Smoking and Mental Illness
A Population-Based Prevalence Study

Karen Lasser, MD
J. Wesley Boyd, MD, PhD
Steffie Woolhandler, MD, MPH
David U. Himmelstein, MD
Danny McCormick, MD, MPH
David H. Bor, MD

Context Studies of selected groups of persons with mental illness, such as those who are institutionalized or seen in mental health clinics, have reported rates of smoking to be higher than in persons without mental illness. However, recent population-based, nationally representative data are lacking.

Objective To assess rates of smoking and tobacco cessation in adults, with and without mental illness.

Design, Setting, and Participants Analysis of data on 4411 respondents aged 15 to 54 years from the National Comorbidity Survey, a nationally representative multistage probability survey conducted from 1991 to 1992.

Main Outcome Measures Rates of smoking and tobacco cessation according to the number and type of psychiatric diagnoses, assessed by a modified version of the Composite International Diagnostic Interview.

Results Current smoking rates for respondents with no mental illness, lifetime mental illness, and past-month mental illness were 22.5%, 34.8%, and 41.0%, respectively. Lifetime smoking rates were 39.1%, 55.3%, and 59.0%, respectively ($P<.001$ for all comparisons). Smokers with any history of mental illness had a self-reported quit rate of 37.1% ($P=.04$), and smokers with past-month mental illness had a self-reported quit rate of 30.5% ($P<.001$) compared with smokers without mental illness (42.5%). Odds ratios for current and lifetime smoking in respondents with mental illness in the past month vs respondents without mental illness, adjusted for age, sex, and region of the country, were 2.7 (95% confidence interval [CI], 2.3-3.1) and 2.7 (95% CI, 2.4-3.2), respectively. Persons with a mental disorder in the past month consumed approximately 44.3% of cigarettes smoked by this nationally representative sample.

Conclusions Persons with mental illness are about twice as likely to smoke as other persons but have substantial quit rates.

JAMA. 2000;284:2606-2610 www.jama.com

SMOKING IS THE LEADING PREventable cause of death in the United States.[1] In an effort to target public health interventions, recent studies have focused on smoking in distinct populations, such as pregnant women[2] and adolescents.[3] We believe those with mental illness are another group that merits special attention.

Previous studies have found high smoking rates among selected populations of persons with mental illness, such as psychiatric outpatients[4] and patients in a state mental hospital.[5] Others have found elevated smoking rates among patients with specific diagnoses, such as bipolar illness, depression, schizophrenia, and panic disorder.[6-11] Persons with mental illness may encounter greater difficulty with tobacco cessation.[4,12,13] However, no recent study has analyzed rates of smoking and quit rates across the spectrum of psychiatric diagnoses in a nationally representative sample. We hypothesized that persons with mental illness smoke at higher rates than persons without mental illness, have lower quit rates, and comprise a large proportion of the US tobacco market.

We used population-based data from the National Comorbidity Survey[14] (NCS) to examine the association between type and severity of mental illness and the likelihood of smoking and subsequent cessation. The NCS differed from previous studies because it was the first to administer a structured psychiatric interview to a nationally representative sample.[15] Furthermore, the NCS was specifically designed to examine both substance-use and nonsubstance-use psychiatric disorders.

METHODS

Data Sources

The NCS was a congressionally mandated study of the prevalence of psychiatric disorders in the United States.[15] Administered between September 1990 and February 1992, the survey used a stratified, multistage probability sample of persons aged 15 to 54 years in the noninstitutionalized civilian population. The data were released for public use in 1998. The study design allowed for estimation of the national prevalence of mental illness as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised* (*DSM-III-R*).[16]

Author Affiliations: Departments of Medicine (Drs Lasser, Woolhandler, Himmelstein, McCormick, and Bor) and Psychiatry (Dr Boyd), The Cambridge Hospital and Harvard Medical School, Cambridge, Mass; and Department of Religion, Smith College, Northampton, Mass (Dr Boyd).
Corresponding Author and Reprints: Karen Lasser, MD, Department of Medicine, Cambridge Hospital, Macht Bldg, 1493 Cambridge St, Cambridge, MA 02139 (e-mail: klasser@massmed.org).

The NCS surveyed 8098 persons. Questions regarding tobacco use were asked of the 4411 respondents interviewed during the latter half of the survey (1991-1992). Specially trained staff from the Survey Research Center at the University of Michigan administered a modified version of the Composite International Diagnostic Interview (CIDI).[17] The CIDI is a well-validated, structured diagnostic interview based on the Diagnostic Interview Schedule (DIS), which was used in the Epidemiologic Catchment Area Study.[18] In the NCS, the overall response rate was 82.4%; nonrespondents resembled respondents in age and sex, which are the only demographic variables available for all nonrespondents. A supplemental survey was administered to a random sample of nonrespondents, who were found to have elevated rates of both lifetime and current psychiatric disorders. The data were weighted to account for sample design (ie, probabilities of selection among households) and for nonresponse using information from the supplemental survey. An additional weight was used to extrapolate the data to the national population by age, sex, race or ethnicity, marital status, educational level, living arrangements, region, and urbanicity (TABLE 1).

Definitions of Mental Illness and Tobacco Use

We defined respondents as lifetime smokers if they answered affirmatively to the question, "Have you ever smoked daily for a month or more?" We defined current smokers as those who responded, "in the past month" when they were asked, "When was the last time you smoked fairly regularly—in the past month, past six months, past year, or more than a year ago?" We defined the quit rate as the proportion of lifetime smokers who were not current smokers. Because this definition of quit rate differs from that used in other studies, we also analyzed the data with a more conservative definition of quit rate: the proportion of lifetime smokers who had stopped smoking for more than a year. This analysis did not significantly change our findings; hence, we used the former definition of quit rate. The NCS did not ascertain the total lifetime consumption of tobacco or the current number of cigarettes smoked. However, respondents were asked, "How many cigarettes did you smoke per day during the period when you were smoking most?" We defined this number as *peak consumption*. We considered persons whose peak consumption exceeded 24 cigarettes per day to be heavy smokers. We defined moderate and light smokers as those whose peak consumption was 24 cigarettes per day or less. We did not analyze cigar or pipe smoking.

We defined mental illness as major depression, bipolar disorder, dysthymia, panic disorder, agoraphobia, social phobia, simple phobia, generalized anxiety disorder, alcohol abuse, alcohol dependence, drug abuse, drug dependence, antisocial personality, conduct disorder, or nonaffective psychosis. The latter includes schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder, and atypical psychosis.

We analyzed persons with and without any mental illness at any time in their lives (lifetime mental illness), persons with active mental illness in the past month (whom we define as "the mentally ill"), and persons with each of the individual *DSM-III-R* diagnoses and with multiple *DSM-III-R* diagnoses. In addition, we compared smoking rates in respondents with current alcohol and drug use to those of respondents who had been abstinent for at least 1 year.

We also estimated the proportion of all cigarettes smoked in the United States that were consumed by persons with mental illness via the following calculation: $(M)(C_1)/\{(N)(C_2)+(M)(C_1)\}$, where M = the number of current smokers with mental illness in the past month; C_1 = the mean peak consumption of cigarettes per day by current smokers with mental illness in the past month; N = the number of current smokers without mental illness in the past month, which includes persons with and without lifetime mental illness; and C_2 = the mean peak consumption of cigarettes per day by current smokers without mental illness in the past month. For both persons with and without mental illness, we assumed that the peak number of cigarettes con-

Table 1. Demographic Characteristics According to Psychiatric Diagnosis*

Variable	Ever Mentally Ill in Lifetime, %	Mentally Ill in Past Month, %
Sex		
Men	51.5	31.0
Women	47.3	25.7
Age, y		
15-24	48.8	33.8
25-34	52.9	29.6
35-44	49.5	26.9
45-54	43.5	20.8
Race†		
White	51.8	28.5
Black	34.9	21.1
Hispanic	50.9	37.2
Other	39.6	19.6
Region		
Northeast	51.4	28.1
Midwest	47.3	24.7
South	44.4	27.2
West	57.6	34.5
Education		
<High school	45.8	33.6
High school graduate	51.8	31.4
Some college	53.0	26.7
College graduate	44.1	17.5
Below poverty level‡		
Yes	51.1	35.3
No	49.1	27.3
Family income, US $		
0-19 999	50.2	33.3
20 000-34 999	52.4	31.3
35 000-69 999	50.3	25.7
≥70 000	40.5	20.8
Marital status		
Married	49.4	26.9
Separated/divorced/ widowed	55.0	30.7
Never married	47.0	30.8

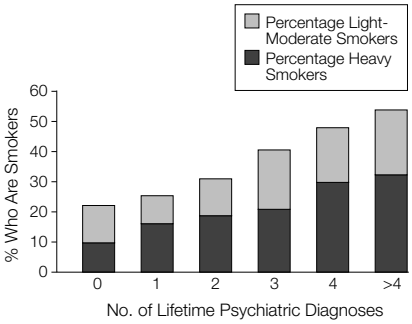
*Mental illness is defined in the "Methods" section. Percentages are weighted to approximate the US population as determined from the 1989 US National Health Interview Survey.
†Race and ethnicity were self-reported. Respondents of Hispanic descent were coded as Hispanic regardless of race (black, white, or other race).
‡Poverty is defined as living in a household below the federal poverty level.

Table 2. Smoking Status According to Psychiatric Diagnosis*

Psychiatric Diagnosis†	US Population, %	Current Smokers, %	Lifetime Smokers, %
Total	100	28.5	47.1
No mental illness	50.7	22.5	39.1
Ever mental illness	49.3	34.8‡	55.3‡
Any mental illness in past month	28.3	41.0‡	59.0‡

*Percentages are weighted to approximate the US population as determined from the 1989 US National Health Interview Survey.
†Percentages of mental illness reported are the proportion of respondents who received the tobacco supplement (n = 4411) who have any of the diagnoses listed in the "Methods" section.
‡Significantly different from respondents without mental illness, χ^2, $P<.001$.

Figure. Smoking Rates Compared According to the Number of Lifetime Diagnoses and the Proportion of Heavy Smokers



Mantel-Haenszel χ^2, $P<.001$. Heavy smokers are defined as those whose peak consumption exceeded 24 cigarettes a day and moderate and light smokers as those whose peak consumption was 24 or less cigarettes a day.

sumed correlated with the current number of cigarettes consumed.

Statistical Methods

We used the SAS computer statistical package (Version 7; SAS Institute, Cary, NC). We used the χ^2 test to compare differences between groups in the proportion of persons who smoked, and the Mantel Haenszel χ^2 test for trend to compare smoking rates with the number of lifetime *DSM-III-R* diagnoses. We used logistic regression to analyze mental illness as a predictor of smoking, while controlling for sex, age, and region of the United States.

RESULTS

The demographic characteristics of persons with a lifetime history of mental illness and persons with mental illness in the past month are shown in Table 1. The population prevalence of current smoking was 28.5%, while the lifetime prevalence was 47.1%. Forty-one percent of persons who reported having mental illness in the past month were current smokers and represented 40.6% of all current smokers in the United States. Respondents with a history of mental illness had elevated smoking rates, and smoking rates increased further in respondents with mental illness in the past month (TABLE 2). Current smokers without mental illness in the past month (n=746) had a mean peak consumption of 22.6 cigarettes per day vs 26.2 in those with mental illness in the past month (n=511). We estimated that persons with mental illness comprised 44.3% of the US tobacco market.

The relationship between smoking and mental illness persisted when we controlled for age, sex, and geographic region using logistic regression (details available on request). Compared with respondents without mental illness, those with any history of mental illness were significantly more likely to be lifetime smokers (odds ratio [OR], 2.1; 95% confidence interval [CI], 1.9-2.4) or current smokers (OR, 1.9; 95% CI, 1.7-2.2). This relationship was stronger among respondents with mental illness in the past month (OR, 2.7; 95% CI, 2.3-3.1 for current smokers; OR, 2.7; 95% CI, 2.4-3.2 for lifetime smokers).

Persons with multiple lifetime psychiatric diagnoses had higher rates of smoking and smoked more heavily than persons with only 1 *DSM-III-R* diagnosis ($P<.001$, FIGURE). Heavy smoking was rare in persons with no history of mental illness; only 10% of such persons were heavy smokers. We observed a dose-response relationship between the number of lifetime psychiatric diagnoses and smoking rates. Quit rates were lower in smokers with mental illness in the past month (30.5%, $P<.0001$) and in smokers with any lifetime history of mental illness (37.1%, $P=.04$) compared with smokers without mental illness (42.5%).

TABLE 3 and TABLE 4 show smoking rates according to psychiatric diagnosis (lifetime and in the past month), as well as the corresponding quit rates. The quit rates of respondents who were abstinent from alcohol (41.5%) or drugs (39.0%) were similar to the quit rate of persons with no mental illness history (42.5%). Due to small numbers in some diagnostic categories, differences between individual diagnoses should be interpreted cautiously.

COMMENT

We found that persons with mental illness are about twice as likely to smoke as other persons, a finding consistent with previous studies.[4,6,19,20] Population-based data collected in the early 1980s by the Epidemiologic Catchment Area Study showed that persons with major depression, dysthymia, agoraphobia, and alcoholism were 1.6 to 4.7 times more likely to have ever smoked than subjects without mental illness.[6] However, we observed that more than a third of patients with a history of mental illness had quit smoking by the time of the survey. The quit rate in the Epidemiologic Catchment Area Study was lower than this and was only determined for persons with major depression. Our finding that persons abstinent from alcohol had quit rates equal to those of persons without mental illness confirms previous findings.[21] However, our finding that persons abstinent from drugs also had quit rates equal to those of persons without mental illness is a novel one.

Our study is based on data collected from 1991 to 1992 and released for public use in 1998, the most recent national data available on mental illness and smoking. Given the minimal decline in

the prevalence of smoking in the United States over the past decade, from 26.5% in 1992 to 24.7% in 1997,[22] our findings are still pertinent. Similarly, we doubt that the prevalence of mental illness has decreased dramatically since 1992. In the NCS, almost half of the respondents had experienced a *DSM-III-R*–defined mental illness in their lifetime, and 28% had experienced mental illness in the past month. These numbers appear high because the definition of mental illness in the NCS (the standard definition used by most psychiatrists in the United States) encompassed a broad spectrum of severity, from simple phobia to schizophrenia.

Mentally-ill cigarette smokers, like other smokers, are at high risk of smoking-related deaths. Persons with major depression, alcohol disorders, and schizophrenia have high mortality rates from vascular disease and cancer.[23] Smoking also complicates the treatment of some mental disorders by decreasing blood levels of neuroleptics.[24] Thus, smokers may require larger doses to achieve therapeutic effect, and thereby run an increased risk of adverse effects.[13,25,26] Some[26,27] but not all[28,29] studies have found that smokers experience more tardive dyskinesia than nonsmokers.

Why do the mentally ill smoke more? Some have suggested that such persons use cigarettes as a means of self-medication of psychiatric symptoms.[13,30] This theory implicitly assumes that mental illness causes smoking. However, recent findings[9-10,31] raise questions about the direction of causality. In a study of childhood and adolescent depression,[31] antecedent smoking was associated with an increased risk of depression, but not vice-versa. Similarly, current smokers have an elevated risk of first-time occurrence of panic attacks relative to nonsmokers or former smokers,[10] and smoking may increase the risk of certain anxiety disorders during late adolescence and early adulthood.[32] Lastly, a recent study[9] found that smoking preceded the onset of schizophrenia in the majority of persons with schizophrenia who smoked.

Internal documents from the tobacco industry suggest that the industry has identified psychologically vulnerable persons as a part of their tobacco market. In the 1981 Segmentation Study,[33] market researchers at R. J. Reynolds Tobacco Co described smokers who smoked for "mood enhancement" and "positive stimulation." This marketing study implied that smokers used nicotine for depressive symptoms, stating that smoking "helps

Table 3. Smoking Status Among Respondents According to Psychiatric Diagnosis at Any Time in Their Life*

Lifetime Diagnosis	US Population, %	Current Smoker, %	Lifetime Smoker, %	Quit Rate, %
No mental illness	50.7	22.5	39.1	42.5
Social phobia	12.5	35.9†	54.0†	33.4‡
Agoraphobia	5.4	38.4†	58.9†	34.5
Panic disorder	3.4	35.9§	61.3†	41.4
Major depression	16.9	36.6†	59.0†	38.1
Dysthymia	6.8	37.8†	60.0†	37.0
Panic attacks	6.5	38.1†	60.4†	36.9
Simple phobia	11.0	40.3†	57.8†	30.3
Nonaffective psychosis	0.6	49.4§	67.9‡	27.2
Alcohol abuse or dependence	21.5	43.5†	65.9†	34.0‡
Antisocial personality, antisocial behavior, or conduct disorder	14.6	45.1†	62.5†	27.8†
Posttraumatic stress disorder	6.4	45.3†	63.3†	28.4§
Generalized anxiety disorder	4.8	46.0†	68.4†	32.7‖
Drug abuse or dependence	11.4	49.0†	72.2†	32.1§
Biopolar disorder	1.6	68.8†	82.5†	16.6†

*Percentages of the National Comorbidity Study sample of 4411 persons are weighted to approximate the US population as determined from the 1989 US National Health Interview Survey.
†Significantly different from respondents without mental illness, χ^2, $P \leq .0001$.
‡Significantly different from respondents without mental illness, χ^2, $P \leq .01$.
§Significantly different from respondents without mental illness, χ^2, $P < .001$.
‖Significantly different from respondents without mental illness, χ^2, $P < .05$.

Table 4. Smoking Status Among Respondents According to Mental Illness in the Past Month*

Diagnosis in Past Month	US Population, %	Current Smokers, %	Lifetime Smokers, %	Quit Rate, %
No mental illness	50.7	22.5	39.1	42.5
Social phobia	4.0	31.5†	44.5	29.2‡
Agoraphobia	1.3	48.1§	63.2§	23.2‡
Panic disorder	1.4	42.6‖	63.5§	32.9
Major depression	4.9	44.7§	60.4§	26.0‖
Dysthymia	1.7	38.2†	49.0	22.0†
Panic attacks	2.0	46.4§	66.1§	29.8‡
Simple phobia	6.3	36.8§	55.2§	33.3‡
Nonaffective psychosis	0.2	45.3	45.3	0
Alcohol abuse or dependence	2.6	56.1§	67.5§	16.9§
Antisocial personality, antisocial behavior, or conduct disorder	14.6	45.1§	62.5§	27.8§
Posttraumatic stress disorder	2.3	44.6§	58.1§	23.2†
Generalized anxiety disorder	1.7	54.6§	76.8§	28.9‡
Drug abuse or dependence	1.0	67.9§	87.5§	22.4†
Bipolar disorder	0.9	60.6§	81.8§	25.9

*Percentages of the National Comorbidity Study sample of 4411 persons are weighted to approximate the US population as determined from the 1989 US National Health Interview Survey.
†Significantly different from respondents without mental illness, χ^2, $P \leq .01$.
‡Significantly different from respondents without mental illness, χ^2, $P \leq .05$.
§Significantly different from respondents without mental illness, χ^2, $P \leq .0001$.
‖Significantly different from respondents without mental illness, χ^2, $P < .001$.

perk you up" and "helps you think out problems." The authors also identified the role of smoking in "anxiety relief," stating that smoking helped people "gain self-control," "calm down," and "cope with stress." While studies have shown that cigarette advertising and promotion influence smoking in adolescents,[34] no studies have examined the effect of cigarette advertising on the mentally ill.

Extrapolating our results to the US population, we estimate that persons with a diagnosable mental disorder in the past month consume nearly half of all cigarettes smoked in the United States. Our findings emphasize the importance of focusing smoking prevention and cessation efforts on the mentally ill. Individual clinicians' efforts in this regard need to be coupled with broader public policy interventions. Increases in tobacco taxes and antismoking media campaigns have been shown to reduce cigarette sales and consumption,[35-38] particularly in lower-income smokers.[37] While data are not available on the impact of tobacco taxation on the subpopulation of smokers with mental illness, we believe that taxation might be an effective smoking deterrent in this group, which tends to be at a low-income level. Tax revenues could then be used to fund smoking cessation and other programs for persons with mental illness and to support counter-advertising campaigns.

Mental illness carries a unique burden of suffering—an "inexplicable agony"—according to one eloquent victim.[39] The mentally ill also carry the burden of nearly half of all US tobacco consumption. However, the fact that smokers with mental illness are able to quit should offer hope.

Funding/Support: This study was supported by grant 5T32PE11001-12 from the National Research Services Award (Dr Lasser) and in part by a grant from the Open Society Institute (Drs Woolhandler and Himmelstein).

Acknowledgment: We thank John Orav, PhD, for his help with statistical analysis, Ronald C. Kessler, PhD, and Patricia Berglund, MBA, for their assistance with the NCS database, and the University of Michigan Institute of Survey Research for making the data available to us.

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