Factors associated with depression among individuals with chronic fatigue syndrome: findings from a nationally representative survey

Esme Fuller-Thomson[a,b] and Jodie Nimigon[b]

Fuller-Thomson E and Nimigon J. Factors associated with depression among individuals with chronic fatigue syndrome: findings from a nationally representative survey. *Family Practice* 2008; **25**: 414–422.

Objectives. Most previous research regarding chronic fatigue syndrome (CFS) and depression has relied on clinical samples. The current research determined the prevalence and correlates of depression among individuals with CFS in a community sample.

Methods. The nationally representative Canadian Community Health Survey, conducted in 2000/2001, included an unweighted sample size of 1045 individuals who reported a diagnosis of CFS and had complete data on depression. Respondents with CFS who were depressed ($n = 369$) were compared to those who were not depressed ($n = 676$). Chi-square analyses, *t*-tests and a logistic regression were conducted.

Results. Thirty-six per cent of individuals with CFS were depressed. Among individuals with CFS, depression was associated with lower levels of mastery and self-esteem. In the logistic regression analyses, the odds of depression among individuals with CFS were higher for females, younger respondents, those with lower incomes and food insecurity and those whose activities were limited by pain. Two in five depressed individuals had not consulted with any mental health professional in the preceding year. Twenty-two per cent of depressed respondents had seriously considered suicide in the past year. Individuals with CFS who were depressed were particularly heavy users of family physicians, with an average of 11.1 visits annually (95% confidence interval = 10.7, 11.6).

Conclusion. It is important for clinicians to assess depression and suicidal ideation among their patients with CFS, particularly among females, those reporting moderate to severe pain, low incomes and inadequate social support.

Keywords. Chronic fatigue syndrome, depression, income, pain, risk factors, social support.

Introduction

Chronic fatigue syndrome (CFS) is a disorder diagnosed following at least 6 months of disabling, unexplained mental and physical fatigue accompanied by other physical and psychological symptoms.[1,2] Common physical symptoms reported by patients include gastrointestinal problems, headaches, muscle and joint pain; typical psychological symptoms include impaired memory or concentration,[2,3] rendering clinical identification of CFS challenging for many GPs.[4,5]

Estimated prevalence rates for CFS among adults range from 0.23% to 2% of the total population.[6–8]

Average age at onset is between 29 and 35 years. Females account for at least 75% of CFS patients.[2]

In a random community sample, individuals with CFS were predominantly from lower socio-economic classes.[3,9] Almost half of CFS patients were unemployed due to illness constraints, while many who remained employed had modified their work schedules since diagnosis.[2,10] The symptoms of CFS often leave individuals disconnected from family, friends and personal interests.[3,10]. It has been hypothesized that the unpredictability of day-to-day energy levels may result in individuals with CFS intentionally restricting their scheduled social engagements to avoid disappointing friends and family.[11]

[a]Department of Family and Community Medicine and [b]Factor-Inwentash Faculty of Social Work, University of Toronto, 246 Bloor Street West, Toronto, Ontario M5S 1A1, Canada. Correspondence to Esme Fuller-Thomson, Faculty of Social Work, University of Toronto, 246 Bloor Street West, Toronto, Ontario M5S 1A1, Canada; Email: esme.fuller.thomson@utoronto.ca

CFS patients have inordinately high rates of depression. Clinical samples indicate that between 35%[12] and 46%[13] suffer from depression. In Taylor *et al.*'s[9] community sample, one in three individuals with CFS had a current mood disorder. Fatiguing illnesses, such as CFS, have been linked with reactive depression due to illness-imposed limitations.

Among a clinical sample of individuals with CFS, patients concurrently suffering from depression were found to have significantly worse outcomes, such as more severe symptoms and unemployment, than those without depression[14]; these individuals are also more likely to be female and poorer.[9] Due to a lack of literature specifically focused on CFS and depression, we turned to studies of depression in individuals with other chronic illnesses [e.g. arthritis, inflammatory bowel disease, multiple sclerosis (MS) and systemic lupus erythematosus (SLE)].

Depressed individuals with other chronic illnesses were at a disadvantage to the non-depressed with these diseases with respect to poorer quality of life,[15–17] lower levels of life satisfaction[18] and increased risk of suicide.[17,19] Studies on other chronic health conditions also suggest that depression is associated with food insecurity,[20] younger age,[21,22] higher education[20] and not being an immigrant.[20] Lower levels of social support,[10,22] in general, and being without a marital partner,[20] in particular, have been associated with depression among those with chronic illnesses.

Studies involving clinical samples of individuals with MS,[23] SLE[24] and arthritis[22] found that depression scores were higher among those reporting bodily pain. There appeared to be interaction effect between pain and self-esteem,[25–27] as well as pain and social supports.[20] Depression was also higher among individuals with chronic illnesses who reported limitations in their activities of daily living (ADL).[22] Depression among those with chronic illnesses is associated with a greatly elevated risk of suicidal ideation.[20]

Among community samples of individuals with CFS, health-care usage is substantially higher than the general population.[28,29] The single greatest cost of care for individuals with CFS stems from an average of 18 visits to GPs and specialists, in addition to 14 visits to non-physician practitioners[28]; an equivalent of $9.1 billion (US)[30] per year.

Using a Canadian nationally representative sample of individuals reporting that they had been diagnosed with CFS by a health professional, we have investigated four research questions:

1. (i) What is the national prevalence of depression among those who report they have CFS?
2. (ii) What demographic (e.g. gender, age, education and income), intrapsychic (e.g. self-esteem and mastery), interpersonal (e.g. social support) and health-related characteristics (e.g. level of pain,

self-reported health and number of other chronic conditions) are associated with depression among individuals with CFS?
3. (iii) What is the prevalence of use of family doctors, mental health services and antidepressants by depressed CFS patients?
4. (iv) What is the prevalence of suicidal ideation among depressed individuals with self-reported CFS?

Methods

Data sources
This study investigated the relationship between demographic, intrapsychic, interpersonal and health-related characteristics and depression among community members with self-reported CFS. The analyses reported in this paper utilized the public use data files of the Canadian Community Health Survey (CCHS) conducted in 2000/2001 by Statistics Canada. The CCHS is a nationally representative survey[31] designed to provide estimates of 'health determinants, health status and health system utilization'. The sample size is sufficiently large to allow in-depth examination of relatively rare disorders, such as CFS. The target population of the CCHS covered approximately 98% of the Canadian population aged 12 or older. The CCHS had a response rate of 84.7% after 14 months of collection, which resulted in a final sample of 130 880 respondents,[32,33] of whom 1084 reported that they had been diagnosed by a health professional with CFS. Of these respondents with self-reported CFS, 39 had incomplete data on depression. Thus, the final unweighted sample used for most of the bivariate analyses in this paper is 1045. The logistic regression analysis only included respondents with self-reported CFS who had complete data on depression and all 11 independent variables incorporated in the analysis (*n* = 929). Some of the bivariate analyses were based on questions which were not asked in all health regions and therefore sample sizes for these questions are smaller (e.g. suicide, social support, self-esteem, mastery, unmet health-care needs and medication). To compare the mean number of family physician visits for individuals with CFS and depression to depressed individuals without CFS and non-depressed individuals without CFS, the full sample of individuals with and without CFS was used.

Measures
Depression. Respondents were diagnosed as depressed if they had a probability of depression of 90% or greater as classified by Kessler and Mroczek's scale based on a subset of items from the Composite International Diagnostic Interview (CIDI).[34,35] The sensitivity of the CIDI-short form was 89.6% and specificity was 93.9% with the total classification accuracy 93.2% for

a major depressive episode in comparison to CIDI.[34] Questions about depression focused on periods of at least two consecutive weeks when respondents felt sad, blue, depressed or lost interest in most things throughout the preceding 12 months. Due to the fact our data were from a public use data set, we did not have access to the respondents' names or medical records and therefore could not validate the diagnosis through chart review.

Demographic characteristics. The following demographic variables were investigated: (i) gender; (ii) marital status (married/common law versus divorced/separated/never married); (iii) age (12–29, 30–59 and 60+); (iv) educational attainment (high school graduate versus not); (v) race (white versus visible minority); and (vi) immigrant status (Canadian born versus immigrant). (vii) Income adequacy (low, medium and high) was calculated based upon total household income and number of people in the household and (viii) food security was assessed through the question 'In the past 12 months, how often did you or anyone else in your household not have enough food to eat because of a lack of money?' (never versus sometimes or often).

Health characteristics. Self-reported health status was derived from the question 'In general, would you say your health is excellent, very good, good, fair, poor.' The responses were dichotomized into excellent, very good or good, versus fair or poor.

The number of chronic conditions among the CCHS respondents was calculated from summing the number of 17 possible conditions, including CFS, that the respondent reported lasted 6 months or more and which that had been diagnosed by a health professional. The responses were categorized as one, two, or three or more conditions.

The survey participants were asked if they were usually free of pain and discomfort. If they responded no, they were asked how many activities their pain or discomfort prevented (none, a few, some and most). The answers were then dichotomized into two categories (usually no pain or discomfort versus pain prevents few, some or most activities).

If a respondent reported that they needed the help of another person in personal care such as washing, dressing or eating and/or in moving about inside the house, they were classified as having a limitation in their ADL.

The respondents were defined as having limitations in their Instrumental Activities of Daily Living if they reported that they needed the help of another person in one of the following activities: (i) preparing meals; (ii) shopping for groceries or other necessities; and (iii) doing normal everyday housework, because of any condition or health problem.

Please note that the questions discussed on suicide, social support, self-esteem, mastery, unmet health-care needs and medication were only asked of respondents in specific health districts and therefore have smaller sample sizes. The findings from these questions are not nationally representative.

Respondents in the CCHS were asked two questions on suicidal ideation: 'Have you ever seriously considered committing suicide or taking your own life.' Those who said yes were asked, 'Has this happened in the past 12 months?' Thus, our constructed suicidal ideation has three response levels: 'considered suicide in the past 12 months, considered suicide previously and never considered suicide'.

Four types of social support were evaluated using the Medical Outcomes Study Social Support Survey: emotional and informational support (e.g. empathic understanding and guidance), tangible support (e.g. material or behavioural assistance), positive social interaction (e.g. doing fun things together) and affection (e.g. love and affection). Previous research has shown this scale to have a Cronbach Alpha of 0.97.[36]

The self-esteem scale addresses positive self-regard and is a subset of the Rosenberg six-item self-esteem scale. The items have been calculated into one dimension by factor analysis, with item loading ranging from –0.46 to 0.79.[37] This scale has reasonable test–retest reliability ($R^2 = 0.42$).[38]

Sense of mastery, an index to determine the extent to which people believe they control their own life chances, is based on a widely used scale by Pearlin and Schooler (1978) which has been shown to have reasonable test–retest reliability ($R^2 = 0.44$).[38]

Health-care utilization. Self-perceived unmet health-care needs for an emotional or mental health issue were determined by respondents' answers to the following two questions: 'During the past 12 months, was there ever a time when you felt that you needed health care but you didn't receive it?'.

Respondents' contact with mental health-care professionals was determined by the question: 'In the past 12 months, have you seen or talked on the telephone to a health professional about your emotional or mental health?'. Those who answered 'yes' were asked how many times they visited a mental health professional (coded as no visits, 1–3 visits, 4 or more visits). Respondents were then asked 'Whom did you see or talk to' (i) family doctor (ii) psychiatrist and/or (iii) psychologist.

Use of a family doctor was determined through the following question: 'Not counting when you were an overnight patient in a hospital, nursing home or convalescent home, in the past 12 months, how many times have you seen, or talked on the telephone, about your physical, emotional or mental health with a family doctor or general practitioner?'. Responses were dichotomized into never/ever.

Medication use characteristics. Respondents from certain health districts were asked 'In the past month, that is, from 1 month ago until yesterday, did you take antidepressants such as Prozac, Paxil or Effexor'.

Statistical analyses strategy

Individuals with CFS who were depressed were compared to those who were not depressed. Chi-square analyses were conducted for categorical variables and independent *t*-tests were conducted for interval and ratio level variables. A multivariate logistic regression analysis was also conducted using the demographic and health characteristics. The use of family physicians by depressed and non-depressed individuals with CFS was compared to that of those without CFS using the full sample of the CCHS to conduct a two-way analysis of variance. In keeping with the recommendations of Statistics Canada, all per cents, means, standard deviations, prevalence ratios and odds ratios (ORs) were calculated using standardized CCHS sampling weights to adjust for the probability of selection.[9] The sample sizes are always presented in their unweighted form. All analyses were performed using the Statistical Package for Social Sciences version 15.0.[39]

Results

Thirty-six per cent of the respondents with CFS were depressed in the 12 months preceding the survey. In the bivariate analyses, individuals with CFS were more likely to be depressed if they were female, not married, younger, poorer and to have experienced food insecurity than were the non-depressed (see Table 1). Twenty-one per cent of all the respondents with CFS had experienced food insecurity in the preceding year.

Depression rates were higher in those who had numerous self-reported chronic conditions in addition to CFS, who reported their activities were prevented due to pain and who had limitations in their ADLs. Those with lower levels of mastery and self-esteem had higher rates of depression. In all four types of social support investigated, the depressed respondents had significantly lower levels of support (see Table 2).

There was an interaction effect between pain, social support and depression. Emotional social support was not related to depression levels among individuals who did not have any activities limited by pain (see Fig. 1). However, among individuals who were limited in their activities due to pain, those with low emotional social support had significantly higher levels of depression than those with high social support.

The vast majority of depressed individuals with CFS (91%) had seen their family doctor in the past year. Individuals with CFS who were depressed were particularly heavy users of family doctor services, with an average of 11.1 visits [95% confidence interval (CI) =

10.7, 11.6] per year. This is significantly higher than those with CFS who were not depressed (7.0 visits, 95% CI = 6.7, 7.4), individuals without CFS who were depressed (5.8. 95% CI = 5.8, 6.0) and individuals without CFS or depression (2.9, 95% CI = 2.9, 3.0). These data may underestimate the actual number of visits by depressed individuals with CFS since the number of visits was top coded at 30. One in every 11 depressed individuals with CFS visited their family doctor 30 or more times in the preceding year.

Yet, only 31% of the depressed respondents reported that they had spoken with their family doctor about mental health issues. Seventeen per cent of depressed individuals with self-reported CFS had consulted with a psychiatrist and 15% had consulted with a psychologist. Two in five depressed individuals had not consulted with any mental health professional. In contrast, 43% had at least four consultations with a mental health professional. In the smaller subsample of those asked about medication use, 41% of depressed respondents were using antidepressants. Twenty-two per cent of depressed respondents had seriously considered suicide in the past 12 months. An additional 25% had considered suicide at an earlier time.

The logistic regression analysis indicates that among those with CFS, females have 58% higher odds of depression than males (see Table 3). In comparison to those 60 and older, younger respondents have more than twice the odds of depression. In comparison to those with high income, individuals with CFS with middle incomes had 54% higher odds and individuals with low income had 78% higher odds of depression. Similarly, those individuals with CFS who reported sometimes not having enough money to purchase adequate food had 59% higher odds of depression in comparison to those with adequate income for nutrition. Of the health-related variables, only that of activities limited by pain was statistically significant (OR = 1.59).

Discussion

Prevalence of depression among those with CFS

Our finding of a 36% prevalence rate of depression in this representative Canadian sample is comparable to the 32% rate found in a US community-based sample of individuals with chronic fatigue.[9] These rates are many times higher than that of the general Canadian population where an estimated 5.6% have a 12-month prevalence of major depression.[40] This is consistent with previous research regarding the elevated rates of depression among individuals with chronic health conditions,[4] such as CFS. More specifically, individuals suffering from medically unexplained physical symptoms, including CFS, are twice as likely to experience

TABLE 1   *Bivariate comparisons of respondents with CFS who were depressed (n = 369) versus those who were not depressed (n = 676)*

Variable	Total (n)	Depressed (%)[a]	P-value[b]
Demographic characteristics			
Gender			
Female	767	39.6%	
Male	278	27.4%	<0.001
Marital status			
Not married	556	42.7%	
Married	488	30.5%	<0.001
Age			
12–29	116	39.5%	
30–59	702	40.8%	
60–oldest	227	17.5%	<0.001
Age, mean (SD)			
Not depressed	676	49.1 (16.4) years	
Depressed	369	43.4 (13.5) years	<0.001
Education			
<High school	337	36.8%	
>High school	699	35.3%	0.65
Race			
Visible minority	73	43.5%	
White	959	35.2%	0.09
Immigrant status			
Yes	127	38.1%	
No	914	35.6%	0.51
Income adequacy			
Low	322	51.0%	
Middle	247	38.2%	
High	398	29.6%	<0.001
Total household income, mean (SD)			
Not depressed	608	$41 460 (25 990)	
Depressed	357	$36 480 (27 230)	0.01
Food security			
Never hungry	786	31.7%	
Sometimes hungry due to inadequate funds to buy food	253	54.8%	<0.001
Health characteristics			
Self-perceived health			
Fair/poor	654	38.2%	
Good/excellent	390	32.7%	0.08
Number of chronic conditions			
One condition	128	28.6%	
Two conditions	169	30.2%	
Three or more conditions	725	39.8%	0.01
Actions prevented by pain			
Does not prevent	368	26.6%	
Prevents	676	40.1%	<0.001
Limitations in ADL			
No	874	33.2%	
Yes	171	51.2%	<0.001
Limitations in instrumental activities of daily living			
No	574	34.2%	
Yes	471	38.6%	0.14
Health care utilization characteristics			
Unmet			
No	648	29.9%	
Yes	394	46.9%	<0.001
Number of visits to mental health professional			
None	669	23.4%	
1–3	147	40.8%	
4–12+	229	67.1%	<0.001

TABLE 1   *Continued*

Variable	Total (n)	Depressed (%)[a]	P-value[b]
Family doctor user			
No (0 visit)	71	25.6%	
Yes (1–30+ visits)	972	37.1%	0.05

Source: CCHS 2000–2001.
[a]In keeping with the recommendations of Statistics Canada, all per cents, means and standard deviations were calculated using standardized CCHS sampling weights to adjust for the probability of selection and non-response. The sample sizes are always presented in their unweighted form.
[b]P-values based on chi-square analyses for categorical variables and t-tests for interval and ratio level variables.

a psychological episode.[41] Furthermore, the rates of depression among those with CFS appear to be much higher than those found in other chronic illnesses, such as inflammatory bowel disease (16.3%),[20] rheumatoid arthritis (15%),[42] chronic back pain (20%)[43] and type 2 diabetes (19%).[44]

Demographic, intrapsychic, interpersonal and health-related factors associated with depression

Our nationally representative study supports the majority of findings of the previous research on depression and CFS from regional community samples and from clinical samples. In accordance with the previous literature on demographic characteristics associated with depression among those with CFS[9] and among those with other chronic illnesses,[20,22] we found that being younger and/or female was associated with depression. Both socio-economic status, in general[45] and food insecurity,[20] a measure of extreme poverty, was associated with an increased risk of depression. Marital status was associated with depression in the bivariate but not the logistic regression analyses. Unlike previous research on depression among individuals with inflammatory bowel disease,[20] education level and immigrant status were not significantly related to depression. Although the association between immigrant status and CFS was not significant in this analysis, it would be helpful if other studies would investigate this under-researched topic with larger sample sizes.

All intrapsychic and interpersonal variables examined by independent t-tests reached statistical significance. As had been found with other chronic illnesses, depression was associated with having lower self-esteem,[46] lower sense of mastery[26,47] and lower levels of social support.[10,48] The finding that availability of emotional social support buffers the relationship between pain and depression is in keeping with studies on other painful chronic conditions.[20,49] Unfortunately, social support and the intrapsychic variables

were not asked of all respondents and therefore could not be included in the logistic regression analyses. Future research would benefit from more focused

TABLE 2 *Bivariate comparisons of intrapsychic and interpersonal characteristics of respondents with CFS who were depressed versus those who were not depressed*

Variable	Total (n)	Mean[a] (SD)	P-value[b]
Intrapsychic characteristics			
Self-esteem, mean (SD)			
Depressed	72	16.2 (4.6)	<0.001
Not depressed	124	18.9 (3.6)	
Mastery, mean (SD)			
Depressed	123	14.2 (5.9)	<0.001
Not depressed	213	18.5 (4.8)	
Interpersonal characteristics			
Emotional/informational support, mean (SD)			
Depressed	227	22.9 (8.5)	0.007
Not depressed	410	24.8 (7.8)	
Positive social interaction, mean (SD)			
Depressed	228	11.5 (4.5)	0.003
Not depressed	412	12.6 (3.9)	
Affection, mean (SD)			
Depressed	228	9.3 (3.3)	0.021
Not depressed	412	10.0 (2.9)	
Tangible social support, mean (SD)			
Depressed	227	11.4 (4.5)	0.024
Not depressed	410	12.3 (4.1)	

Source: CCHS 2000–2001[c].
[a]Questions asked in only some health regions. Unweighted sample size ranges from 196 for self-esteem scale to 640 for positive social interaction scale.
[b]In keeping with the recommendations of Statistics Canada, all means and standard deviations ratios were calculated using standardized CCHS sampling weights to adjust for the probability of selection and non-response. The sample sizes are always presented in their unweighted form.
[c]P-values based on chi-square analyses for categorical variables and t-tests for interval and ratio level variables.

analyses on these variables and their association with depression in a multivariate model.

Unlike previous research on CFS, we were able to add several health-related characteristics into the multivariate analyses (i.e. self-reported health status, number of chronic conditions and whether activities were prevented by pain). Although the number of chronic conditions was significantly associated with depression in the bivariate analysis, it was no longer a significant factor in the logistic regression when 'pain' was included in the analyses. The change in the Nagelkerke R^2 measure indicates that health-related characteristics added only a modest amount to the explanatory power of the model once demographic characteristics were accounted for.

The cross-sectional nature of our data prohibits conclusions about the direction of association and the mechanisms by which CFS may be related to depression. Future longitudinal research using nationally representative data will aid in theory development. In particular, future longitudinal research on CFS patients may benefit from examining the validity of the biopsychosocial model of depression, which has been supported in recent longitudinal studies of rheumatoid arthritis[50] and more generalized research on individuals with chronic pain and depression.[51] A biopsychosocial perspective theorizes that depression is a consequence of interactions among physical, psychological (e.g. self-esteem and helplessness) and social factors (e.g. social support).[50] Our cross-sectional findings are in keeping with the model's hypothesized relationships.

Utilization of family doctors, mental health services and antidepressants among depressed CFS patients
Individuals with CFS and depression were extremely heavy users of family physician services, even when compared to non-depressed individuals with CFS and to individuals who were depressed who do not have CFS. Despite this heavy use, this study's findings
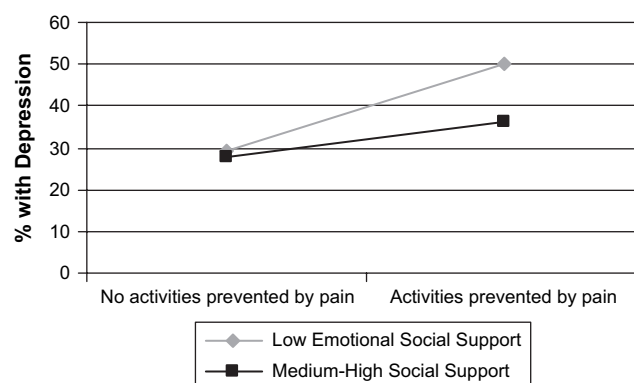

FIGURE 1 *Percent of individuals with depression by levels of pain and social support (source: CCHS 2000–2001, unweighted n = 634 individuals with CFS). Chi-square for no activities prevented by pain = 0.05, P = 0.83; chi-square for activities prevented by pain = 4.56, P = 0.03*

TABLE 3 *Summary of multivariate logistic regression of respondents with CFS who were depressed versus those who were not depressed*

Independent variables	OR[a] (95% CI)
Demographic characteristics	
Gender: female	1.58** (1.13, 2.20)
Marital status[b]: married/common law	0.80 (0.58, 1.12)
Age[c]	
12–29	2.63** (1.49, 4.66)
30–59	3.45*** (2.18, 5.46)
Education[d]: high school graduate	0.94 (0.69, 1.29)
Race[e]: white	0.92 (0.54, 1.58)
Immigrant status[f]: immigrant	1.17 (0.76, 1.78)
Income adequacy[g]	
Lower income	1.78** (1.19, 2.67)
Middle income	1.54* (1.07, 2.22)
Food insecurity[h]	
Sometimes hungry due to inadequate funds to buy food	1.59 (1.09, 2.34)
Health-related characteristics	
Self-reported health[i]: fair/poor health	0.91 (0.66, 1.27)
Chronic health conditions[j]	
CFS + 1 other chronic condition	1.01 (0.60, 1.70)
CFS + 2 or more chronic conditions	1.36 (0.86, 2.15)
Activities prevented by pain[k]	1.59* (1.11, 2.26)
Summary statistics	
–2 Log L	1115
Nagelkerke R^2	0.149[k]

Source: CCHS 2000–2001, *n* = 929.
[a]In keeping with the recommendations of Statistics Canada, all ORs and CIs were calculated using standardized CCHS sampling weights to adjust for the probability of selection and non-response. The sample sizes are presented in their unweighted form.
[b]Reference category: divorced/widowed/single.
[c]Reference category: respondents aged 60 and older.
[d]Reference category: did not finish high school.
[e]Reference category: member of a visible minority.
[f]Reference category: born in Canada.
[g]Reference category: upper income category (adjusted for family size).
[h]Reference category: always enough funds to buy food.
[i]Reference category: excellent/very good/good health.
[j]Reference category: only CFS and no other chronic health conditions.
[k]Change in Nagelkerke R^2 due to demographic characteristics: 0.130; change in Nagelkerke R^2 due to health-related characteristics: 0.019.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

underline the gaps in service provision to individuals with CFS who are depressed. The most efficacious interventions for depression are antidepressant medication and/or psychotherapeutic interventions.[52] Only two in five depressed individuals with CFS were receiving antidepressants in the month preceding the survey. This is substantially greater than the study of Brown *et al.*[4] study involving patients in primary care settings which indicated that one-third of depressed individuals were receiving antidepressant medication treatment. Unfortunately, we do not have information on the percentage of depressed individuals who had been prescribed antidepressants but chose to discontinue use due to side effects or a lack of therapeutic response. Clinical research indicates a large proportion of depressed clients prematurely discontinue antidepressants for these reasons.[53] It is also important to note that only a minority of health regions included the question on antidepressants and, therefore, findings on antidepressant use are only representative of those health regions.

Although depressed individuals with CFS had very frequent contact with their family physician, seven of 10 reported they had not discussed mental health issues with their family physician in the preceding year. Even when psychiatrist, psychologists and other health professionals were considered, 40% of depressed individuals with CFS reported that they had not discussed any mental health issues in the past year with any health professionals. Similarly, Halm and Segal (2005) found that patients with depression often fail to seek health care.[54] However, given the frequency of depression among individuals with chronic health conditions, patients may misinterpret his/her experience of depressive symptoms.[4]

The prevalence of suicidal ideation among depressed individuals with CFS

Our findings indicate that 22% of the depressed respondents with CFS had seriously considered suicide in the past 12 months and an additional 25% had seriously considered it during an earlier time period. Since our findings indicate that medical professionals see almost all CFS patients on at least an annual basis, there is great potential for effectively identifying these individuals through regular screenings for depression and suicidal ideation and subsequently referring and/or treating those suffering from these mental health conditions.

Limitations

There are several limitations inherent in this study. First, as was the case in previous studies,[55] individuals were classified as having CFS through self-report of previous medical diagnosis. This substantially underestimates those suffering from CFS; a recent study by the Centers for Disease Control and Prevention indicates that only 16% of those with CFS have been diagnosed by a medical professional.[56] It would have been preferential to have a medical exam or to have access to medical records. Secondly, classification of depression was not by a health professional. This study used a valid and reliable tool, the Kessler and Mroczek's scale based on a subset of items from the CIDI.[34,57] Further research exploring risk factors for depression among individuals with CFS would benefit from the use of actual physician diagnosis of depression. Thirdly, several variables explored in the bivariate analyses (e.g. antidepressant use) were only included in a subset of health regions. Thus, findings for these variables are representative of these regions and not of the national population.

Despite these limitations, the present study has expanded existing literature regarding CFS and depression by providing the largest nationally representative study identifying the demographic and health characteristics associated with depression in individuals with CFS. Any discrepancies between the findings of our study and previously published studies of depression and CFS could be due to the limitations discussed above and/or to the fact our study used a nationally representative community sample, as opposed to a clinical sample.

Our findings underscore the importance of having clinicians screen for depression and suicidal ideation in their patients with CFS,[3,14,25,55] with particular targeting of those who have low incomes, substantial pain and limited social supports.

Declaration

References

1   Fukuda K, Straus S, Hickie I, Sharpe M, Dobbins J, Komaroff A. The chronic fatigue syndrome: a comprehensive approach to its definition and study. *Ann Intern Med* 1994; **121:** 953–959.

2   Prins J, Van Der Meer JVM, Bleijenberg G. Chronic fatigue syndrome. *Lancet* 2006; **367:** 346–355.

3   Sharpe M. Psychiatric diagnosis and chronic fatigue syndrome: controversies and conflicts. *J Ment Health* 2005; **14:** 269–276.

4   Brown C, Dunbar-Jacob J, Palenchar DR *et al.* Primary care patients' personal illness models for depression: a preliminary investigation. *Fam Pract* 2001; **18:** 314–320.

5   Bazelmans E, Vercoulen J, Swanink C *et al.* Chronic fatigue syndrome and primary fibromyalgia syndrome as recognized by GPs. *Fam Pract* 1999; **16:** 602–604.

6   Jason L, Richman J, Rademaker A *et al.* A community-based study of chronic fatigue syndrome. *Arch Intern Med* 1999; **159:** 2129–2137.

7   Evengard B, Jacks A, Pedersen N, Sullivan P. The epidemiology of chronic fatigue in the Swedish Twin Registry. *Psychol Med* 2005; **35:** 1317–1326.

8   Wessely S, Chalder T, Hirsch S, Wallace P, Wright D. The prevalence and morbidity of chronic fatigue and chronic fatigue syndrome: a prospective primary case study. *Am J Public Health* 1997; **87:** 1449–1455.

9   Taylor RR, Jason LA, Jahn SC. Chronic fatigue and sociodemographic characteristics as predictors of psychiatric disorders in a community-based sample. *Psychosom Med* 2003; **65:** 896–901.

10   Assefi N, Coy TV, Uslan D, Smith WR, Buchwald D. Financial, occupational, and personal consequences of disability in patients with chronic fatigue syndrome and fibromyalgia compared to other fatiguing conditions. *J Rheumatol* 2003; **30:** 804–808.

11   Taillefer S, Kirmayer KJ, Robbins JM, Lasry JC. Psychological correlates of functional status in chronic fatigue syndrome. *J Psychosom Res* 2002; **53:** 1097–1106.

12   Johnson SK, DeLuca J, Natelson. Depression in fatiguing illness: comparing patients with chronic fatigue syndrome, multiple sclerosis and depression. *J Affect Disord* 1996; **39:** 21–30.

13   Ciccone DS, Busichio K, Vickroy M, Natelson BH. Psychiatric morbidity in the chronic fatigue syndrome: are patients with personality disorder more physically impaired? *J Psychosom Res* 2003; **54:** 445–452.

14   Henderson M, Tannock C. Use of depression rating scales in chronic fatigue syndrome. *J Psychosom Res* 2005; **59:** 181–184.

15   Bernklev T, Jahnsen J, Lygren I, Henriksen M, Vatn M, Moum B. Health-related quality of life in patients with inflammatory bowel disease measured with the short form-36: psychometric assessments and a comparison with general population norms. *Inflamm Bowel Dis* 2005; **11:** 909–918.

16   Guthrie E, Jackson J, Shaffer J, Thompson D, Tomenson B, Creed F. Psychological disorder and severity of inflammatory bowel disease predict health-related quality of life in ulcerative colitis and Crohn's disease. *Am J Gastroenterol* 2002; **97:** 1994–1999.

17   Andelman F. Analysis of quality of life among adolescents with epilepsy. *Int J Adolesc Med Health* 2000; **12(suppl 1):** 17–24.

18   Janke K, Klump B, Gregor M, Meisner C, Haeuser W. Determinants of life satisfaction in inflammatory bowel disease. *Inflamm Bowel Dis* 2005; **11:** 272–286.

19   Kurdyak PA, Gnam WH. Medication management of depression: the impact of comorbid chronic medical conditions. *J Psychosom Res* 2004; **57:** 565–571.

20   Fuller-Thomson E, Sulman J. Depression and inflammatory bowel disease: findings from two nationally representative Canadian surveys. *Inflamm Bowel Dis* 2006; **12:** 697–707.

21   Patten SB, Williams JV, Wang J. Mental disorders in a population sample with musculoskeletal disorders. *BMC Musculoskelet Disord* 2006; **7:** 37–46.

22   Tsai P. Predictors of distress and depression in elders with arthritic pain. *J Adv Nurs* 2005; **51:** 158–165.

23   Kalia LV, O'Connor PW. Severity of chronic pain and its relationship to quality of life in multiple sclerosis. *Mult Scler* 2005; **11:** 322–327.

24   Jolly M. How does quality of life of patients with systemic lupus erythematosus compare with that of other common chronic illnesses? *J Rheumatol* 2005; **32:** 1706–1708.

25   Michielsen HJ, Van Houdenhove B, Leirs I, Vandenbroeck A, Onghena P. Depression, attribution style and self-esteem in chronic fatigue syndrome and fibromyalgia patients: is there a link? *Clin Rheumatol* 2006; **25:** 183–188.

26   Creswell C, Chalder T. Underlying self-esteem in chronic fatigue syndrome. *J Psychosom Res* 2002; **53:** 755–761.

27   Powell R, Dolan R, Wessely S. Attributions and self-esteem in depression and chronic fatigue syndromes. *J Psychosom Res.* 1990; **34:** 665–673.

28   Bombardier CH, Buchwald D. Chronic fatigue, chronic fatigue syndrome, and fibromyalgia: disability and health-care use. *Med Care* 1996; **34:** 924–930.

29   Twemlow SW, Bradshaw SL Jr, Coyne L, Lerma BH. Patterns of utilization of medical care and perceptions of the relationship between doctor and patient with chronic illness including chronic fatigue syndrome. *Psychol Rep* 1997; **80:** 643–658.

30   Reynolds KJ, Vernon SD, Bouchery E, Reeves WC. The economic impact of chronic fatigue syndrome. *Cost Eff Resour Alloc* 2004; **2:** 4–12.

31   Statistics Canada. *Canadian Community Health Survey: 2000/2001.* Statistics Canada: Ottawa, http://www.statcan.ca/english/sdds/document/3226_DLI_D1_T22_V1_E.pdf (accessed on September 15, 2008).

32   Statistics Canada, The Canadian Community Health Survey (CCHS)–cycle 1.1. Statistics Canada: Ottawa, http://www.statcan.ca/english/concepts/health/content.htm (accessed on September 16, 2008).

33   Béland Y, Dufour J, Hamel M. *Preventing Non-response in the Canadian Community Health Survey. Proceedings of Statistics Canada's Symposium 2001: Achieving Data Quality in a Statistical Agency, a Methodological Perspective.* Statistics Canada: Ottawa, http://www.statcan.ca/english/freepub/11-522-XIE/2001001/session9/s9d.pdf (accessed on September 15, 2008).

34   Kessler RC, Andrews G, Mroczek D *et al.* The World Health Organization Composite International Diagnostic Interview Short Form (CIDI-SF). *Int J Methods Psychiatr Res.* 1998; **7:** 171–185.

[35] American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Third revised edition. Washington, DC: American Psychiatric Association, 1987.

[36] Sherbourne CD, Stewart AL. The MOS social support survey. *Soc Sci Med* 1991; **32:** 705–714.

[37] Pearlin L, Schooler C. The structure of coping. *J Health Soc Behav* 1978; **19:** 2–21.

[38] Wilson A, Hickie I, Hadzi-Pavlovic D *et al.* What is chronic fatigue syndrome? Heterogeneity within an international multicentre study. *Aust N Z J Psychiatry* 2001; **35:** 520–527.

[39] SPSS Inc. *Statistical Package for Social Sciences, Version 15*. 2006. Chicago: SPSS Inc.

[40] Beaudet MP. Depression. *Health Rep* 1996; **7:** 11–25.

[41] Verhaak PFM, Meijer SA, Visser AP, Wolters G. Persistent presentation of medically unexplained symptoms in general practice. *Fam Pract* 2006; **23:** 414–420.

[42] Pincus T, Griffith J, Pearce S, Isenberg D. Prevalence of self-reported depression in patients with rheumatoid arthritis. *Br J Rheumatol* 1996; **35:** 879–883.

[43] Currie S, Wang J. Chronic back pain and major depression in the general Canadian population. *Pain* 2004; **107:** 54–60.

[44] Engum A, Mykletun A, Midthjell K, Holen A, Dahl AA. Depression and diabetes: a large population-based study of sociodemographic, lifestyle, and clinical factors associated with depression in type 1 and type 2 diabetes. *Diabetes Care* 2005; **28:** 1904–1909.

[45] Everson SA, Maty SC, Lynch JW, Kaplan GA. Epidemiologic evidence for the relation between socioeconomic status and depression, obesity, and diabetes. *J Psychosom Res.* 2002; **53:** 891–895.

[46] Symister P, Friend R. The influence of social support and problematic support on optimism and depression in chronic illness: a prospective study evaluating self-esteem as a mediator. *Health Psychol* 2003; **22:** 123–129.

[47] Tower RB, Krasner M. Marital closeness, autonomy, mastery, and depressive symptoms in a U.S. Internet sample. *Pers Relatsh* 2006; **13:** 429–449.

[48] 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:** 307–316.

[49] Sewitch MJ, Abrahamowicz M, Bitton A *et al.* Psychological distress, social support, and disease activity in patients with inflammatory bowel disease. *Am J Gastroenterol* 2001; **96:** 1470–1479.

[50] Covic T, Adamson B, Spencer D, Howe G. A biopsychosocial model of pain and depression in rheumatoid arthritis: a 12-month longitudinal study. *Rheumatology* 2003; **42:** 1287–1294.

[51] Campbell L, Clauw D, Keefe F. Persistent pain and depression: a biopsychosocial perspective. *Biol Psychiatry* 2003; **54:** 399–409.

[52] U.S. Preventive Services Task Force. *Screening for Depression: Recommendations and Rationale.* http://www.ahrq.gov/clinic/3rduspstf/depression/depressrr.htm (accessed on November 12, 2006).

[53] Walsh CM, Zainal NZ, Middleton SJ, Paykel ES. A family history study of chronic fatigue syndrome. *Psychiatr Genet.* 2001; **11:** 123–128.

[54] Hahm HC, Segal SP. Failure to seek health care among the mentally ill. *Am J Orthopsychiatry* 2005; **75:** 54–62.

[55] Smith WR, Noonan C, Buchwald D. Mortality in a cohort of chronically fatigued patients. *Psychol Med* 2006; **36:** 1301–1306.

[56] Reyes M, Nisenbaum R, Hoaglin DC *et al.* Prevalence and incidence of chronic fatigue syndrome in Wichita, Kansas. *Arch Intern Med* 2003; **163:** 1530–1536.

[57] Kessler RC, McGonagle KA, Zhao S, Nelson CB. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Study. *Arch Gen Psychiatry* 1994; **51:** 8–19.