ORIGINAL INVESTIGATION

A Community-Based Study of Chronic Fatigue Syndrome

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Background: Most previous estimates of the prevalence of chronic fatigue syndrome (CFS) have derived largely from treated populations, and have been biased by differential access to health care treatment linked with sex, ethnic identification, and socioeconomic status.

Objective: To assess the point prevalence of CFS in an ethnically diverse random community sample.

Design and Participants: A sample of 28 673 adults in Chicago, Ill, was screened by telephone, and those with CFS-like symptoms were medically evaluated.

Main Outcome Measures and Analyses: Self-report questionnaires, psychiatric evaluations, and complete medical examinations with laboratory testing were used to diagnose patients with CFS. Univariate and multivariate statistical techniques were used to delineate the overall rate of CFS in this population, and its relative prevalence was subcategorized by sex, ethnic identification, age, and socioeconomic status.

Results: There was a 65.1% completion rate for the telephone interviews during the first phase of the study. Findings indicated that CFS occurs in about 0.42% (95% confidence interval, 0.29%-0.56%) of this random community-based sample. The highest levels of CFS were consistently found among women, minority groups, and persons with lower levels of education and occupational status.

Conclusions: Chronic fatigue syndrome is a common chronic health condition, especially for women, occurring across ethnic groups. Earlier findings suggesting that CFS is a syndrome primarily affecting white, middle-class patients were not supported by our findings.

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THE ESTIMATED annual direct and indirect cost to the community for each person with chronic fatigue syndrome (CFS)[1] has been projected to be $9436.[2] In addition, the quality of life for individuals with CFS has been found to be significantly lower than for other chronic illness groups.[3-6] Because the functional disability associated with CFS results in a marked interruption of work and family life, the syndrome has important implications related to public health and policy.[7]

Few studies of the distribution of fatigue[8,9] and CFS[10-13] have used community-based samples.[14] Many prevalence studies of fatigue have been based on physician referrals from hospitals and community-based clinics.[15] Epidemiological studies that relied on referrals from physicians at medical clinics underestimated prevalence because many low-income individuals lack access to the health care system, and many with fatigue drop out of it.[16] Thus, individuals identified in these studies do not represent the total population of ill patients.[7,17,18]

In 1993, Jason and colleagues[19,20] interviewed a random community-based sample. Individuals who self-reported having CFS or many of the symptoms of CFS were examined by a physician and interviewed by a psychiatrist to determine whether they met CFS case criteria. The research team diagnosed 0.2% of the sample as having current CFS, which was higher than expected, given rates from past epidemiological studies. This rate of 200 per 100 000 was 20 to 50 times higher than that originally reported by the Centers for Disease Control and Prevention.[10] The sample size for this study, however, was relatively small (N = 1031). Another CFS epidemiological study using a random sample by Buchwald and associates[21] also found higher CFS rates than the original Centers for Disease Control and Prevention study: 75 to 267 per 100 000 in a sample of individuals enrolled in a health

PARTICIPANTS AND METHODS

These data derive from a community-based study of CFS that was carried out in 2 phases. In phase 1, 28 673 adults representing a stratified random sample were screened for CFS-like symptoms using a telephone survey. In phase 2, a structured psychiatric interview was administered to respondents from phase 1 who had positive test results for CFS-like symptoms, based on the initial screen (≥6 months of fatigue and at least 4 minor symptoms based on the 1994 CFS criteria of Fukuda et al[1]), and to a random sample of individuals who had negative test results for CFS-like symptoms, based on the initial screen. Phase 2 also involved a complete physical examination, laboratory tests, and a structured medical history form. The institutional review boards of DePaul University and Mercy Hospital and Medical Center, both in Chicago, approved this investigation.

SAMPLE

Procedures developed by Kish[27] were used to select 1 adult aged 18 years or older from each household; the person with the most recent birthday was interviewed. We used a stratified random sample from 8 Chicago neighborhoods that were 10 to 15 minutes from the site of the medical examinations. The neighborhood residents were from diverse ethnic and socioeconomic groups. Telephone numbers were obtained from Survey Sampling Inc, Fairfield, Conn, which generated random telephone numbers using valid Chicago prefixes (details of the procedures are presented elsewhere[26]).

MEASURES

The phase 1 CFS Screening Questionnaire[28] assessed interviewees' sociodemographic characteristics and established verbal consent to participate in a telephone survey, clarifying aspects of confidentiality. Basic demographic data included sex, ethnic identification, age, occupation, current work status, education, and marital status. The revised scoring rules for the scale by Hollingshead (A. B. Hollingshead, unpublished data, 1975), developed and validated by Wasser,[29] were used to construct a definition of socioeconomic status. Using the formula by Wasser, socioeconomic status was estimated from data on occupation and education for each participant, resulting in 3 categories: (1) unskilled and semiskilled workers, (2) skilled workers, and (3) professionals. The first part of the phase 1 screening questionnaire also contained the Fatigue Scale[30] and other questions assessing quality and duration of fatigue.

The Fatigue Scale provides a continuous distribution of fatigue scores. Despite its brevity, this scale was reliable and valid, possessing good face validity and reasonable discriminant validity. The 11-item scale has responses rated on a 4-option continuum; total scores range from 0 to 33 (with higher scores signifying greater fatigue).

Interviewees who reported that they had severe fatigue, extreme tiredness, or exhaustion for 6 months or longer were asked additional questions on the CFS Screening Questionnaire that assessed more specific dimensions of their fatigue. These questions assessed several symptoms that are commonly experienced by people with CFS, including minor symptoms, as defined by the current Centers for Disease Control and Prevention criteria.[1] The screening scale used in this study demonstrated high discriminant validity and excellent test-retest and interrater reliability.[28]

In phase 2, the Structured Clinical Interview for *DSM-IV* (SCID)[31] was used to assess current and lifetime psychiatric diagnoses, as defined on Axis I of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.[32] The SCID is a valid and reliable semistructured interview guide that approximates a traditional psychiatric interview[33]; it has been successfully used to assess psychiatric disorders in samples of people with CFS.[34]

The Medical Questionnaire is a modified version of the Chronic Fatigue Questionnaire, a structured instrument developed by Komaroff and Buchwald and used by Komaroff and associates.[35] Before the physician examination, the Medical Questionnaire was administered to all participants to assess current and past medical history. This comprehensive instrument assessed symptoms related to CFS and other medical and psychiatric symptoms to help rule out exclusionary conditions, such as human immunodeficiency virus and acquired immunodeficiency syndrome, active malignant neoplasms, iatrogenic conditions resulting from the adverse effects of medication use, unresolved hepatitis, and active substance use. In addition, the Medical Questionnaire measured fatigue severity, CFS-related social role impairment, psychosocial stressors, job satisfaction, toxic exposures before CFS onset, chemical sensitivities, presence of CFS in other network members, and family medical history. Because sleep disturbances are often reported by individuals with CFS, the Sleep Disturbance Questionnaire, which has been validated experimentally in a sleep laboratory,[36] was also incorporated into the Medical Questionnaire to help identify participants with sleep disorders. Back-translated, Spanish-language versions of all measures were administered to individuals choosing to respond in Spanish.

INTERVIEWER SELECTION AND TRAINING

Twenty interviewers with previous survey research experience were recruited; details about their training are presented elsewhere.[26] Telephone calls were made Mondays through Fridays from 9 AM to 8 PM and Saturdays and Sundays from 10 AM to 8 PM. If the interviewer continued to reach an answering machine after 7 attempts on a variety of days and times, a message was left on the eighth attempt giving the standard introduction and requesting that the person call the survey group to be interviewed. If no calls were answered after 10 attempts, the probability of it being a residence was considered low and the telephone number was excluded and no longer pursued. Interviewers were instructed to ask for only the respondent's first name or initials. Respondents were assured of confidentiality in the standard introduction.

Individuals were considered ineligible if they reported being too ill to be interviewed or not speaking English or Spanish. Response rate was calculated by dividing the number of completed interviews by the number of eligible adults with whom contact was attempted, either successfully or unsuccessfully. Nonrespondents were defined on the basis of calls in which eighth-attempt answering machine messages were not returned or the household or designated person refused to be interviewed.

PHASE 1

In phase 1, the CFS Screening Questionnaire[28] was administered and individuals were classified into groups based

on fatigue status. Individuals who indicated not experiencing severe fatigue, extreme tiredness, or exhaustion for 1 month or longer composed the no fatigue group. Individuals who indicated severe fatigue, extreme tiredness, or exhaustion for 1 to 5 months were defined as having prolonged fatigue. Individuals who indicated severe fatigue, extreme tiredness, or exhaustion for 6 months or longer were defined as having chronic fatigue (CF). Chronic fatigue syndrome–like illness (CFS-like) was defined as unexplained, persistent, or relapsing chronic fatigue for 6 months or longer, with an absence of medical exclusionary diseases that might be causing the fatigue. In addition, 4 or more minor symptoms needed to be present[1] (eg, sore throat, muscle pain). Similarly, individuals with CF who did not meet the full minor symptom criteria composed the idiopathic chronic fatigue–like illness (ICF-like) group, and those who verbally self-reported 1 or more medical conditions that would preclude a CFS-like diagnosis composed the chronic fatigue explained–like condition.

Individuals in the CFS-like group were defined as screened positives. All others were defined as screened negatives, including those in the no fatigue, ICF-like, and CF explained–like groups. We used the term *like* after the labels CFS, ICF, and CF explained after phase 1 screening to clarify the tentative nature of these labels; participants had not yet undergone psychiatric and medical evaluation to completely rule out exclusionary conditions.

PHASE 2

Participants in the CFS-like group (screened positives) and a control sample that screened negative on the phase 1 CFS Screening Questionnaire (screened negatives) were invited by telephone to participate in phase 2. Participants were told this was a study of fatigue, and the objective was to examine different degrees of fatigue, from low to high. Individuals agreeing to participate completed the psychiatric interview (SCID) by telephone. Other researchers[37,38] have successfully used telephone contacts to collect psychiatric data. Trained advanced clinical psychology graduate students with master's degrees administered the SCID.

After the SCID interview, participants underwent complete medical examination, at which time they were asked to sign the Human Subjects Consent Form, which explained in detail the nature of all aspects of participation, and a medical records release form so that their medical records from previous episodes of care could be obtained and reviewed later by an independent panel of physicians. At the time of evaluation, the examining physician (A.V.P.) was unaware of any participant's status with respect to both initial classification based on the phase 1 screen and results of the psychiatric interview. In addition, the examining physician was not provided access to any written medical history gathered on participants unless findings from his examination precipitated him to order results from specialized laboratory testing completed before the patient's participation in this study. The examining physician conducted a detailed medical examination at Mercy Hospital and Medical Center to rule out exclusionary medical conditions and to detect evidence of diffuse adenopathy, hepatosplenomegaly, synovitis, neuropathy, myopathy, cardiac or pulmonary dysfunction, or any other medical disorder. An 18-tender-point examination was used to test for fibromyalgia.[39] Laboratory tests administered to all participants included a chemistry screen (glucose, calcium, electrolytes, uric acid, and liver and renal function tests), complete blood cell count with differential and platelet cell counts, thyroxine and thyrotropin, erythrocyte sedimentation rate, arthritic profile (which included rheumatoid factor and antinuclear antibody), hepatitis B surface antigen, creatine kinase, human immunodeficiency virus screen, and urinalysis. An intradermal, intermediate-strength purified protein derivative skin test was performed, and a posteroanterior chest radiograph was taken—if not already obtained by the participant—within 8 months of entering the study. Participants were given the results of the medical examination and laboratory tests, and those with identified abnormalities were referred to their primary care physician or clinic.

At the end of phase 2, a team of 4 physicians and a psychiatrist made the final diagnoses. Two physicians independently rated each file using the current US definition of CFS.[1] If a disagreement occurred, a third physician rater was used. To control for reviewer bias effects, physicians on the review panel were masked to the diagnoses of the other reviewer(s) as well as the diagnoses of the physician who conducted the medical examinations. All 213 participants who underwent physician review in phase 2 were diagnosed in 1 of 4 ways: those who met the current US definition of CFS[1] were given a final diagnosis of CFS; those not meeting full CFS criteria but possessing unexplained CF and no exclusionary medical conditions detected in evaluation were given a final diagnosis of ICF; those with exclusionary medical or psychiatric conditions detected in evaluation were given a final diagnosis of CF explained; and the remaining individuals evaluated as having no CF were given a final diagnosis of no fatigue.

DATA ANALYSES

The primary objective of this investigation was to estimate the point prevalence of CFS. Point prevalence data were calculated using statistical methods used by Shrout and Newman[40] for a 2-phase survey design, in which a different (in this case higher) proportion of screened positives than screened negatives is evaluated for further disease diagnosis. **Table 1** illustrates the numeric breakdown of participants as they progressed through both phases of the present investigation. Using these data, the point prevalence of CFS and its SE were estimated according to the methods described by Shrout and Newman as follows:

$$p = \frac{[x(c)/a + y(d)/b]}{\mathrm{n}} = \frac{[408(32)/166 + 18\,260(0)/47}{18\,668} = \frac{78.65}{18\,668} = 0.00422 = 422/100\,000$$

where p indicates the prevalence of CFS; n, total number of respondents screened in phase 1; x, number of screened positives; y, number of screened negatives ($y = n - x$); a, number of screened positives evaluated in phase 2; b, number of screened negatives evaluated in phase 2; c, number of screened positives evaluated in phase 2 diagnosed as having CFS; and d, number of screened negatives evaluated in phase 2 diagnosed as having CFS.

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Additional analyses were conducted to address the following secondary objectives: (1) to examine the differential prevalence rates of CFS across sociodemographic variables; (2) to compare the CFS, ICF, CF explained, and control groups in terms of sociodemographic variables; (3) to explore the rates of psychiatric comorbidity across all 4 groups; (4) to compare duration of fatigue and age at onset of fatigue across the CFS, ICF, and CF explained groups; (5) to compare the CFS, ICF, and CF explained groups in terms of whether a physician was overseeing the fatigue-related illness; and (6) to compare the frequency and proportion of fatigue-related symptoms[1] across the CFS, ICF, and CF explained groups. χ^2 And *t* tests were used to test differences in proportions and means, respectively, between all 4 groups. When a test across multiple groups was significant ($P<.05$), pairwise comparisons among the groups were performed at .05 and .01 levels. An SAS statistical package[41] was used to conduct statistical tests.

Table 1. Frequency Data on Selection for Diagnostic Evaluation, Completion of Diagnostic Evaluation, and Diagnostic Outcomes for Participants Screening Positive and Negative for CFS-like Illness (N = 28 673)*

	Participants, No.	
	Screened Positive	Screened Negative
Completed initial screening phase 1†	408	18 260
Selected for phase 2 evaluation	408	199
Completed physician review phase 2	166	47
Final diagnosis		
CFS	32	0
ICF	45	1
CF explained‡	89	2
No fatigue	0	44

**The total includes all the working residential numbers to which attempts at contact were made. Of these 28 673 households, actual telephone contact was established with 18 675. CSF indicates chronic fatigue syndrome; ICF, idiopathic CF.*

†Seven individuals were not included because fatigue-related information was missing.

‡Nineteen participants had melancholic depression, 3 had bipolar disorders, 4 had anorexia nervosa or bulimia nervosa, 7 had psychotic disorders, 25 had drug- or alcohol-related disorders, and 33 had medical explanations for their fatigue.

maintenance organization. Because these respondents all had access to a health maintenance organization, those lacking access to the health care system were underrepresented. Steele and colleagues[22] conducted a community-based survey in San Francisco, Calif, and found that the prevalence of CFS-like disorders was an estimated 200 per 100 000. However, this study collected self-report data but lacked medical and psychiatric evaluations. Thus, the CFS-like disorders may have encompassed a heterogeneous set of disorders similarly characterized by high levels of fatigue. In Great Britain, Wessely and associates[23] determined that 2600 per 100 000 of a primary health care setting sample had CFS. In another study in Great Britain, Lawrie and colleagues[24] estimated the prevalence of CFS to be 740 per 100 000. Unfortunately, neither of these British studies used complete medical examinations as a means of diagnosing CFS.

Prevalence studies[8,10,25] often do not evaluate the relation between ethnicity and fatigue, or they collapse different ethnic categories and fail to adequately measure the complexities of ethnicity so that classification becomes vague. However, the overall set of studies,[21,22,26] to date, indicates that women are at greater risk for chronic fatigue (CF) than are men. By contrast, Wessely and associates[15] reviewed CFS epidemiological studies conducted around the world and concluded that findings indicating that patients with CFS come from upper social classes are probably a function of selection bias based on access to particular health care settings. Rates of CFS vary widely, and it is likely that discrepancies across epidemiological studies reflect nonrandom, nonrepresentative sampling strategies. Earlier studies seem to have underrepresented underserved minorities, who have been shown to manifest higher levels of chronic illness while being less likely to receive adequate care or be counted in epidemiological rates derived from treatment sources. Moreover, estimates of rates according to sex have confounded the differential susceptibility to illness with help-seeking behaviors.[18] Therefore, the present study attempted to determine the overall rate of CFS in a socioeconomically and ethnically diverse community-based sample of adults in Chicago, Ill.

RESULTS

In phase 1, we called 28 673 working residential telephone numbers and completed the interview for 18 675 households (65.1%). This is a conservative number because it includes households in which an answering machine was reached. If we included only those working residential numbers for which we reached an eligible household (N = 24 953) and did not count answering machines, the completion rate would be 74.8%.

According to the phase 1 screen, of the 18 675 interviewees, 16 453 (88.1%) had no prolonged fatigue or CF, 1435 (7.7%) had prolonged fatigue, and 780 (4.2%) had CF (7 participants did not answer the fatigue questions). Among 780 respondents with CF, at phase 1304 (39.0%) had ICF-like illness (eg, not enough minor symptoms to be eligible for a CFS diagnosis), 68 (8.7%) had a CF explained–like condition, and 408 (52.3%) had CFS-like profiles.[1] All 408 members of the CFS-like group were invited to participate in phase 2, and the physician review team reviewed data on 166 (40.7%) of them after phase 2 evaluation; see Table 1 for frequency data on final diagnoses.

The control group comprised individuals selected randomly from the 18 260 screened negatives (groups included participants with no prolonged fatigue or CF, prolonged fatigue, ICF-like illness, and CF explained–like illness). Of 199 screened negative controls randomly selected for evaluation after phase 1, the physician review team reviewed data on 47 (23.6%) after phase 2 evaluation; see Table 1 for frequency data on final diagnoses.

First, an independent samples *t* test was executed to compare fatigue scale scores[30] between the 166 screened positive (CFS-like) participants and the 242 screened positive (CFS-like) nonparticipants; it revealed no significant differences between groups. χ^2 Analyses were then executed to compare the same groups in terms of sex, ethnic identification, age, occupation, education, and marital status; analyses revealed no significant differences. Identical analyses were performed to compare participants and nonparticipants selected for phase 2 evaluation in the screened negative group (eg, individuals in the no fatigue, prolonged fatigue, ICF-like, and CF explained–like groups). Analogous to findings within the screened positive group, *t* test analysis comparing fatigue scale scores[30] between the 47 screened negative participants and the 152 screened negative nonparticipants revealed no significant differences. Similarly, χ^2 analyses comparing the same groups in terms of sex, ethnic identification, age, occupation, education, and marital status revealed no significant differences. In summary, given that participants (those medically evaluated and physician reviewed) and nonparticipants (those refusing medical evaluation and physician review) did not differ significantly with respect to fatigue scale scores and sociodemographic characteristics, these results provide evidence that support the assumption of equivalent prevalence rates between participants and nonparticipants.

Table 2 presents data on the point prevalence of CFS. The estimated prevalence rate for CFS was 0.42% (95% confidence interval, 0.29%-0.56%). Table 2 also presents prevalence estimates of CFS according to sociodemographic subcategories of sex, ethnic identification, age, and socioeconomic status. The prevalence of CFS was substantially higher among women than men. Individuals in Latino, other (which included 1 Asian American, 1 American Indian, and 1 multiracial individual), and African American groups exhibited higher rates of CFS than whites, with Latino participants demonstrating the highest CFS prevalence. Individuals in the 40- to 49-year-old age range exhibited the highest rates of CFS. In terms of socioeconomic status, the prevalence of CFS was highest among skilled workers and lowest among professionals.

Table 3 presents sociodemographic and psychiatric data comparing the CFS, ICF, CF explained, and control groups. For these analyses, the control group included 2 screened negative participants diagnosed as having CF explained and 1 screened negative participant diagnosed as having ICF after physician review. Individuals in the CFS, ICF, and CF explained groups reported significantly higher levels of fatigue[30] than controls. Significantly higher frequencies of women than men were observed in the CFS, ICF, and CF explained groups than in controls. With respect to occupation, the CF explained group differed significantly from controls, with individuals in the CF explained group demonstrating lower levels of occupational status than controls. In terms of work status, a significantly higher number of individuals in the control group reported working full-time compared with those in the CFS, ICF, and CF explained groups, who were more likely to be unemployed, receiving disability income, or working part-time. Individuals in the ICF and CF explained groups exhibited significantly lower levels of educational attainment than controls. Individuals in all 4 groups did not differ significantly with respect to ethnic identification, age, or marital status. (Identical analyses were conducted after removing the 2 screened negative individuals diagnosed as having CF explained and the 1 screened negative individual diagnosed as having ICF from the control group, and placing them into the CF explained and ICF groups, respectively. There were no differences in findings after this relocation of participants.) χ^2 Analyses of psychiatric data demonstrated that a significantly higher frequency of individuals in the CFS, ICF, and CF explained groups received current and lifetime Axis I *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition,* psychiatric diagnoses compared with controls. χ^2 Analysis of the relationship between onset of fatigue and onset of psychiatric disorder revealed no significant differences between the CFS, ICF, and CF explained groups, with all groups receiving more psychiatric diagnoses after fatigue onset than before.

Kruskal-Wallis analysis comparing the median number of minor symptoms of fatigue[1] revealed no significant differences among the CFS, ICF, and CF explained groups (**Table 4**). Similarly, these groups did not differ significantly in terms of fatigue duration or age at onset of fatigue (Table 4). With respect to the issue of having a physician oversee the fatigue-related illness, χ^2 analyses revealed that individuals in the CFS, ICF, and CF explained groups did not differ significantly (Table 4).

Table 4 also presents results of χ^2 analyses comparing minor symptoms of fatigue[1] across the CFS, ICF, and CF explained groups, which consistently revealed no significant differences.

Table 2. Prevalence Rates (± SEs) of CFS (Conditions per 100 000 Persons)*

	Respondents, No.	Individuals With CFS, No.	CFS Prevalence Rate
Total	18 668	32	422 ± 70†
Sex			
Women	10 507	23	522 ± 103
Men	8110	9	291 ± 91
Race			
White	9715	15	318 ± 77
Latino	3447	9	726 ± 227
African American	3691	5	337 ± 145
Other	1614	3	491 ± 258
Age, y			
18-29	6618	8	315 ± 103
30-39	4718	8	412 ± 138
40-49	2611	9	805 ± 249
50-59	1716	3	413 ± 229
≥60	2668	4	354 ± 168
Occupation			
Unskilled/semiskilled worker	4233	9	486 ± 156
Skilled worker	3415	11	701 ± 195
Professional	8587	12	325 ± 87

*CFS indicates chronic fatigue syndrome.
†The 95% confidence interval for the estimate of prevalence in the overall sample is 285-559.

Table 3. Fatigue Scale Scores, Sociodemographic Characteristics, and Medical History by Fatigue Diagnosis in 213 Participants Who Underwent Physician Review*

	Group			
	CFS (n = 32)	ICF (n = 45)	CF Explained (n = 89)	Control (n = 47)
Fatigue scale score, mean ± SD	19.77 ± 4.95†	19.00 ± 5.51†	19.61 ± 4.66†	13.40 ± 3.97
Age, y, %				
18-29	25.0	22.2	16.9	29.8
30-39	25.0	35.6	25.8	23.4
40-49	28.1	20.0	23.6	17.0
50-59	9.4	13.3	14.6	19.2
≥60	12.5	8.9	19.1	10.6
Race, %				
African American	15.6	24.4	25.8	29.8
White	46.9	44.5	36.0	55.3
Latino	28.1	24.4	32.6	6.4
Other	9.4	6.7	5.6	8.5
Sex, %				
Women	71.9‡	77.8‡	73.0‡	48.9
Men	28.1‡	22.2‡	27.0‡	51.1
Marital status, %				
Married	40.6	31.1	18.0	27.7
Ever married	31.3	31.1	37.1	23.4
Never married	28.1	37.8	44.9	48.9
Education, %				
Some or less than high school	15.6	13.4†	34.8†	8.5
High school degree or part college	40.6	51.1†	47.2†	31.9
Standard college degree	31.3	33.3†	13.5†	38.3
Graduate/professional degree	12.5	2.2†	4.5†	21.3
Occupation, %				
Unskilled worker	25.0	24.4	34.8‡	17.0
Skilled worker	6.3	11.1	21.4‡	4.3
Clerical worker	18.8	15.6	11.2‡	19.2
Technician	15.6	6.7	15.7‡	10.6
Manager	18.7	28.9	13.5‡	25.5
Administrator	15.6	13.3	3.4‡	23.4
Current work status, %				
Receiving disability income	15.6†	9.1†	21.4†	4.3
Unemployed	20.5†	22.7†	21.4†	4.3
Working part-time	12.5†	15.9†	6.7†	8.5
Working full-time	40.6†	47.7†	38.2†	76.6
Retired	5.3†	4.6†	12.4†	6.4
Psychiatric diagnosis, %				
Current	54.8†	56.8†	77.5†	23.4
Lifetime	80.6†	72.7†	93.3†	44.7
Before fatigue onset	40.7	41.0	27.9	NA

**CFS indicates chronic fatigue syndrome; ICF, idiopathic chronic fatigue; CF, chronic fatigue; and NA, not applicable.*
†*Differs from control group* $P<.05$.
‡*Differs from control group,* $P<.01$.

COMMENT

Data from this study indicate that CFS is a more common chronic condition, overall affecting 422 per 100 000 in the population, or about 836 000 people in the United States (based on the current US population count of 198 107 000 adults aged 18 years and older.[42]) It is possible that CFS rates may be higher than this estimate, given that some individuals with CFS may have escaped detection because of being too ill to undergo the evaluation process. Previous estimates using the current Centers for Disease Control and Prevention criteria[1] have ranged widely, from 75 to 2600 per 100 000, suggesting significant methodological and sampling discrepancies between studies.[43]

The rate found in this investigation is substantially higher than that reported in a study of similar design in Wichita, Kan, in which Reeves[44] estimated the rate of CFS to be 238 per 100 000. This discrepancy might be explained by differences between the 2 investigations in terms of the sociodemographic composition of the populations sampled. Most participants in the Wichita sample were white, whereas about half of the participants in the present sample were Latino, African American, or other. Our conclusions must be qualified since the Chicago population is restricted in geography and urbanicity.

Wessely and associates[23] recently determined that 2.6%, or 2600 per 100 000, of a primary health care setting sample had CFS. This rate is markedly higher than that reported by both Reeves[44] and the present investi-

gation. The higher prevalence rate of Wessely and associates might be because their sample did not receive rigorous, controlled evaluation for exclusionary medical and psychiatric disorders. Wessely and associates administered a simple biochemical screening and gathered medical records on participants, but they did not evaluate them in a comprehensive, controlled manner. Moreover, they used the Revised Clinical Interview Schedule, an instrument that was not designed to detect specific exclusionary psychiatric conditions, as defined by the current CFS criteria[1] (eg, melancholic depression, drug abuse or dependence, alcohol abuse or dependence, anorexia nervosa, bulimia nervosa, and psychotic disorders).

Historically, the relation between CFS and sex has represented an additional source of interest and political controversy among scientists. Consistent with estimates reported in many previous investigations,[43] CFS prevalence rates for women in the present study are markedly higher than for men, with 522 women and 291 men afflicted per 100 000. Comparing the prevalence of CFS with that of other diseases in women, CFS emerges as a serious women's health concern (acquired immunodeficiency syndrome, 12 per 100 000; breast cancer, 26 per 100 000; lung cancer, 33 per 100 000; diabetes, 900 per 100 000; hypertension, 3000 per 100 000; heart conditions, 3400 per 100 000; and arthritis, 3800 per 100 000).[42] Although most investigators report elevated prevalence rates of CFS among women,[8,10,22] atypical reports of higher rates of CFS in men,[11] or equivalent rates among men and women,[21,45] have contributed to ambiguity surrounding this issue. Given this lack of clarity, some researchers[18] have questioned the authenticity of findings of increased CFS rates in women. The present investigation, which found a predominance of CFS in women within a random sample, might involve certain predisposing vulnerabilities that may be more prevalent in women than in men. These could include biological factors such as reproductive correlates[46] and biopsychosocial factors such as stress-associated immune modulation.[47]

Another important finding from the present study concerns the relation between ethnic identification and CFS. This study used a multiethnic, urban community sample to explore whether previous investigations may have underrepresented the prevalence of CFS in certain ethnic groups by collapsing ethnic categories,[8,21] sampling predominantly white populations,[44] or simply not attending to issues related to ethnicity in analyses.[23] Elevated rates of CFS in Latinos and African Americans compared with whites may be partly explained by a predominance of findings indicating consistently poor or deteriorating health status among certain underserved ethnic groups that face various forms of psychosocial stress.[48] Interacting factors contributing to poorer health status among underserved ethnic groups may include psychosocial stress, behavioral risk factors (use of alcohol and tobacco and lack of sufficient exercise), differences in health care practices (inadequate nutrition and lack of routine medical examinations), barriers to access to adequate health care (lack of health insurance and inadequate health care), and more hazardous occupations and environmental exposures.[49-51] In addition to these factors, Rogers and associates[52] highlight the importance of demographic variables as contributors to compromised health status. Low income, household crowding, marital status loss, parental status, unemployment, language and acculturation, family responsibility, and family size interact with ethnicity to cause elevated morbidity and mortality rates among certain groups.[52,53]

Table 4. Reported Symptoms of Chronic Fatigue (CF) Groups*

	Groups		
	CFS (n = 32)	ICF (n = 45)	CF Explained (n = 89)
Symptoms, median No.	6.0	5.0	5.0
Median duration of fatigue, y	2.5	2.0	1.9
Age at onset of fatigue, y	36.3	37.5	40.4
Physician overseeing the disease, %	51.6	44.4	47.2
Sore throat, %	62.5	44.4	49.4
Painful glands, %	53.1	44.4	47.2
Muscle aches or pain, %	93.8	91.1	91.0
Postexertional malaise, %	75.0	57.8	72.1
New headaches, %	52.4	50.0	64.4
Joint pain, %	84.4	75.6	83.2
Nonrestorative sleep, %	87.5	88.9	80.7
Impaired memory or concentration limits functioning, %	88.5	94.7	88.5

*CFS indicates chronic fatigue syndrome; ICF, idiopathic chronic fatigue.

Because this investigation found particularly high CFS prevalence rates among Latino participants, attributes of the Latino culture in general and characteristics unique to certain subpopulations of Latinos could be contributing to increased rates of CFS in this population. Reflective of the current sociodemographic composition of the area surveyed, the Latino sample in this study primarily comprised Mexican Americans and Puerto Rican Americans. Elevated rates of CFS among Latinos in this sample may reflect a combination of factors, including risk factors contributing to decreased physical health status and a cultural predisposition toward frequent reporting of physical complaints among Latinos.[54,55] Clearly, Mexican Americans and Puerto Rican Americans in Chicago face several risk factors associated with well-established findings for elevated rates of psychosocial stress, psychiatric disorder, and decreased physical health status.[56,57] Because of lack of sufficient education and job skills, language barriers, conflict between Latino subgroups, relative newness to Chicago compared with other immigrant groups, and other forms of social and political oppression, Mexican Americans and Puerto Rican Americans are among the most politically and economically limited groups in Chicago.[57]

Consistent with findings of many investigations,[20-22,45] our findings indicate that CFS exists independently of the natural aging process and tends to peak during middle age. This result suggests that the baby-boomer cohort may be at greater risk for CFS than other cohorts. In this study, CFS was most prevalent among individuals in the 40- to 49-year-old age range and, to a lesser degree, among those in the 50- to 59- and 30- to 39-year-old age ranges. Chronic fatigue syndrome was least prevalent in 18- to 29-year-olds and in those 60 years and older.

With respect to social status, many studies[58-61] describe individuals with CFS as well educated, with middle or upper incomes and professional occupations. However, these descriptions are based on nonrandom samplings of medical facility populations, which presumably have access to care as a result of their social and economic resources. In addition, these results contradict other findings[11,23,24] for minimal social class variation among individuals who report various forms of fatigue. The present investigation found the highest CFS prevalence rates among skilled craftsmen, clerical workers, and sales workers (701 per 100 000); the second highest rates among unskilled laborers, machine operators, and semiskilled workers (486 per 100 000); and the lowest rates among professionals (325 per 100 000).

There were no significant differences between individuals with CFS and controls with respect to marital status, educational attainment, or occupational status. However, individuals with CFS differed significantly from controls with respect to current employment status. Individuals with CFS were more likely to be unemployed, receiving disability income, or working part-time, while controls were more likely to be working full-time. Taken together, these findings do not provide empirical support for the social class stereotype of higher social status among individuals with CFS. Instead, our findings suggest that most individuals with CFS in an urban community sample tend to report middle-to-low socioeconomic status, and a significantly greater number report their current employment status as unemployed, receiving disability income, or working part-time compared with their nonfatigued counterparts.

In addition to issues related to sociodemographic aspects, psychiatric comorbidity represents a key area of interest when exploring the nature of CFS. Consistent with findings from most previous studies, the present study found evidence for significantly higher rates of current and lifetime psychiatric diagnoses in the CFS, ICF, and CF explained groups compared with controls. In this sample, 80.6% of participants with CFS received at least 1 Axis I psychiatric diagnosis within their lifetime, and 54.8% met criteria for at least 1 current Axis I psychiatric diagnosis. These results fall within the upper range of previous reports of lifetime psychiatric diagnoses among individuals with CFS (24.7%-85.7%) and within the middle range of current psychiatric diagnoses (2.0%-76.5%).[34] Consistent with observations by other investigators,[62,63] the present investigation detected a subgroup (19.4%) of individuals with CFS who had never experienced a diagnosable psychiatric illness, thus confirming previous contentions that CFS cannot be entirely attributable to psychological factors. Contrasting some previous findings[64] for high rates of psychiatric morbidity preceding a CFS diagnosis, most participants with CFS (59.3%) in the present investigation did not meet criteria for any lifetime psychiatric diagnosis before onset of fatigue. Rates of lifetime psychiatric diagnosis before fatigue were not elevated in the ICF and CF explained groups. One explanation for increased rates of psychiatric comorbidity across all groups with CF may partly involve interactions between psychosocial stress resulting from compromised social and financial resources (common among underserved, multiethnic urban populations) and emotional distress emerging from the experience of physical symptoms and functional impairment. Evidence for lower rates of lifetime psychiatric diagnosis before fatigue onset favors such an interactive explanation.

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