigue and a range of psychosocial factors including emotional intelligence, depression, anxiety, dispositional optimism, self-efficacy, health beliefs, social support and history of physical, sexual and/or emotional abuse.

### **Measures**

#### *Fatigue*

Fatigue was measured using the Fatigue Impact Scale (FIS),<sup>43</sup> a 40-item self-report questionnaire examining individuals' perceptions of their functional limitations caused by fatigue over the past month. FIS items reflect the perceived impact of fatigue on cognitive or mental functioning, physical functioning and psychosocial functioning. Participants were asked to rate items on the extent to which fatigue caused problems for them, from 0 (no problem), to 4 (extreme problem), with higher FIS scores indicating more severe fatigue. Internal consistency reliability for the scale is high with a Cronbach coefficient alpha of 0.98 and subscale Cronbach alphas greater than 0.87.<sup>43</sup> Convergent validity was adequate<sup>44</sup> and discriminant function analysis correctly classified 80.0% of chronic fatigue patients and 78.1% of multiple sclerosis patients

when compared.<sup>43</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .97 for the total scale.

### *Emotional Intelligence*

Emotional Intelligence was measured by the Assessing Emotions Scale,<sup>30,31</sup> a 33-item questionnaire that assesses the extent to which respondents characteristically identify, understand, harness, and regulate emotions in themselves and in others. Respondents rate themselves on each item from 1 (strongly disagree) to 5 (strongly agree), with higher total scores indicating greater emotional intelligence. Schutte et al.<sup>31</sup> reported internal consistency as assessed by Cronbach's alpha of .87 and .90 for two different samples and a two-week test-retest reliability of .78. The measure shows adequate convergent and discriminant validity.<sup>31</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .85.

### *Depression*

The Center for Epidemiological Studies Depression Scale (CES-D)<sup>45</sup> measured depressive symptoms. Respondents' indicated the frequency of 20 symptoms using a 0 to three scale, with higher scores indicating a higher frequency of depressive symptoms. The scale has been found to have internal reliability, as assessed by Cronbach's alpha, ranging from .84 to .90,<sup>45</sup> and convergent validity evidence consisting of high correlations with other depression measures such as the Beck Depression Inventory.<sup>46</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .91.

### *Anxiety*

State anxiety was measured using the Spielberger State-Trait Anxiety Inventory (STAI),<sup>47</sup> a 20-item self-administered scale which asks participants to rate each item on the extent to which it describes how they feel at the moment, from 'not at all' to 'very much so'. Item scores are

weighted from 1 to 4, with higher scores representing greater anxiety levels. Scores on the 20-item scale were summed to give a total anxiety score (out of 80). High internal consistency with coefficient alphas above 0.90 was reported in non-psychiatric samples, and the scale had high convergent and discriminant validity.<sup>47</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .88.

### *Optimism*

Dispositional optimism was measured using the Life Orientation Test (revised) (LOT),<sup>48</sup> a 10-item, self-administered scale assessing generalized expectancies for positive versus negative outcomes. Respondents were asked to indicate the extent of their agreement with each of the items, from 0 (strongly disagree) to 4 (strongly agree), with higher scores indicating greater optimism. Item scores were summed for 6 of 10 items and an overall optimism score (out of 24) was computed; the remaining 4 items were filler items. High internal consistency with a coefficient alpha of 0.78 was reported in non-psychiatric samples, and the scale had adequate predictive and discriminant validity.<sup>48</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .83.

### *General Self-Efficacy*

The General Self-Efficacy Scale<sup>49</sup> assessed global self-efficacy. Respondents rated each of the 10 items comprising the scale on how true the item was for them using a four-point scale, with higher scores indicating greater self-efficacy. Internal consistency in different samples has ranged from .75 to .91 and convergent and predictive validity of the instrument was good.<sup>49</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .86.

### *Health Locus of Control*

Perceived control over fatigue was measured using Form-B of the Multidimensional Health Locus of Control Scale (MHLC).<sup>50</sup> This 18-item, self-report scale measures people's beliefs that their health is or is not determined by their own behaviour, on three sub-scales; internal health locus of control (LOC), external health LOC (under the control of powerful others), and chance health LOC. Participants were asked to rate each item on 6-item Likert scales, from 1 (strongly disagree) to 6 (strongly agree). Item responses were summed to give scores (out of 36) on each of the three dimensions, with high scores indicating a stronger belief in control. Satisfactory convergent and discriminant validity was shown, and internal consistency as measured by Cronbach alpha was in the range 0.60 - 0.76 for the three subscales.<sup>51</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .69 for internal HLOC, .72 for external HLOC, and .61 for chance HLOC.

### *Social Support*

Social support was measured using the Sarason Social Support Questionnaire (SSQ; Short-Form).<sup>52</sup> This 12-item self-report questionnaire measures the number of 'available others' the individual feels he or she can turn to in times of need in a variety of situations, as well as the individual's degree of satisfaction with the perceived support available to them, in that particular situation. Subjects indicated how satisfied they were on a 6-point Likert scale from 'very dissatisfied' to 'very satisfied', with weighted satisfaction scores for each item ranging from 1-6. The SSQ (short-form) has been found to have high internal consistency with coefficient alphas for the number and satisfaction sub-scales ranging from 0.90 - 0.93.<sup>52</sup> In the present study internal reliability, as measured by Cronbach's Alpha, was .93 for number of available others and .92 for satisfaction with support.

*Lifestyle factors*

Participants were asked if they had ever been physically, sexually or verbally abused as a child or young adult. The response options to these questions were 'yes' or 'no'. They were asked if they had a diagnosed medical illness, and if so, what type of illness. Subjects were also asked to rate their sleep quality over the past month. Participants rated sleep quality from 0 to 3, with higher ratings indicating poorer sleep quality. This question was taken from the Pittsburgh Sleep Quality Index,<sup>53</sup> a 19-item self-rated questionnaire assessing sleep quality and sleep disturbances in clinical populations.

**RESULTS**

The mean scores for the major variables are presented in Table. 1. The number of participants who reported abuse can be seen in Table 4. Participants' mean score on total subjective fatigue was 47.28 ( $SD=29.22$ ) out of a maximum of 160, indicating rather low fatigue levels overall. This level is considerably lower than for chronic fatigue patients (mean fatigue score greater than 90) and multiple sclerosis patients (mean fatigue score greater than 60), but similar to hypertensive patients (mean fatigue score greater than 30).<sup>43</sup>

There were no significant differences between women and men on the major variables except in satisfaction with social support and history of sexual abuse. Women were more satisfied with their social support ( $M=1.60$ ,  $SD=0.75$ ) than men ( $M=1.92$ ,  $SD=.95$ ),  $t(159)=2.21$ ,  $p<.03$ . Thirty-five of 125 (28%) women reported having been sexually abused, while 2 of 39 (5%) men reported having been sexually abused, chi square = 8.90,  $p<.003$ .

**Psychological Characteristics**

Pearson 'r' product moment correlations between the psychological variables and fatigue are shown in Tables 2. Lower emotional intelligence, lower internal health locus of control,

higher chance health locus of control, less optimism, lower general self-efficacy, less social support, less satisfaction with social support, higher depression scores and higher anxiety scores were all significantly correlated with high fatigue levels and with cognitive, physical, and social aspects of fatigue. Further, lower emotional intelligence was correlated with lower internal health locus of control, higher chance health locus of control, less optimism, lower general self-efficacy, less social support, less satisfaction with social support, and higher depression and anxiety scores. Neither fatigue nor emotional intelligence were correlated with external health locus of control.

To test the hypotheses that the relationship between emotional intelligence and fatigue was mediated by health locus of control, optimism, general self-efficacy, social support, depression and anxiety, mediation analyses as described by Kenny, Kashy and Bolger<sup>54</sup> were performed. For these analyses, total fatigue scores were the outcome variable. The first step of mediation analysis requires evidence that the predictor variable and the hypothesized mediating variable are significantly associated. Emotional intelligence was significantly related to all hypothesized mediator variables except for external health locus of control (see Table 2); thus, no further mediation tests were performed for external health locus of control. The second step, which requires evidence that the predictor variable and the outcome variable are related, was shown by the significant correlation between lower emotional intelligence and fatigue (see Table 2).

The third step of mediation analysis involves regressing the hypothesized mediator variable on the outcome variable, while controlling for the predictor variable. Only if the mediator variable is significantly associated with the outcome variable when the predictor variable is controlled through semi-partial correlation is it relevant to go to the fourth step, which involves examining the impact of the predictor variable on the outcome variable while controlling

through semi-partial correlation the hypothesized mediator variable. If in step four the predictor variable is no longer associated with the outcome variable, there is evidence of complete mediation; if the association between the predictor variable and the outcome variable decreases, there is evidence of partial mediation. Kenny et al.<sup>54</sup> suggested that steps three and four be performed in the same regression, and this was done in the present analyses. Table 3 shows the results of the regression analyses.

There was no evidence for a mediating effect of internal health locus of control, as internal locus of control was not significantly related to fatigue when emotional intelligence was controlled. There was also no evidence for a mediating effect of general self-efficacy as general self-efficacy was not significantly related to fatigue when emotional intelligence was controlled.

Chance health locus of control was significantly related to fatigue when emotional intelligence was controlled, meeting the requirements for step three of the mediation analysis. The relationship between emotional intelligence and fatigue decreased from  $-.34$  to  $-.28$  when chance health locus of control was controlled, indicating as required in step four of mediation, that chance health locus of control partially mediated the relationship between emotional intelligence and fatigue.

When emotional intelligence was controlled, optimism was still related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship between emotional intelligence and fatigue decreased from  $-.34$  to  $-.22$  when optimism was controlled, indicating as required in step four of mediation, that optimism partially mediated the relationship between emotional intelligence and fatigue.

When emotional intelligence was controlled, amount of social support was still related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship

between emotional intelligence and fatigue decreased from -.34 to -.30 when amount of social support was controlled, indicating as required in step four of mediation, that amount of social support partially mediated the relationship between emotional intelligence and fatigue.

When emotional intelligence was controlled, satisfaction with social support was still related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship between emotional intelligence and fatigue decreased from -.34 to -.26 when satisfaction with social support was controlled, indicating as required in step four of mediation, that satisfaction with social support partially mediated the relationship between emotional intelligence and fatigue.

When emotional intelligence was controlled, depression scores were related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship between emotional intelligence and fatigue decreased from -.34 to -.12 when depression scores were controlled, indicating that depression partially mediated the relationship between emotional intelligence and fatigue.

When emotional intelligence was controlled, anxiety was related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship between emotional intelligence and anxiety decreased from -.34 to -.17 when anxiety scores were controlled, indicating as required in step four of mediation, that anxiety partially mediated the relationship between emotional intelligence and fatigue.

### **Life Style and Life History Factors**

Participants provided information on several lifestyle factors. Pearson 'r' correlations showed that poorer sleep quality was related to higher fatigue levels,  $r(164)=.45, p<.001$ , although frequency of exercise and frequency of use of relaxation techniques were not

significantly correlated with fatigue,  $r(162)=.15$  and  $r(150)=.11$ , respectively. Emotional intelligence was associated with a higher frequency of aerobic exercise,  $r(160)=-.21, p<.008$ ; and better sleep quality,  $r(161)=-.21, p<.008$ ; but not with frequency of use of relaxation techniques,  $r(149)= -.11$ .

Steps one and two in the mediation analysis were significant for the possible mediating effect of sleep quality between emotional intelligence and fatigue. A regression analysis examined steps three and four, required for proof of mediation. Together, emotional intelligence and sleep quality significantly predicted fatigue,  $R=.52, F(2,158), p<.001$ . Emotional intelligence had a standardized Beta of  $-.25$  and sleep quality had a standardized beta of  $.40$ . When emotional intelligence was controlled, sleep quality was still related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship between emotional intelligence and fatigue decreased from  $-.34$  to  $-.25$  when sleep quality was controlled, indicating, as required in step four of mediation, that sleep quality partially mediated the relationship between emotional intelligence and fatigue.

Participants reported whether or not they had a chronic medical illness. There were no demonstrable differences in either subjective fatigue or emotional intelligence between the 53 individuals who reported such an illness and the 111 who reported no illness. Participants also provided information on their history of abuse. Two between-groups t-tests showed that those who reported a history of physical or sexual abuse were more likely to suffer from fatigue (see Table 4). There was no significant difference in emotional intelligence between participants who reported physical, sexual, or verbal abuse in their past and those who did not report abuse, indicating that emotional intelligence did not mediate between history of abuse and subjective fatigue.

### **Exploratory Analyses for History of Abuse**

Since a history of physical and/or sexual abuse was significantly related to fatigue, exploratory analyses examined whether psychological variables other than emotional intelligence might mediate the relationship between abuse and fatigue. Physical and sexual abuse are dichotomous variables; in this mediation analysis both physical and sexual abuse were treated as continuous variables with two levels. Some participants failed to answer the abuse questions; 3 failed to answer the physical abuse question and 4 failed to answer the sexual abuse question.

Physical abuse was correlated with less satisfaction with social support,  $r(159)=.20$ ,  $p<.01$ . Sexual abuse was correlated with higher depression score,  $r(159)=.22$ ,  $p<.01$ , and higher anxiety score,  $r(159)=.19$ ,  $p<.02$ . Both physical abuse and sexual abuse were related to higher total fatigue,  $r(163)=.25$ ,  $p<.001$  and  $r(162)=.29$ ,  $p<.001$  respectively. As shown in Table 2, satisfaction with social support, depression and anxiety were all significantly related to fatigue. Thus, steps one and two of the mediation analysis were satisfied for satisfaction with social support as a possible mediator between physical abuse and fatigue, and symptoms of depression and anxiety as possible mediators between sexual abuse and fatigue.

Together, physical abuse and satisfaction with social support were significantly related to fatigue,  $R=.65$ ,  $F(2,157)=10.00$ ,  $p<.001$ . Physical abuse had a standardized Beta of .15 and depression had a standardized beta of .27. When physical abuse was controlled, satisfaction with social support was still related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship physical abuse and fatigue decreased from .25 to .15 when satisfaction with social support was controlled, indicating that satisfaction with social support partially mediated the relationship between physical abuse and fatigue.

Together, sexual abuse and depression were significantly related to fatigue,  $R=.66$ ,  $F(2,156)=59.00$ ,  $p<.0001$ . Sexual abuse had a standardized Beta of .15 and depression had a standardized beta of .61. When sexual abuse was controlled, depression was still related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship between sexual abuse and fatigue decreased from .29 to .15 when depression was controlled, indicating as required in step four of mediation, that depression scores partially mediated the relationship between sexual abuse and fatigue.

Together, sexual abuse and anxiety were significantly related to fatigue,  $R=.56$ ,  $F(2,156)=59.00$ ,  $p<.0001$ . Sexual abuse had a standardized Beta of .20 and anxiety had a standardized beta of .48. When sexual abuse was controlled, anxiety was still related to fatigue, meeting the requirements for step three of the mediation analysis. The relationship between sexual abuse and fatigue decreased from .29 to .20 when anxiety was controlled, indicating as required in step four of mediation, that anxiety partially mediated the relationship between sexual abuse and fatigue.

## **DISCUSSION**

The results of this cross-sectional study indicate that higher emotional intelligence was associated with less subjective fatigue. This is the first demonstration of a relationship between emotional intelligence and fatigue, and this was true for both total fatigue scores and the physical, cognitive and social fatigue subscores. The theoretical premise for expecting this relationship is that higher emotional intelligence, which involves adaptive perception and management of emotions, helps individuals differently interpret and manage fatigue symptoms. Other explanations are possible as well, and these are reviewed later in the discussion.

We also evaluated the possible mediating roles of psychosocial, dispositional/cognitive and lifestyle factors in the relationship between emotional intelligence to fatigue. Two mood factors, high depression and anxiety, each accounted for a substantial proportion of the variance in the relationship between emotional intelligence and fatigue. This result is consistent with previous reports indicating that anxiety and depression are related to and may precede prolonged fatigue;<sup>15-18</sup> and that higher emotional intelligence is related to more positive mood,<sup>29</sup> and less depressed mood.<sup>31</sup>

Two dispositional/cognitive factors, low optimism and internal health locus of control also partially mediated between emotional intelligence and fatigue, although external health locus of control, chance health locus of control, and general self-efficacy did not. Low internal health locus of control has previously been shown to be related to fatigue,<sup>19</sup> and high optimism is related to a lower illness burden in CFS patients.<sup>21</sup> Moreover, this finding is consistent with the literature describing an association between high emotional intelligence and greater optimism;<sup>31</sup> but is inconsistent with previous reports that low self-efficacy predicts fatigue.<sup>20</sup>

Finally, both the amount and satisfaction with social support partially mediated the relationship between emotional intelligence and fatigue. This finding sheds more light on the inconsistently reported relationship between fatigue and social support. Some studies indicate that fatigue and persistence of fatigue are related to a lack of social support,<sup>22,23</sup> and high levels of social support are associated with fatigue improvement,<sup>24</sup> although self-assessed failure to recover is also attributed to greater family support.<sup>25</sup>

It appears then that a viable additional explanation for why there is a connection between higher emotional intelligence and less fatigue is that emotional intelligence allows individuals to

develop buffers, such as healthier mood, more adaptive ways of interpreting the world, and better social supports to help ameliorate the effects of physical stresses.

The relationship between emotional intelligence and fatigue was also partially mediated by a single lifestyle factor, sleep quality, but not exercise or relaxation training practice or frequency. Disturbed sleep has previously been shown to predict fatigue in healthy workers,<sup>37</sup> and more subjective sleepiness is seen in CFS patients.<sup>38</sup> This result suggests that those who are higher in emotional intelligence may be able to better use strategies to promote good quality sleep.

The presence of a chronic medical illness, frequency of exercise and use of relaxation techniques did not mediate the relationship between emotional intelligence and fatigue. Most previous studies have found a negative relationship between exercise and fatigue; with reduced exercise tolerance<sup>40,41</sup> and lower childhood exercise levels in CFS patients.<sup>42</sup> The lack of association between exercise and fatigue in this study is likely due to the high levels of exercise practiced by these students; with most of the sample (113/167, 68% of participants) exercising at least once a week.

Consistent with previous research on the relationship between abuse and fatigue<sup>34-36</sup>, a history of physical and/or sexual abuse was related to fatigue, although emotional intelligence did not mediate these relationships. Exploratory analyses determined that less satisfaction with social support partially mediated the relationship between physical abuse and fatigue, while higher depression and anxiety partially mediated the relationship between sexual abuse and fatigue. It is not clear why emotional intelligence didn't mediate the relationship between physical/sexual abuse and fatigue, although it may be that abuse is such an overwhelming stressor that psychological compensation is not possible. That is, the impact may have been too catastrophic to

be absorbed by a resilient and adaptive psyche. Instead, we found that the link between abuse and fatigue was partly mediated by psychological distress (for sexual abuse) and dissatisfaction with social supports who perhaps failed to end the abuse (for physical abuse).

Several cautions should be kept in mind regarding these findings. First, all participants were university students, albeit a mix of mature-aged and traditional-aged students. University students may have special stressors as well as study-based insights that make them different from other populations. However, they are useful to study because of their relatively high prevalence of depression, anxiety and fatigue. Future research might examine the replicability of the present findings with other populations.

Second, the findings were based on a cross-sectional regression design. Even though mediation analyses can give some insight into possible paths of causality, they do not rule out other causal explanations. For example, it is possible that individuals who experience persistent fatigue may also experience a secondary decline in optimism; thus, fatigue may impact on these psychosocial characteristics rather than the reverse. We are currently attempting to disentangle the likely temporal sequence of some of these events and symptoms, using additional mediation analyses and a longitudinal study examining the relationship between initial levels of emotional intelligence and other psychosocial variables and later changes in fatigue.

Even stronger evidence of causality, as well as important clinical implications, would come from a randomised controlled trial (RCT) of an intervention designed to increase emotional intelligence and decrease fatigue. Future RCTs planned by this group include a cognitive-behavioural-therapy approach that will integrate recent empirically-derived findings regarding psychosocial predictors and correlates of fatigue.

In summary, emotional intelligence was directly and indirectly related to the experience of fatigue. Partial mediators included mood (i.e. depression, anxiety), dispositional/cognitive factors (i.e. optimism, internal health locus of control), social support (amount and satisfaction) and lifestyle factors (i.e. sleep quality). Physical and sexual abuse was also directly and indirectly related to subjective fatigue; with the relationship between physical abuse and fatigue mediated by satisfaction with social support, and the relationship between sexual abuse and fatigue mediated by mood.

## REFERENCES

1. Loblay R, Stewart G, Bertouch J, Cistulli P, Darveniza P, Ellis C, Gatenby P, Gillis D, Hickie I, Lloyd A, Phillips B, Phoon W, Rowe K, Steven I, Wakefield D, Watson DO. Chronic fatigue syndrome: clinical practice guidelines – 2002. *Med J Aust* 2002; 176: S17-55.
2. Fukuda K, Straus SE, Hickie I, Sharpe MC, Dobbins JG, Komaroff A. Chronic fatigue syndrome: a comprehensive approach to its definition and study. *Ann Intern Med* 1994; 121: 953-59.
3. Bates DW, Schmitt W, Buchwald D, Ware NC, Lee J, Thoyer E, Kornish RJ, Komaroff AL. Prevalence of fatigue and chronic fatigue syndrome in a primary care practice. *Arch Int Med* 1993; 15: 2759-65.
4. Cathebras PJ, Robbins JM, Kirmayer LJ, Hayton BC. Fatigue in primary care. *J Gen Intern Med* 1992; 7: 276-86.
5. David A, Pelosi A, McDonald E, Stephens D, Ledger D, Rathbone R, Mann A. Tired, weak or in need of rest: fatigue among general practice attenders. *Br Med J* 1990; 301: 1199-1202.
6. McDonald E, David AS, Pelosi AJ, Mann AH. Chronic fatigue in primary care attenders. *Psychol Med* 1993; 23: 987-98.
7. Hickie IB, Hooker AW, Hadzi-Pavlovic D, Bennett BK, Wilson AJ, Lloyd AR. Fatigue in selected primary care settings: sociodemographic and psychiatric correlates. *Med J Aust* 1996; 164: 585-88.

8. Sharpe M, Wilks D. ABC of psychological medicine: fatigue. *Br Med J* 2002; 325: 480-83.
9. Cope H, David A, Pelosi A, Mann A. Predictors of chronic 'postviral' fatigue. *Lancet* 1994; 344: 864-68.
10. Hotopf M, Noah N, Wessely S. Chronic fatigue and minor psychiatric morbidity after viral meningitis: a controlled study. *J Neurol Neurosurg Psychiatry* 1996; 60: 504-09.
11. Mohren DC, Swaen GM, Kant IJ, Borm PJ, Galama JM. Associations between infections and fatigue in a Dutch working population: results of the Maastricht Cohort Study on fatigue at work. *Eur J Epidemiol* 2002; 17: 1081-87.
12. Smith A, Thomas M, Borysiewicz L, Llewelyn M. Chronic fatigue syndrome and susceptibility to upper respiratory tract illness. *Br J Health Psychol* 1999; 4: 327-35.
13. Butler S, Chalder T, Ron M, Wessley S. Cognitive behaviour therapy in chronic fatigue syndrome. *J Neurol Neurosurg Psychiatry* 1991; 54: 153-58.
14. Surawy C, Hackman A, Hawton K, Sharpe M. Chronic fatigue syndrome: a cognitive approach. *Behav Res Ther* 1995; 33: 535-44.
15. Chen MK. The epidemiology of self-perceived fatigue among adults. *Prevent Med* 1986; 15: 74-81.
16. Van der Linden G, Chalder T, Hickie I, Koschera A, Sham P, Wessely S. Fatigue and psychiatric disorder: different or the same? *Psychol Med* 1999; 29: 863-68.
17. Merikangas K, Angst J. Neurasthenia in a longitudinal cohort study of young adults. *Psychol Med* 1994; 24: 1013-24.

18. Henker B, Whalen CK, Jamner LD, Delfino RJ. Anxiety, affect and activity in teenagers: monitoring daily life with electronic diaries. *J Am Acad Child Adolesc Psychiatry* 2002; 41: 660-70.
19. Ray C, Jefferies S, Weir WR. Coping and other predictors of outcome in chronic fatigue syndrome: a 1-year follow up. *J Psychosom Res* 1997; 43: 405-15.
20. Findley JC, Kerns R, Weinberg LD, Rosenberg R. Self-efficacy as a psychological moderator of chronic fatigue syndrome. *J Behav Med* 1998; 21: 351-62.
21. Lutgendorf SK, Antoni MH, Ironson G, Fletcher MA, Penedo F, Baum A, Schneiderman N, Klimas N. Physical symptoms of chronic fatigue syndrome are exacerbated by the stress of Hurricane Andrew. *Psychosom Med* 1995; 57: 310-23.
22. Prins JB, Bos E, Huibers MJ, Servaes P, van der Werf SP, van der Meer JW, Bleijenberg G. Social support and the persistence of complaints in chronic fatigue syndrome. *Psychother Psychosom* 2004; 73: 174-82.
23. van der Werf SP, de Vree B, Alberts M, van der Meer JW, Bleijenberg G. Natural course and predicting self-reported improvement in patients with chronic fatigue syndrome with a relatively short illness duration. *J Psychosom Res* 2002; 53: 749-53.
24. Saltzstein BJ, Wyshak G, Hubbuch JT, Perry JC. A naturalistic study of the chronic fatigue syndrome among women in primary care. *Gen Hosp Psychiatry* 1998; 20: 307-16.
25. Buchwald DS, Rea TD, Katon WJ, Russo JE, Ashley RL. Acute infectious mononucleosis: characteristics of patients who report failure to recover. *Am J Med* 2000; 109: 531-37.

26. Salovey P, Mayer JD, Caruso D. The positive psychology of emotional intelligence. In: Snyder CR, Lopez SJ, eds. *The handbook of positive psychology*. New York NY: Oxford University Press 2002: 159-71.
27. Mayer JD, Salovey P, Caruso DL, Sitarenios G. Measuring emotional intelligence with the MSCEIT V2.0. *Emotion* 2003; 2: 97-105.
28. Conte, J.M. A review and critique of emotional intelligence measures. *Journal of Organizational Behavior* 2005; 26: 433-440.
29. Schutte NS, Malouff JM, Simunek M, Hollander S, McKenley J. Characteristic emotional intelligence and emotional well-being. *Cognition Emotion* 2002; 16: 769-86.
30. Brackett MA, Mayer JD. Convergent, discriminant, and incremental validity of competing measures of emotional intelligence. *Pers Soc Psychol Bull* 2003; 29: 1-12.
31. Schutte NS, Malouff JM, Hall LE, Haggerty DJ, Cooper JT, Golden CJ, Dornheim L. Development and validation of a measure of emotional intelligence. *Pers Individ Diff* 1998; 25: 167-77.
32. Schutte N, Malouff J, Bobik C, Coston T, Greeson C, Jedlicka C, Wendorf G. Emotional intelligence and interpersonal relations. *J Soc Psychol* 2001; 141: 523-36.
33. Lopes PN, Salovey P, Straus R. Emotional intelligence, personality and the perceived quality of social relationships. *Pers Individ Diff* 2003; 35: 641-58.
34. Taylor RR, Jason LA. Sexual abuse, physical abuse, chronic fatigue and chronic fatigue syndrome: a community-based study. *J Nerv Ment Dis* 2001; 189: 709-15.
35. Van Houdenhove B, Neerinckx E, Lysens R, Vertommen H, Van Houdenhove L, Onghena P, Westhovens R, D'Hooghe MB. Victimization in chronic fatigue syndrome

- and fibromyalgia in tertiary care: a controlled study on prevalence and characteristics. *Psychosomatics* 2001; 42: 21-28.
36. Taylor RR, Jason LA. Chronic fatigue, abuse-related traumatization and psychiatric disorders in a community-based sample. *Soc Sci Med* 2002; 55: 247-56.
37. Akerstedt T, Knutsson A, Westerholm P, Theorell T, Alfredsson L, Kecklund G. Mental fatigue, work and sleep. *J Psychosom Res* 2004; 57: 427-33.
38. Watson NF, Jacobsen C, Goldberg J, Kapur V, Buchwald D. Subjective and objective sleepiness in monozygotic twins discordant for chronic fatigue syndrome. *Sleep* 2004; 27: 973-77.
39. Sugahara H, Akamine M, Kondo T, Fujisawa K, Yoshimasu K, Tokunaga S, Kubo C. Somatic symptoms most often associated with depression in an urban hospital medical setting in Japan. *Psychiatry Res* 2004; 126: 151-58.
40. Wallman KE, Morton AR, Goodman C, Grove R. Physiological responses during a submaximal cycle test in chronic fatigue syndrome. *Med Sci Sports Exerc* 2004; 36: 1682-88.
41. Cook DB, Nagelkirk PR, Peckerman A, Poluri A, Lamanca JJ, Natelson BH. Perceived exertion in fatiguing illness: civilians with chronic fatigue syndrome. *Med Sci Sports Exerc* 2003; 35: 563-68.
42. Viner R, Hotopf M. Childhood predictors of self reported chronic fatigue syndrome/myalgic encephalomyelitis in adults: national birth cohort study. *Br Med J* 2004; 329: 941.

43. Fisk JD, Ritvo PG, Ross L, Haase DA, Marrie TJ, Schlech WF. Measuring the functional impact of fatigue: initial validation of the Fatigue Impact Scale. *Clin Infect Dis* 1994; 18: S79-83.
44. Mathiowetz V. Test-retest reliability and convergent validity of the Fatigue Impact Scale for persons with multiple sclerosis. *Am J Occup Ther* 2003; 57: 389-95.
45. Radloff LS. The CES-D Scale: a self-report depression scale for research in the general population. *App Psychol Measur* 1977; 1: 385-401.
46. Berndt D. Inventories and scales. In: Wolman B, Stricker G, eds. *Depressive disorders: Facts, theories and treatment methods*. New York, NY: Wiley 1990: 255-74.
47. Spielberger CD, Gorusch RL, Luschene RE, Volberg, Jacobs GA. *State-Trait Anxiety Inventory for Adults (Form Y)*. Redwood City: Mind Garden, 1983.
48. Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery and self-esteem): a reevaluation of the Life Orientation Test. *J Pers Soc Psychol* 1994; 67: 1063-78.
49. Scholz U, Dona BG, Sud S, Schwarzer R. Is general self-efficacy a universal construct? psychometric findings from 25 countries. *Eur J Psychol Assess* 2002; 18: 242-51.
50. Wallston KA, Wallston BS, DeVellis R. Development of the Multidimensional Health Locus of Control (MHLC) Scales. *Health Educ Monogr* 1978; 6: 160-70.
51. Wallston KA, Wallston BS. Health Locus of Control Scales. In Lefcourt HM ed. *Research with the Locus of Control Construct: Assessment Methods*. Florida: Academic Press, 1981: 189-243.
52. Sarason IG, Sarason BR, Shearin EH, Pierce GR. A brief measure of social support: practical and theoretical implications. *J Soc Pers Rel* 1987; 4: 497-510.

53. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 1989; 28: 193-213.
54. Kenny DA, Kashy DA, Bolger N. Data analysis in social psychology. In: Gilbert D, Fiske S, Lindzey G, eds. *The handbook of social psychology* (4th ed.). Boston MA: McGraw-Hill 1998: 233-65.

Table 1

*Mean Scores on subjective Fatigue, Emotional Intelligence, Health Locus of Control, Optimism, Self-Efficacy, Social Support, Depression and Anxiety*

	Mean	SD
Overall Fatigue	47.28	29.22
Cognitive Fatigue	13.97	8.47
Physical Fatigue	11.46	7.92
Social Fatigue	21.78	14.95
Emotional Intelligence	126.51	11.61
Internal Locus of Control	26.79	4.33
Chance Locus of Control	16.99	4.40
External Locus of Control	15.28	4.77
Optimism	21.45	4.12
General Self-Efficacy	31.38	3.91
Amount of Social Support	4.63	2.30
Satisfaction with Social Support	1.68	.81
Depression	16.36	10.44
Anxiety	36.28	10.11
Sleep Quality	2.27	.78
Aerobic Exercise Frequency	3.85	2.31
Relaxation Frequency	2.27	2.48

Note: Lower numbers on satisfaction with social support, sleep quality, aerobic exercise, and relaxation indicate a higher level on the variable. For all other variables, higher numbers indicate more of the quality.

Table 2

*Correlations between Fatigue, Emotional Intelligence and Health Locus of Control, Optimism, Self-Efficacy, Social Support, Depression and Anxiety*

Constructs	Overall Fatigue	Cognitive Fatigue	Physical Fatigue	Social Fatigue	Emotional Intelligence
Emotional Intelligence	-.34**	-.33**	-.31**	-.31**	-
Internal Locus of Control	-.20*	-.16*	-.21**	-.15	.23**
Chance Locus of Control	.29**	.25**	.31**	.26**	-.24**
External Locus of Control	.05	-.03	.07	.07	.05
Optimism	-.33**	-.34**	-.29**	-.29**	.43**
General Self-Efficacy	-.29**	-.31**	-.20*	-.29**	.58**
Amount of Social Support	-.25**	-.20*	-.20*	-.29**	.28**
Satisfaction with Social Support	.30**	.29**	.24**	.31**	-.29**
Depression	.64**	.58**	.51**	.65**	-.35**
Anxiety	.52**	.55**	.38**	.49**	-.39**

Note: Correlations marked with a \* are significant at  $p < .05$  two-tailed, correlations marked with a \*\* are significant at  $p < .01$  two-tailed. On the Social Support Questionnaire, lower scores indicate greater satisfaction with social support.

Table 3  
*The Association Between Emotional Intelligence and Fatigue Controlling for the Effect of Other Psychological Variables*

Variable	B	SE B	$\beta$	t	R
Outcome Variable: Fatigue					
Predictor Variables Combined					.35**
Emotional Intelligence	-.77	.19	-.31	-4.04**	
Internal Health Locus of Control	-.72	.52	-.11	-1.39	
Predictor Variables Combined					.39**
Emotional Intelligence	-.71	.19	-.29	-3.77**	
Chance Health Locus of Control	1.37	.49	.21	2.77**	
Predictor Variables Combined					.39**
Emotional Intelligence	-.61	.20	-.24	-3.01**	
Optimism	-1.53	.59	-.22	-2.65**	
Predictor Variables Combined					.35**
Emotional Intelligence	-.64	.23	-.26	-2.81**	
General Self-Efficacy	-.99	.68	-.13	-1.47	
Predictor Variables Combined					.38**
Emotional Intelligence	-.76	.19	-.31	-4.00**	
Amount of Social Support	-2.01	.97	-.16	-2.07*	
Predictor Variables Combined					.40**
Emotional Intelligence	-.67	.19	-.27	-3.53**	
Satisfaction with Social Support	8.18	2.73	.23	3.00**	
Predictor Variables Combined					.64**
Emotional Intelligence	-.32	.16	-.13	-1.98***	
Depression	1.66	.19	.58	8.85**	
Predictor Variables Combined					.53**
Emotional Intelligence	-.44	.18	-.18	-2.41*	
Anxiety	1.27	.22	.44	5.85**	

Note: \* indicates significance at  $p < .05$ , \*\* indicates significance at  $p < .01$ , \*\*\* = .05 exactly.

Table 4

*Differences in Fatigue between Individuals Who Had or Had Not Been Physically, Sexually, or Verbally Abused*

Type of Abuse	Mean	SD	N	<i>t</i>	<i>p</i>
Physical				-2.59	.015
Yes	63.85	36.98	26		
No	44.17	26.55	138		
Sexual				-3.87	.001
Yes	62.59	32.11	37		
No	42.41	26.56	126		
Verbal				-1.56	ns
Yes	50.92	30.52	84		
No	43.82	27.46	79		

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