Correlates of Depression in Primary Care

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Background. Depression is a significant health problem in the United States. This study examined the relationship between depression and substance use, substance problems, conduct disorders, and sociodemographic factors in primary care settings.

Methods. A survey of 1898 patients in 88 primary care offices was conducted using a self-administered health-habits questionnaire. Depression was assessed for both lifetime and for the past 30 days using the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition Revised* (DSM-III-R) criteria.

Results. A total of 21.7% of women and 12.7% of men met DSM-III-R criteria for depression in the 30 days prior to completing the survey. Lifetime rates of depression were 36.1% for women and 23.3 % for men. Young women who smoke, drink, or use marijuana, and both men and women with antisocial personality disorder and a family history of mental health problems are particularly at high risk for depression.

Conclusions. One in 5 women and one in 10 men who see their primary care physicians have recently been depressed.

Key words. Depression, primary care; substance use; substance abuse; conduct disorders.

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Depressive disorders pose a significant health problem in the United States. The Epidemiologic Catchment Area (ECA) Study[1] interviewed a stratified sample from community and institutional populations aged 18 years and older (N=20,000) at five sites in the United States in the late 1970s to estimate rates of depressive disorders and other mental health disorders. Using the Diagnostic Interview Schedule (DIS)[2] based on the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition Revised* (DSM-III-R)[3] criteria for depression, they reported a lifetime prevalence of 7.8% and previous-month prevalence of 2.4%. There was striking similarity among ethnic groups, but marked differences between men and women, as has been noted in several previous studies. The lifetime rates were twice as high for women as for men (10.5% vs 5.2%). There was also a significant cohort effect with depression rates decreasing with age.

The National Co-Morbidity Study (NCS),[4] which was coordinated by a research team at the University of Michigan in 1990–1991, was the first study to administer a structured psychiatric interview (Composite International Diagnostic Interview) to a representative national sample of adults aged 18 to 55 years in the United States. Utilizing a cross-sectional design, face-to-face interviews were conducted by 158 researchers throughout the United States. They found a 21.3% lifetime prevalence of a major depressive episode for women and 12.7% for men, for an overall rate of 17.1%. The corresponding rates for 12-month prevalence were 12.9% for women, 7.7% for men, and 10.3% overall. Lower rates of affective and substance use disorders were noted for African-Americans, and higher rates of these problems were noted for Hispanics. The higher rates of affective disorders found in the NCS as compared with the ECA study may be related to differences in the two samples, changes in the diagnostic instruments and DSM criteria, natural history changes, and interview techniques.

A number of surveys have also been conducted to estimate the prevalence of depressive disorders in primary care settings. Zung et al[5] reported on a series of over 75,000 patients presenting to 765 primary care physi-

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cians. Using the Zung Self-Rating Depression Scale, they found a 20.9% overall prevalence of clinically significant depressive symptoms. They also noted a significant difference in the prevalence of depressive symptoms between women (23.2%) and men (16.1%). Prevalence was inversely related to education. There were also differences by marital status, with divorced, widowed, or separated persons reporting more symptoms than married and single persons. Rucker et al[6] administered the Beck Depression Inventory to 375 patients in an internal medicine clinic that served as the primary facility for indigent patients. Moderate to severe depression was identified in 32% of the patients. Schulberg and Burns[7] reviewed two decades of research into mental disorders in primary care. Investigators in the United States,[2,8–11] using the DIS, have reported lifetime prevalences varying from 15% to 31% among primary care patients.

Given the high prevalence and clinical importance of depressive symptoms, it is important to extend the work on depression to primary care settings in order to identify factors that should alert clinicians to screen more carefully for depression. This is especially important if depression in the primary care population is a substantially different entity from that seen in the psychiatric care population, as suggested by Schulberg and Burns.[7] Factors of interest in our study included sex, age, education, employment, household size, substance use, conduct disorders, antisocial personality disorders, health habits, and family history of mental health and addictive disorders. These are all variables that have been suggested as individually important in the studies of depression reviewed above. To our knowledge, this study represents the first time in which all of these variables have been reported in a primary care setting, which permits combined analysis to determine the relative importance of individual factors associated with depression. In this descriptive study, the 1-month and lifetime prevalence of major depression is also estimated for a population drawn from a diverse sample of clinics in urban and rural primary care settings.

Methods

A self-administered health screening survey (HSS) was offered to all adult patients (ages 18 to 65; N=19,151) presenting to one of the 88 primary care physicians' offices participating in Project TrEAT (Trial of Early Alcohol Treatment). The methodology and results of this trial are in preparation (Fleming MF, Barry K. The effectiveness of brief advice with problem drinkers in community-based primary care settings, 1995; unpublished data). The HSS is a masked screening instrument designed to assess smoking, exercise, weight, and alcohol use in the previous 3 months. The instrument was developed by Wallace and Haines[12] and modified by Fleming and Barry[8] for use in brief intervention alcohol trials to minimize the intervention effect of the alcohol use questions. A random sample of 10% of the respondents (n=1898) was also asked to complete an extended form that asked additional questions regarding depression, conduct disorders, drug use and problems, and family history of other mental health or substance abuse problems. This report presents the findings on rates of depression and associated factors in this 10% subgroup.

The HHS was distributed to patients on arrival and collected before departure by clinic reception staff. Surveys were not given to persons who were unable to complete the questionnaire because of severe illness or a physical disability. Women who were pregnant were not eligible until postpartum. The rate of patient refusal varied by clinic, with a range of 5% to 30% and a weighted mean of 13%. The most common reasons given for patient refusal were lack of time or feeling too ill to complete the questionnaire.

Demographic data included ethnicity, household size, marital status, age, education, and occupation.

Depression was assessed by first asking the DIS probe question, which was whether the respondent had ever had a 2-week period of feeling sad, blue, or depressed nearly every day. Those who responded "yes" were then asked the 12 confirmatory questions, which reflect DSM-III-R criteria for major depression. The number of episodes of depression and the number of suicide attempts were also ascertained.

Questionnaires were scored using the standard criteria for major affective disorder utilized in the DIS; ie, persons who answered positively to both the probe question and four or more of the seven symptom groups were defined as "ever depressed in their lifetime." The first group of symptoms included loss of appetite or weight loss, or increased appetite or weight gain. The second symptom group included being unable to get to sleep, being unable to sleep through the night, or sleeping too much. The third symptom group involved loss of energy or fatigue. The fourth was either loss of enjoyment in usual activities or loss of interest or pleasure in sex. The fifth symptom grouping included either the presence of extreme guilt or feeling worthless. The sixth symptom category addressed by the questionnaire was whether the respondent had trouble concentrating or thinking. The final symptom was either suicidal thoughts or suicide attempts. To assess recent depression, the respondents were asked to indicate whether they had experienced any of the confirmatory symptoms during the past 30 days. The criterion for depression in the 30 days preceding the survey was four or more positive answers.

Alcohol use was ascertained by first asking patients if they had consumed alcoholic beverages during the past 3

months. Those who responded "yes" were then asked more detailed questions regarding consumption: quantity and frequency of beer, wine, or liquor consumed per week and number of episodes of binge drinking (five or more drinks per single occasion) during the 3-month period. The four CAGE* screening questions[13] were also included in the HSS.

Respondents were also questioned regarding the use of other mood-altering drugs. Categories of drug use included tranquilizers, sleeping pills, marijuana, stimulants, cocaine, narcotics, PCP, psychedelics, and inhalants. Additional questions addressed past problems with alcohol or drugs, or both.

Conduct disorders and antisocial personality disorders (ASP) were also identified using the DIS questions in a checklist. The presence of symptoms both before and after age 15 was queried. A probable conduct disorder was defined by a positive response of three or more symptoms before age 15. A probable ASP disorder was considered present if persons responded in the affirmative to four or more symptoms after the age of 15. As with the ECA, highly sensitive questions were not asked. Family history questions were based on the work of Andreasen[9] and inquired about mental health and alcohol and drug problems of the father, mother, brothers, sisters, daughters, sons, and stepparents.

Univariate comparisons for all categorical data were initially analyzed using Mantel-Haenszel chi-square, adjusting for sex as warranted. Within categories, odds ratios and 95% confidence intervals were calculated for univariate comparisons of interest. A forward stepwise multivariate logistic regression model using statistical significance $P<.05$ for inclusion was then used to further examine the factors found to be significantly associated with major depression in the univariate analyses and to adjust for confounding. Adjusted odds ratios and 95% confidence intervals are reported. Since the study methodology did not provide a way to immediately check forms for missing responses, not all questions were answered by all respondents. The multivariate model only includes the respondents for whom a complete data set is available.

Results

Sociodemographics

Of the 1898 HSS questionnaires completed in the sample, 1865 answered questions regarding demographics (sex) and depression symptoms. This population is reported in this paper. A comparison of this population with the total TrEAT Project population (N=19,151) found no significant differences by age, sex, ethnicity, education, or use of alcohol and tobacco smoking. The population is a well-educated and ethnically homogeneous group, with 90% describing themselves as white, 21% completing 4 or more years of college, and another 35% having attended college. There are nearly twice as many women (n=1187) as men (n=678) in the population described.

Depression by Sociodemographic Variables

Women were more likely than men to report symptoms consistent with one or more episodes of major depression in their lifetime (36.1% vs 23.3%, respectively; $\chi^2(1)=33.0$, $P<.001$). The prevalence of depression during the month preceding the clinic visit was also significantly higher: 21.7% for women compared to 12.7% for men ($\chi^2(1)=23.0$, $P<.001$). Sixteen percent of persons (6.1% of women, 3.7% of men) who reported ever having been depressed in their lifetime also reported one or more suicide attempts.

Overall education was not a significant factor, but for women who had at least a bachelor's degree, there were significantly lower rates of depressive symptoms in the previous 30 days than for those with less education (odds ratio [OR]=0.53; 95% CI, 0.35 to 0.80); $\chi^2(1)=9.10$, $P=.003$). When reported depressive symptoms are examined by age group, there are statistically significant differences ($\chi^2(4)= 24.3$, $P<.001$) between the groups. There is a marked division between those under age 50 and those over age 50, with the older group being only one half as likely to have met criteria for major depression in their lifetime (OR=0.50; 95% CI, 0.39 to 0.64) or in the last 30 days (OR= 0.46; 95% CI, 0.33 to 0.64).

Marital status exerted a highly significant effect in rates of depression for both 30-day ($\chi^2(2)=21.8$, $P<.001$) and lifetime ($\chi^2(2)=22.0$, $P<.001$) depression. Over 40% of men and women who were separated, widowed, or divorced met criteria for major depression at some time in their lives. Single men, whether never married or previously married and now divorced, widowed, or separated, had three times the risk of major depressive symptoms in the last 30 days when compared with currently married men (OR=3.01; 95% CI, 1.86 to 4.87). Similar findings were noted for lifetime depression in men (OR=2.45; 95% CI, 1.64 to 3.65). Single women also had significantly higher rates of 30-day and lifetime depression than did married women (OR=1.60; 95% CI, 1.15 to 1.94), but the odds ratios were one half that of men (OR=1.49; 95% CI, 1.15 to 1.94).

Current household size was significantly associated with differing rates of depression in men but not women.

*CAGE is a standard screening instrument used to assess the possibility of a drinking problem by means of four questions: (1) Have you ever felt you should cut down on or stop drinking? (2) Have people annoyed you by criticizing your drinking? (3) Have you felt guilty or bad about your drinking? (4) Have you been waking up in the morning wanting an alcoholic drink (eyeopener)?

Men who lived alone were more likely to be depressed. They reported significantly higher 30-day (34.4%) and lifetime (43.5%) prevalences, as compared with 10.8% and 20.6%, respectively, for men living in households of two or more persons ($\chi^2(2)=17.00$, $P<.001$, and $\chi^2(2)=23.45$, $P<.001$).

Significant differences in rates of lifetime depression by standard occupational category were noted for both sexes ($\chi^2(8)=24.0$, $P=.004$ for women and $\chi^2(8)=15.8$, $P=.045$ for men). The highest rates of depression over lifetime and in the last 30 days were observed among the unemployed, students, and women either in service occupations or nontraditional female occupations, such as forestry, farming, or mechanical production. The lowest rates of depression were noted for retired persons.

Depression by Alcohol and Other Drug Use

Table 1 presents the frequency of depression over lifetime and in the last 30 days by cigarette, alcohol, and drug use as well as by self-reported alcohol and drug problems.

Alcohol

As noted in Table 1, heavy alcohol use and alcohol problems were associated with higher rates of depression in both men and women. Those who drank four or more drinks per day ($\chi^2(1)=6.23$, $P=.013$), who ever had a drinking problem ($\chi^2(2)=35.8$, $P<.001$), or who responded positively to the CAGE questions ($\chi^2(4)=18.9$, $P=.001$) had significantly greater rates of depression. There were minimal differences in depression for different levels of alcohol use below an average of four drinks per day. There was a significant association between depression and binge drinking in women. The prevalence of recent depression was 28.6% for those who had had at least one binge drinking episode of five or more drinks during the previous 3 months as compared with 20.3% for those who did not ($\chi^2(1)=6.7$, $P=.010$).

There was an even stronger association between depression in the last 30 days and self-acknowledged drinking problems: for women, 47% of those who reported a problem vs 19% who did not report a problem ($\chi^2(2)=40.1$, $P<.001$); for men, 25.5% vs 10.3%, respectively ($\chi^2(2)= 18.3$, $P<.001$). For men who reported ever having had a drinking problem, the risk of depression during the last 30 days was three times higher when compared with those who had not (OR=2.96, 95% CI, 1.76 to 4.98). Odds were similarly increased for women (OR=3.62, 95% CI, 2.18 to 6.00). The increased risk of depression at some point during lifetime was of a similar magnitude: for men, OR=3.38 (95% CI, 2.17 to 5.25) and for women, OR=2.79 (95% CI, 1.67 to 4.67).

The CAGE screening score, based on symptoms over the last 60 days, was also associated with a markedly increased risk of depression in the last 30 days for both sexes. Prevalence of depression for women with a CAGE score of 3 or more as compared with zero was 52.0% vs 20.7%, OR=3.98 (95% CI, 2.21 to 7.15). For men, the corresponding values were 28.1% vs 10.0%, OR=3.09 (95% CI, 1.37 to 6.96). Depression among men with a CAGE score of 4 (n=6) compared with those scoring zero was 50.0% vs 10.0%, OR=7.50 (95% CI, 1.48 to 37.88)

Drug Use

Twenty-three percent (429 of 1858 respondents) reported using drugs to get high at least five times in their lifetime. Compared with those who did not report using drugs, there was a significantly increased frequency of depression among those who did use drugs during the last 30 days (28.2% vs 15.5%; $\chi^2(1)=35.1$, $P<.001$), and in those who have experienced lifetime depression (46.3% vs 27.0%; $\chi^2(1)=56.4$, $P<.001$).

Women who used only marijuana five or more times to get high were twice as likely as those who did not use drugs to be currently depressed (OR=1.99; 95% CI, 1.27 to 3.12). However, marijuana had no significant influence on depression among men (OR=1.37; 95% CI, 0.67 to 2.77). Both men and women who used other drugs had more than three times the risk of lifetime depression: for women, OR=3.09 (95% CI, 2.04 to 4.69); for men, OR=3.67 (95% CI, 2.19 to 6.15).

Among subjects who reported ever having a drug problem, the association with depression was even stronger. Compared with those who reported never having a drug problem, men who reported drug problems were nine times as likely to have lifetime depression (OR=8.96; 95% CI, 4.01 to 20.05), and women who reported drug problems were four times as likely to have lifetime depression (OR=4.07; 95% CI, 1.75 to 9.44). The odds ratios for depression during the last 30 days were nearly identical for men (OR=8.09; 95% CI, 3.79 to 17.30) and women (OR=4.04; 95% CI, 1.82 to 8.97).

Tobacco Use

The number of tobacco users in the last 3 months was nearly identical for men and women, 28.7% overall. Risk of depression for current cigarette smokers in this population was twice that of nonsmokers, with the odds of depression in the last 30 days calculated to be 2.13 (95% CI, 1.67 to 2.71) and over lifetime, 1.92 (95% CI, 1.55 to 2.37)

Table 1. Frequency of Depression Over Lifetime and in Last 30 Days, by Substance Use, Substance Problems, and Conduct Disorder

	Depression Prevalence Among Female Patients		Depression Prevalence Among Male Patients	
	Lifetime	30 Days	Lifetime	30 Days
Risk Factor	% (n)	% (n)	% (n)	% (n)
Cigarettes				
Smokers	47.4 (153/323)	31.8 (102/321)	32.6 (62/190)	19.5 (37/190)
Nonsmokers	31.9 (274/860)	18.0 (154/857)	19.7 (96/488)	10.1 (49/485)
Alcohol consumption				
28 or more drinks/week	55.6 (5/9)	55.6 (5/9)	47.1 (8/17)	33.3 (6/18)
14–27 drinks/week	36.8 (14/38)	21.1 (8/38)	13.6 (6/44)	6.8 (3/44)
1–13 drinks/week	36.2 (228/630)	20.5 (130/633)	22.9 (85/371)	10.8 (40/369)
None	36.3 (179/493)	22.9 (111/485)	24.4 (57/234)	15.2 (35/231)
Binge drinking*				
Once or more in past 3 months	41.9 (85/203)	28.6 (58/203)	21.2 (45/212)	13.6 (29/214)
None	35.2 (339/964)	20.3 (195/960)	24.3 (111/457)	12.4 (56/453)
Alcohol problem†				
Ever had problem	59.4 (38/64)	47.0 (31/66)	43.4 (46/106)	25.5 (27/106)
Uncertain	70.0 (14/20)	55.0 (11/20)	35.0 (7/20)	10.0 (2/20)
None	34.3 (362/1054)	19.7 (207/1052)	18.5 (99/535)	10.3 (55/532)
CAGE screening score‡				
4	60.0 (6/10)	60.0 (6/10)	80.0 (4/5)	50.0 (3/6)
3	63.2 (24/38)	50.0 (19/38)	26.9 (7/26)	23.1 (6/26)
2	36.8 (21/57)	22.4 (13/58)	34.8 (16/46)	17.4 (8/46)
1	37.8 (34/90)	27.8 (25/90)	22.2 (16/72)	15.3 (11/72)
0	35.0 (291/831)	20.7 (172/831)	21.0 (95/453)	10.0 (45/451)
Recreational drug use§				
Marijuana only	47.5 (57/120)	28.3 (34/120)	23.0 (17/74)	11.1 (8/72)
Other drugs or multiple drugs	57.4 (78/136)	39.7 (54/136)	49.4 (43/87)	25.6 (22/86)
None	31.5 (285/904)	18.3 (165/902)	18.7 (94/504)	10.5 (53/504)
Drug problem†				
Ever had problem	69.2 (18/26)	52.0 (13/25)	70.0 (21/30)	50.0 (15/30)
Uncertain	50.0 (3/6)	33.3 (2/6)	0.0 (0/5)	0 (0/5)
No problem	35.6 (392/1101)	21.1 (233/1102)	20.6 (128/620)	11.0 (68/618)
Antisocial personality disorder				
Meets criteria	65.7 (23/35)	54.3 (19/35)	46.2 (24/52)	33.3 (17/51)
No	35.3 (401/1137)	21.0 (238/1135)	21.3 (131/616)	11.1 (68/615)
Childhood conduct disorder				
Meets criteria	68.3 (43/63)	52.4 (33/63)	35.7 (30/84)	18.1 (15/83)
No	34.7 (385/1111)	20.2 (224/1109)	21.6 (126/583)	12.0 (70/581)

*Binge drinking refers to >5 drinks on any one occasion.
†Based on patient self-report.
‡Number of positive responses to the four CAGE questions.
§Recreational drug use >5 times over lifetime.
NOTE: CAGE is a standard screening instrument used to assess the possibility of a drinking problem by means of four questions: (1) Have you ever felt you should cut down on or stop drinking? (2) Have people annoyed you by criticizing your drinking? (3) Have you felt guilty or bad about your drinking? (4) Have you been waking up in the morning wanting an alcoholic drink (eyeopener)?

Depression by Childhood Conduct Disorders and Antisocial Personality Disorder

Questions were included in the survey to assess respondents for symptoms of childhood conduct and antisocial personality (ASP) disorders. This study suggests that 7.8% of men and 3.1% of women met probable criteria for a diagnosis of ASP disorder. The frequency of childhood conduct disorders was higher: 12.6% for men and 5.3% for women. As shown in Table 1, there was a substantial increase in the prevalence of depression among those who met the criteria for these disorders, with more than one half of the women who met childhood conduct disorder criteria being positive for current or lifetime depression.

The increased odds of depression were nearly identical for women and men who met the criteria for ASP disorders: for depression in the last 30 days, overall OR=3.42 (95% CI, 2.20 to 5.32) and for depression over lifetime, OR=2.67 (95% CI, 1.74 to 4.11). The increased risk of depression associated with conduct disorders is very similar for both 30 days and lifetime (OR=2.32; 95% CI, 1.60 to 3.34, and OR=2.29; 95% CI, 1.63 to 3.22, respectively).

Depression and Family History

Subjects were asked if their father, mother, siblings, or children had ever been diagnosed with a mental health problem including depression, a nervous breakdown, or severe nervousness. A family history of a mental health problem was positively associated with depression over lifetime and in the last 30 days. The rate of lifetime depression was higher for men who reported that one or both parents had been diagnosed with a mental disorder. Rates were 19.7% if neither parent had a disorder, 34.0% if mother had a disorder, 35.7% if father had a disorder, and 33.3% if both parents had a mental disorder ($\chi^2(3)=9.50$, $P=.023$). For women, the rate of lifetime depression was 31.7% if neither parent had a problem, 46.2% if father had a disorder, 51.4% if mother had a disorder, and 75% if both parents were affected by mental illness ($\chi^2(3)=31.9$, $P<.001$). Similar differences were observed for recent depression. Associations between depression and a family history of mental illness in a sibling or offspring were less marked. There was no statistically significant association noted between depression and a reported family history of alcohol and drug problems.

Correlates of Depression in Primary Care Patients: A Multivariate Logistic Regression Model

To further examine relationships among the variables shown to be associated with depression, a multivariate logistic regression model was developed. Using forward stepwise methods, all univariate items with a $P<.05$ were added to the model in order of strength of association and variables were eliminated at a step if $P>.10$. Since only those questionnaires with complete responses for all questions were analyzed, the model includes 1446 respondents. Several interaction variables, such as alcohol and smoking, were also examined but were not found to be significant. Table 2 presents the adjusted odds ratios and confidence intervals for the variables included in the final model: sex, marital status, family history of mental illness, age, antisocial personality, smoking, positive CAGE, and patient perceptions of drinking, drug, and fitness problems. The strongest variable associated with both recent and lifetime depression was a self-reported drug problem, which significantly increased the risk of depression (adjusted OR=2.54 for lifetime and adjusted OR=3.34 for 30 days).

Two indicators of probable alcohol abuse were also prominently associated. In this model, the CAGE score, which reflected symptoms only over the past 3 months, was important for recent depression but was not a significant indicator for lifetime depression. Respondents with a CAGE score of 3 or more and those who reported a drinking problem were nearly twice as likely to be depressed in the past 30 days (OR=2.14 and 1.71, respectively). Those who were not sure if they had a drinking problem were more likely to be depressed (OR=3.30) than were those who stated they had never had a problem.

Sex was a stable independent variable in both models, with women twice as likely to be depressed both in the last 30 days and in their lifetime. Other salient variables for lifetime depression included parental mental illness (OR=2.24), cigarette smoking (OR=1.55), and marital dissolution (OR=1.50). The model for recent depression varied in that ASP disorder had an adjusted odds ratio of 2.37 and drug use was not significant. Drug use and ASP were the most highly correlated variables ($R^2=.32$), which may explain why one or the other drops out of the stepwise model.

Discussion

The results of this study confirm the high rates of depression in the primary care population. The prevalence of symptoms suggesting major depression in patients within the month preceding their clinic visits underscores the need for primary care clinicians to consider major depression as a diagnostic possibility in patient encounters. As shown in previous studies of depression,[10,11,14,15] women in this population had a substantially higher prevalence of both lifetime and recent depression than men and were also more likely to have attempted suicide.

The strong relationship between high alcohol consumption, alcohol problems, and a high CAGE score noted in this study is consistent with previous studies showing a relationship between alcohol dependence and depression. The biological effects of alcohol as a sedative drug may be a contributing factor. The use of alcohol to facilitate avoidance of or tolerance for stressful, unsatisfactory life circumstances associated with depression may be another factor. There was not a clear linear relationship with quantity consumed, and this variable was not significant in the multivariate model. However, rates of depression were more than 50% higher in persons who drank five or more drinks per day than for lighter drinkers. Although

Table 2. Risk Factors Associated with Depression

Patient Characteristic	Lifetime Adjusted Odds Ratio (95% CI)	30 Days Adjusted Odds Ratio (95% CI)
Female Sex	2.07 (1.56–2.74)	2.28 (1.60–3.24)
Marital status		
Widowed, divorced, or separated	1.50 (1.17–1.92)	1.39 (1.06–1.71)
Never married	1.15 (0.57–1.33)	0.92 (0.57–1.49)
Married	0.77 (0.64–0.92)	0.78 (0.63–0.96)
Parental mental illness history	2.24 (1.66–3.04)	1.56 (1.10–2.21)
Age ≥50 y	0.60 (0.43–0.84)	0.60 (0.40–0.91)
Antisocial personality disorder	NS	2.37 (1.29–4.35)
Cigarette smoking (any in past 3 months)	1.55 (1.18–2.04)	1.44 (1.05–1.98)
CAGE score 3 or 4 (symptoms last 3 months)	NS	2.14 (1.18–3.92)
Drinking problem (self-reported ever)		
Recognizes problem	1.81 (1.18–2.80)	1.71 (1.05–2.79)
Uncertain if a problem	3.05 (1.33–6.98)	3.30 (1.41–7.71)
Recreational drug use (≥5 more times over lifetime)		
Marijuana only	1.29 (0.88–1.89)	NS
Other or multiple drugs	1.92 (1.30–2.84)	NS
Drug problem (self-reported ever)	2.54 (1.17–5.49)	3.34 (1.59–6.98)
Fitness problem (self-reported ever)	1.90 (1.47–2.47)	2.41 (1.74–3.34)

CI denotes confidence interval.

a highly significant correlation was found between binge drinking during the past 3 months and recent depression for women, no correlation with binge drinking was seen for men. These data suggest that not only is alcohol abuse and dependence more highly associated with depression for women, as has been consistently reported in the literature, but also that heavy alcohol use is highly associated. The CAGE screening instrument appears to function differently in men and women, with a score of 3 or 4 for women and 3 for men being equally predictive, but a score of 4 for men being associated with substantially higher odds of depression. This finding, however, may reflect sampling variation, as the numbers are small and confidence intervals wide.

The relationship of childhood conduct disorder and antisocial personality disorders with depression and substance use is a complex issue. Because highly sensitive questions were eliminated, this survey was likely to underestimate the prevalence of ASP, as did the ECA.[1] A number of recent studies, including the ECA and the NCS,[4] suggest that there is a substantial degree of comorbidity between these mental health disorders and substance use disorders. Thus, it is not surprising that our study showed a relationship between personality disorders and alcohol or drug use at levels that may reflect substance abuse. In univariate analyses, depression rates were nearly twice as high among these patients; however, in the regression model, which adjusts for confounding factors, the only statistically significant association found was between depression in the last 30 days and ASP.

A family history of mental health problems was a strong predictor of depression over lifetime and in the last 30 days, whereas a family history of substance abuse was not. The strongest correlation occurred if both parents had a history of mental health problems. The absence of an observed relationship between family history of substance abuse and depression in this sample is inconsistent with the findings of other investigators who have reported higher rates of depression in women whose biological parent had an alcohol problem.[16] This may reflect a difference in depression between primary care and psychiatric care populations or may reflect the questionnaire's imitations in accurately assessing family history.

Marital status and household size data suggest that

marriage is a greater protective factor against depression for men than for women.

This study has a number of strengths and limitations. Its strengths include a large sample size, recruitment of subjects from a large number of community-based primary care practices, a high response rate, and the use of DSM-III-R criteria. The research sites were the practices of 88 primary care physicians located in 10 counties in southern Wisconsin. All the physicians were in full-time practice and no house staff or full-time academic faculty were included in the study. While Project TrEAT was not designed as a national prevalence study, the diversity of the physician sites and the remarkable consistency with the only large survey conducted in a primary care setting as reported by Zung[5] suggest that the findings may be generalizable to other primary care sites. This study achieved a high response rate. Over 86% of the persons who were given the HSS completed the questionnaire while they were waiting to see their physicians. The use of DSM-III-R criteria to classify subjects by their responses to questions contained in the DIS permitted direct comparison with other surveys based on these criteria.

Study limitations include the use of a convenience sample, the relatively racially homogeneous and well-educated midwestern population, and a cross-sectional design relying on retrospective reports to assess the prevalence of lifetime depression. If the patients who declined to participate in the survey because of being "too ill" are more depressed, the results could be biased downward. While the survey data cannot provide a definitive diagnosis of major depression, their consistency with other large national studies suggests that the level of depression detected is reasonably valid. Future research, however, should include greater emphasis on representation of disadvantaged or racially diverse groups since the findings of this study may not be generalizable to those groups.

This study confirms the findings of Zung and colleagues[5] that the prevalence of depression among patients in primary care clinics is nearly double that of the general population. It is thus important that clinicians screen carefully for depression in their patients. The strong association among multiple problems and depression suggests subsets of patients who should be examined more closely for depression: those under the age of 50 years with a parental history of mental illness, a personal history of antisocial behaviors, and the heavy use or abuse of mood-altering substances including tobacco, alcohol, and illicit drugs. Also, men who live alone and have been separated from a spouse by divorce or death are particularly at risk. Noting that 1 in 5 women reported symptoms consistent with major depression in the month preceding their clinic visits, one could reasonably argue that all women should be screened, with particular emphasis on those with the characteristics listed above. These factors are also important in the development of screening instruments for depression.

Physicians and other providers can serve an important function in identifying and treating this major health problem, which affects a large percentage of those patients seen in the primary care setting.

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