

# Smoking Characteristics of Adults With Selected Lifetime Mental Illnesses: Results From the 2007 National Health Interview Survey

Annette K. McClave, MPH, Lela R. McKnight-Eilly, PhD, Shane P. Davis, PhD, and Shanta R. Dube, PhD, MPH

Smoking is the leading cause of preventable death in the United States and accounts for approximately 1 of every 5 deaths each year.<sup>1,2</sup> Although rates of cigarette use have dropped substantially among the general population,<sup>3</sup> smoking continues to be a major public health problem, particularly for persons with mental illness. Between 40% and 85% of persons with various forms of mental illness currently smoke cigarettes,<sup>4,5</sup> and these estimates are as much as 4 times as high as the current prevalence of smoking among the US adult population (19.8%).<sup>3</sup> Additionally, persons with mental illness suffer from tobacco-related diseases at twice the rate of same-aged adults without mental illness.<sup>6,7</sup> Given these high rates of smoking and increased morbidity and mortality, it is pertinent to investigate and understand the smoking patterns and cessation behaviors of persons with mental illnesses to inform and guide programs and policies that can reach and assist this population.

Recent clinical research has effectively addressed the association of cigarette smoking and cessation attempts of persons with specific mental health disorders<sup>4,5,8,9</sup>; however, population-based data are scant. Lasser et al.<sup>10</sup> used population-based data collected from the National Comorbidity Study in the early 1990s to examine smoking prevalence and behaviors. They found that persons with a mental disorder were twice as likely to smoke as were persons without a mental disorder, yet persons with a mental disorder had a self-reported quit rate between 30% and 37%. Breslau et al.,<sup>11</sup> using the same data to examine smoking intensity and frequency, found that preexisting disorders predicted an increased risk for the first onset of daily smoking and for smokers' progression to nicotine dependence. Using data from the 2002 National Survey of Drug Use and Health, a population-based study, Hagman et al.<sup>12</sup> examined serious psychological distress by use

**Objectives.** We estimated smoking prevalence, frequency, intensity, and cessation attempts among US adults with selected diagnosed lifetime mental illnesses.

**Methods.** We used data from the 2007 National Health Interview Survey on 23393 noninstitutionalized US adults to obtain age-adjusted estimates of smoking prevalence, frequency, intensity, and cessation attempts for adults screened as having serious psychological distress and persons self-reporting bipolar disorder, schizophrenia, attention deficit disorder or hyperactivity, dementia, or phobias or fears.

**Results.** The age-adjusted smoking prevalence of adults with mental illness or serious psychological distress ranged from 34.3% (phobias or fears) to 59.1% (schizophrenia) compared with 18.3% of adults with no such illness. Smoking prevalence increased with the number of comorbid mental illnesses. Cessation attempts among persons with diagnosed mental illness or serious psychological distress were comparable to attempts among adults without mental illnesses or distress; however, lower quit ratios were observed among adults with these diagnoses, indicating lower success in quitting.

**Conclusions.** The prevalence of current smoking was higher among persons with mental illnesses than among adults without mental illnesses. Our findings stress the need for prevention and cessation efforts targeting adults with mental illnesses. (*Am J Public Health.* 2010;100:2464–2472. doi:10.2105/AJPH.2009.188136)

of the Kessler-6 (K6) measure and found that persons with serious psychological distress were more likely to be daily smokers, were less likely to quit smoking, and appeared to smoke more heavily as symptom severity increased. In yet another study, Grant et al.<sup>13</sup> used the National Epidemiologic Survey on Alcohol and Related Conditions and found that nicotine-dependent smokers with a mental health disorder consumed 34.2% of all cigarettes smoked in the United States.

Although these population-based studies have added valuable prevalence data on tobacco use by those with mental health disorders, the studies are not without limitations. The Lasser et al.<sup>10</sup> and Breslau et al.<sup>11</sup> studies were based on data collected from 1991 to 1992, a time when overall smoking prevalence in the United States was 26.5%, almost 7 percentage points higher than current reported estimates. With major advances

in tobacco control and with similar decreases of smoking prevalence seen among other population subgroups (i.e., Hispanics, Asian/Pacific Islanders, and pregnant smokers), it would be worthwhile to use more current data to determine whether smoking rates of persons with mental health disorders have followed a similar decline.<sup>3,14</sup> Additionally, because of the design and scope of many population-based surveys, none of the previous studies was able to comprehensively assess both mental health disorders and cigarette use.<sup>12</sup> Hagman et al.<sup>12</sup> attempted to address this issue with their study; however, they relied solely on the K6 scale. Although the K6 is a validated instrument that is intended to be a proxy measure for current serious psychological distress and mental health impairments, the scale does not measure specific types of mental health disorders or assess the diagnosis of a mental health disorder over the lifespan.

To that end, in this study, we sought to specifically examine the prevalence, frequency, and intensity of smoking and cessation attempts by adults with previously diagnosed mental illnesses or serious psychological distress by using 2007 data from the National Health Interview Survey (NHIS). The NHIS is a nationally representative survey that provides extensive information on smoking behaviors and self-reported lifetime diagnoses of specific mental health disorders as well as serious psychological distress by use of the K6 measure.

## METHODS

Data were from the 2007 NHIS, a cross-sectional household interview survey of the civilian, noninstitutionalized population in all 50 states and the District of Columbia that used a multistage area probability sampling design to produce nationally representative estimates on health. Data were collected through a household interview conducted by the US Census Bureau. All adults, aged 18 years and older, in a sampled household were invited to participate in the interview. One adult, aged 18 years or older, was randomly selected from the household for a survey of adult health. Responses were collected through computer-assisted personal interviewing.

## Measures

A total of 23 393 adults took part in the 2007 NHIS and were included in the present study. We identified individuals in the sample who stated that they had received from a doctor or other health professional diagnoses of 1 or more of 5 mental illnesses: bipolar disorder, schizophrenia, attention deficit disorder (ADD) or hyperactivity, dementia, and phobias or fears. Respondents were considered to have a lifetime diagnosis of any of the 5 mental illnesses if they answered “yes” when questioned if they had ever been told by a doctor or other health professional that they had this condition. In addition, we assessed serious psychological distress in the present study by use of the K6, a 6-item screening measure of nonspecific psychological distress developed by the Substance Abuse and Mental Health Services Administration to estimate the state-specific prevalence of serious mental illness.

The K6 was recently found to be useful as a screening instrument for depression in population health surveys and has good agreement with the Composite International Diagnostic Interview depression module.<sup>15</sup> The K6 requires respondents to rate on a Likert scale how frequently they experienced the following symptoms of psychological distress during the preceding 30 days: (1) nervousness, (2) hopelessness, (3) feeling restless or fidgety, (4) feeling so depressed that nothing could cheer them up, (5) feeling that everything was an effort, and (6) feeling worthless.<sup>15</sup> To create a score, we coded responses to the 6 questions on the K6 scale from 0 to 4, where “all of the time” was coded as 4, “most of the time” as 3, “some of the time” as 2, “a little of the time” as 1, and “none of the time” as 0. The response codes (0–4) were summed to yield a score range of 0 to 24. Serious psychological distress was defined as a value of more than 13.<sup>15</sup> Finally, to address potential mental illness comorbidities, we also categorized respondents as having 1, 2, or 3 or more lifetime diagnosed mental illnesses out of those self-reporting at least 1 diagnosed mental illness.

The smoking characteristics that we examined included smoking status, smoking frequency, smoking intensity, and quit attempts. Smoking status was separated into 2 groups: ever smokers, which included current and former smokers, and never smokers. Ever smokers were defined as respondents who reported smoking 100 cigarettes or more in their lifetime; never smokers were defined as respondents who reported they had not smoked up to 100 cigarettes in their lifetime. Current smokers were ever smokers who were currently smoking some days or every day, and former smokers were ever smokers who were not currently smoking at all. Smoking frequency was assessed for current smokers only and was separated into 2 categories: every day and some days. Smoking intensity also was assessed for current smokers only and was divided into 3 categories: “light,” “moderate,” and “heavy.” Smokers who smoked cigarettes every day were asked how many cigarettes, on average, they smoked per day. Smokers who smoked cigarettes on some days were asked how many days in the past 30 days they had smoked. If they reported that they had smoked at least 1 day or more in the past 30 days, they

were then asked how many cigarettes, on average, they had smoked per day when they smoked in the past 30 days. Light smokers were smokers who reported smoking 14 cigarettes or fewer per day, moderate smokers were smokers who reported smoking between 15 and 24 cigarettes per day, and heavy smokers were smokers who reported smoking 25 cigarettes or more per day. Finally, current smokers were asked whether in the past 12 months they had stopped smoking for 1 day or more because they were trying to quit smoking. A quit attempt was defined as answering “yes” to this question. A quit ratio also was calculated for each diagnosed mental illness and serious psychological distress. The quit ratio was defined by the following equation: quit ratio = (no. of former smokers)/(no. of ever smokers).

## Statistical Analysis

Using SUDAAN release 10.0.0 software (Research Triangle Institute, Research Triangle Park, NC), we produced weighted frequency values and 95% confidence intervals (CIs) of smoking characteristics for each category of lifetime mental illness and serious psychological distress. Because the age distribution of persons with certain mental illnesses varies<sup>16,17</sup> and age at diagnosis of the mental illnesses examined in this study varies considerably (particularly ADD or hyperactivity and dementia),<sup>18</sup> age-adjusted weighted frequency values and 95% CIs of smoking characteristics based on standard population estimates for 2000 were also calculated for each lifetime mental illness and serious psychological distress.<sup>19</sup>

## RESULTS

Of the 23 393 respondents, 51.7% were women; 49.6% of all respondents were aged 18 to 44 years. The majority were non-Hispanic White (69.3%), and 56.0% reported being married. More than half had some college education or higher (55.5%), and close to two thirds reported being employed (64.6%). The majority of respondents reported having health care coverage (83.8%) and having been born in the United States (83.7%). Approximately 86.7% of the respondents reported that their general health was good, very good, or excellent, and the majority of the respondents were able to respond for themselves (98.5%).

Of the total sample, 0.5% had a knowledgeable proxy respond to survey questions because of a mental or physical condition that restricted them from responding independently (n=114).

Approximately 7.8% of the general population reported having at least one lifetime diagnosis of selected mental illnesses. Overall, 1.7% of the general population reported bipolar disorder, 0.6% reported schizophrenia, 2.4% reported ADD or hyperactivity, 0.7% reported dementia, 4.1% reported phobias or fears, and 2.9% reported serious psychological distress.

### Demographics by Mental Illness

Overall, a large proportion of adults with a diagnosis of bipolar disorder (59.7%), dementia (60.6%), phobias or fears (63.9%), and serious psychological distress (65.7%) were women; 67.6% of adults with schizophrenia and 64.2% of adults with ADD or hyperactivity were men (Table 1). Approximately 32.1% of adults who reported a diagnosis of ADD or hyperactivity were aged 18 to 24 years; 73.6% of persons with dementia were aged 65 years or older (Table 1).

Close to one third of persons with a diagnosis of selected mental illnesses or serious psychological distress reported that their highest educational attainment was a high school diploma or general equivalency diploma (GED; range: 30.5% [ADD or hyperactivity] to 38.8% [schizophrenia]). More than one third (37.2%) of adults who did not report a selected lifetime mental illness reported completing a college degree or higher education and most were employed (66.1%). With the exception of ADD or hyperactivity (39.3%), the majority of adults with a diagnosed mental illness or serious psychological distress were unemployed (range: 57.3% [phobias or fears] to 93.5% [dementia]). The majority of adults with dementia (60.6%), schizophrenia (55.0%), or serious psychological distress (56.4%) reported their health as fair or poor; more than half of those with ADD or hyperactivity (56.4%) reported their health as very good or excellent. The majority of adults who did not report a lifetime mental illness were in very good or excellent health (62.5%; Table 1).

### Smoking Behaviors by Mental Illness

Approximately 39.4% of adults with no specified lifetime mental illness were ever

smokers (18.3% were current smokers; 21.0% were former smokers), and 60.6% were never smokers. Overall, after age standardization, 69.8% of persons with bipolar disorder, 76.7% of persons with schizophrenia, and 61.9% of persons with ADD or hyperactivity were ever smokers. Approximately 57.5% of persons with dementia, 59.8% of persons with phobias or fears, and 59.8% of persons with serious psychological distress were ever smokers (data not shown).

Among people with these disorders, current smoking prevalence was highest for persons with schizophrenia (59.1%) and lowest for persons self-reporting phobias or fears (34.3%; Figure 1). Approximately 46.4% of persons with bipolar disorder, 38.1% of persons with serious psychological distress, 37.2% of persons with ADD or hyperactivity, and 35.4% of persons with dementia were current smokers (Figure 1). Among those with a reported mental illness, between 17.6% (schizophrenia) and 25.6% (phobias or fears) were former smokers; 21.7% of persons with serious psychological distress were former smokers (Figure 1).

Overall, 10.3% of current smokers who reported no lifetime mental illness were heavy smokers. Heavy smoking by those with a mental illness or serious psychological distress was most prevalent among smokers with serious psychological distress (28.8%) and smokers with phobias or fears (19.8%; Table 2). Approximately 15.1% of smokers with bipolar disorder, 17.8% of smokers with schizophrenia, and 11.4% of smokers with ADD or hyperactivity were heavy smokers (Table 2).

Among adults with none of the selected lifetime mental illnesses, 77.1% of current smokers reported smoking every day. The majority of smokers reporting a mental illness or serious psychological distress were every day smokers (>85%), ranging from 85.7% (schizophrenia) to 89.1% (serious psychological distress). Approximately, 86.6% of smokers with bipolar disorder, 86.9% of smokers with ADD or hyperactivity, and 87.3% of smokers with phobias or fears reported smoking every day (Table 2).

Less than half (41.8%) of current smokers with none of the selected mental illnesses reported attempting to quit at least once in the preceding year. The percentage of current smokers reporting a mental illness who had

tried to quit in the preceding year ranged from 38.9% (schizophrenia) to 50.5% (bipolar disorder). About 47.9% of current smokers with ADD or hyperactivity, 45.1% of smokers with serious psychological distress, 43.5% of persons with phobias or fears, and 38.9% of current smokers with schizophrenia reported trying to quit in the preceding year (Table 2). The quit ratio for smokers with none of the selected mental illnesses was 0.54. With the exception of adults with dementia (quit ratio: 0.78), persons with a diagnosed lifetime mental illness or serious psychological distress reported quit ratios ranging from 0.26 (bipolar disorder) to 0.45 (phobias or fears).

### Smoking Behaviors by Total Number of Lifetime Mental Illnesses

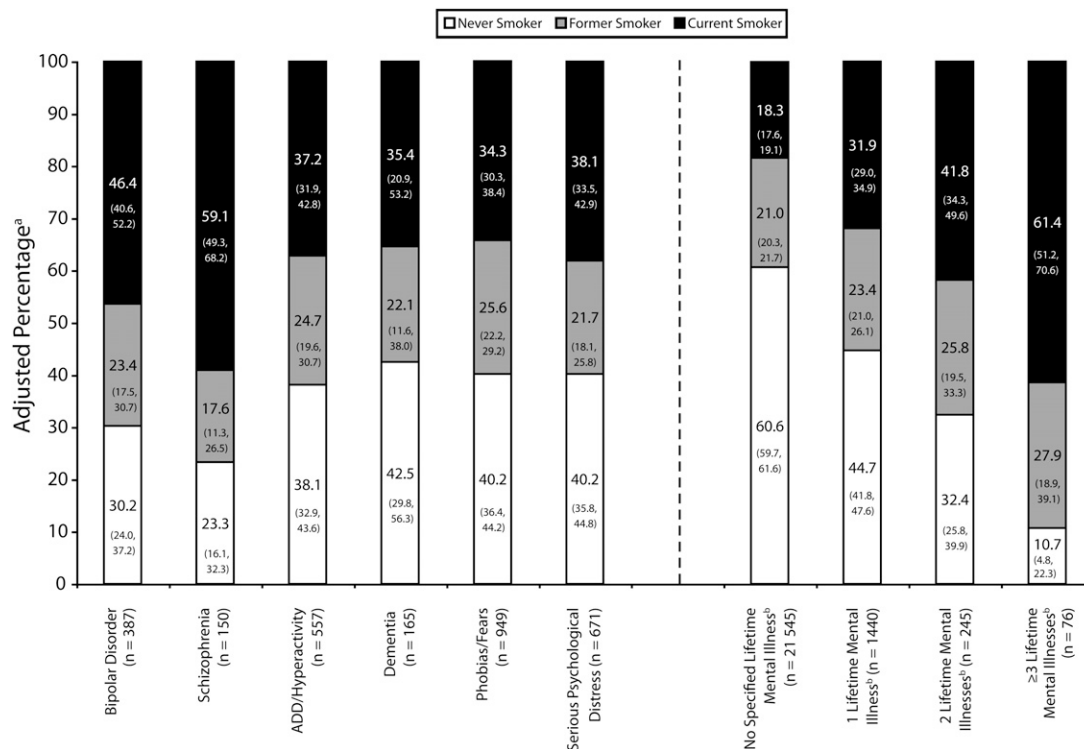
An average increase of 14.4% in the age-adjusted prevalence of ever smokers was observed as the total number of mental illnesses increased (Figure 1); 39.4% of persons with no specified mental illnesses were ever smokers, whereas ever smoking was observed for 55.3% of persons with 1 mental illness, 67.6% of persons with 2 mental illnesses, and 89.3% of persons with 3 mental illnesses (data not shown). An increase in the age-adjusted prevalence of current smoking also was observed for persons with 1 or more mental illnesses (Figure 1). Current smoking prevalence was 31.9% for persons reporting 1 mental illness, 41.8% for persons reporting 2 mental illnesses, and 61.4% for persons reporting 3 or more mental illnesses (Table 3). Heavy smoking was observed among 16.6% of smokers reporting 1 mental illness, 16.7% of smokers reporting 2 mental illnesses, and 19.1% of persons reporting 3 or more mental illnesses. Whereas a higher percentage of smokers with mental illnesses reported smoking every day (>85%) than did smokers with no specified mental illness (77.1%), there was no apparent graded increase. The age-adjusted prevalence of attempting to quit in the past year remained stable as the number of mental illnesses increased; however, quit ratios decreased as the number of diagnosed mental illnesses increased (Table 3). A quit ratio of 0.43 was observed for persons who reported 1 diagnosed lifetime mental illness, 0.38 for persons who reported 2 diagnosed lifetime mental illnesses, and 0.19 for persons who reported 3

**TABLE 1—Demographic Characteristics of Persons With a Lifetime Mental Illness or Serious Psychological Distress: National Health Interview Survey, United States, 2007**

	No Specified Lifetime Mental Illness, No. (%)	Lifetime Mental Illness <sup>a</sup>					Serious Psychological Distress, No. (%)
		Bipolar Disorder, No. (%)	Schizophrenia, No. (%)	ADD or Hyperactivity, No. (%)	Dementia, No. (%)	Phobias or Fears, No. (%)	
No.	21 545	387	150	557	165	949	671
Gender							
Men	9 585 (48.3)	145 (40.3)	86 (67.6)	328 (64.2)	64 (39.4)	320 (36.1)	216 (34.3)
Women	11 960 (51.7)	242 (59.7)	64 (32.4)	229 (35.8)	101 (60.6)	629 (63.9)	455 (65.7)
Age group							
18–24 y	2 251 (12.4)	54 (19.0)	14 (13.3)	152 (32.1)	2 (1.1)	63 (9.7)	53 (10.4)
25–44 y	7 923 (36.9)	169 (44.3)	51 (40.5)	234 (43.2)	6 (4.7)	297 (33.5)	234 (34.1)
45–64 y	7 128 (34.3)	150 (33.4)	71 (41.3)	144 (21.8)	31 (20.6)	410 (40.9)	286 (43.4)
≥ 65 y	4 243 (16.4)	14 (3.3)	14 (4.9)	27 (2.9)	126 (73.6)	179 (15.9)	98 (12.1)
Race/ethnicity							
Non-Hispanic White	12 772 (68.5)	279 (79.4)	83 (66.7)	424 (83.8)	98 (67.0)	642 (76.2)	388 (67.5)
Non-Hispanic Black/Asian/other race	4 828 (17.7)	65 (13.5)	41 (22.4)	72 (9.5)	46 (24.9)	158 (13.0)	141 (16.5)
Hispanic	3 945 (13.8)	43 (7.1)	26 (10.9)	61 (6.8)	21 (8.1)	149 (10.8)	142 (16.0)
Marital status							
Separated, divorced, or widowed	5 813 (18.8)	174 (33.2)	56 (30.8)	127 (14.9)	91 (50.0)	360 (28.1)	287 (31.8)
Married	10 181 (57.3)	87 (31.7)	21 (17.1)	158 (33.6)	58 (42.3)	359 (48.4)	213 (44.1)
Single/never married	5 432 (23.9)	121 (35.1)	72 (52.1)	268 (51.5)	13 (7.7)	226 (23.5)	167 (24.1)
Educational attainment							
Some high school or less	3 817 (15.3)	89 (22.6)	50 (25.7)	101 (16.0)	61 (36.2)	204 (18.8)	213 (28.0)
High school diploma or GED	5 992 (28.7)	114 (32.9)	50 (38.8)	154 (30.5)	55 (36.1)	285 (32.1)	225 (36.8)
Some college	3 957 (18.8)	85 (20.4)	29 (26.7)	131 (24.5)	11 (7.3)	211 (22.1)	110 (17.5)
College degree or higher	7 550 (37.2)	95 (24.1)	15 (8.8)	169 (29.0)	33 (20.3)	243 (27.0)	115 (17.7)
Employment status							
Employed	13 657 (66.1)	125 (32.0)	27 (25.6)	316 (60.7)	8 (6.5)	382 (42.7)	213 (32.1)
Unemployed	7 855 (33.9)	262 (68.0)	123 (74.4)	240 (39.3)	157 (93.5)	567 (57.3)	458 (67.9)
Health care coverage							
No	3 664 (16.1)	72 (20.6)	17 (15.7)	129 (22.0)	2 (0.7)	157 (16.5)	165 (25.7)
Yes	17 810 (83.9)	314 (79.4)	132 (84.3)	426 (78.0)	163 (99.3)	790 (83.5)	504 (74.3)
Born in United States							
Yes	17 165 (82.9)	363 (95.1)	134 (91.6)	527 (95.7)	141 (88.3)	829 (91.4)	575 (89.7)
No	4 364 (17.1)	23 (4.9)	15 (8.4)	29 (4.3)	24 (11.7)	120 (8.6)	95 (10.3)
Self-reported general health							
Very good or excellent	12 979 (62.5)	94 (27.7)	23 (18.5)	281 (56.4)	22 (11.3)	285 (32.8)	120 (19.3)
Good	5 760 (25.8)	130 (34.2)	46 (26.5)	136 (24.4)	47 (28.1)	283 (29.6)	163 (24.3)
Fair or poor	2 794 (11.7)	163 (38.1)	80 (55.0)	139 (19.2)	96 (60.6)	381 (37.6)	387 (56.4)
No. of lifetime mental illnesses <sup>a</sup>							
None	21 545 (100.0)	0	0	0	0	0	382 (57.6)
1	0	188 (50.1)	39 (33.4)	402 (76.5)	119 (71.7)	692 (74.3)	163 (24.2)
2	0	123 (29.3)	52 (28.7)	106 (16.5)	35 (19.4)	174 (18.1)	77 (12.3)
≥ 3 or more	0	72 (20.6)	50 (37.9)	45 (7.0)	10 (8.9)	66 (7.6)	31 (5.9)
Proxy status							
Physical or mental condition prohibits from responding	182 (1.0)	14 (7.2)	12 (16.8)	23 (4.7)	62 (42.6)	38 (6.1)	29 (5.4)
Sample adult is able to respond	21 135 (99.0)	367 (92.8)	130 (83.2)	531 (95.3)	102 (57.4)	898 (93.9)	633 (94.6)

*Note.* ADD = attention deficit disorder; GED = general equivalency diploma. Percentages are weighted. Because of item nonresponse on the 2007 National Health Interview Survey, column values for each demographic characteristic may not sum to the column total for each mental illness or serious psychological distress.

<sup>a</sup>Lifetime mental illnesses included schizophrenia, bipolar disorder, ADD or hyperactivity, dementia, and phobias or fears; because comorbidity is possible, categories of mental illnesses were not mutually exclusive.



Note. ADD = attention deficit disorder. 95% confidence intervals are in parentheses.

<sup>a</sup>Percentages are age-adjusted to standardized population estimates for 2000.

<sup>b</sup>Lifetime mental illnesses include bipolar disorder, schizophrenia, attention deficit disorder or hyperactivity, dementia, and phobias or fears.

**FIGURE 1—Age-adjusted prevalence of smoking among persons with a lifetime mental illness, serious psychological distress, or one or more lifetime mental illnesses: National Health Interview Survey, United States, 2007.**

or more diagnosed lifetime mental illnesses (Table 3).

## DISCUSSION

To our knowledge, this is the first study to examine smoking and smoking-related behaviors of US adults with lifetime diagnoses of selected mental illnesses or serious psychological distress by use of NHIS data. Our results are consistent with the findings of previous research<sup>10,12,20</sup> in that the prevalence estimates of current smoking by adults with either a lifetime mental illness or serious psychological distress were 1.7 to 3.3 times higher than estimates among adults without those mental illnesses. Our findings also suggest that the greater the number of comorbid lifetime diagnoses of mental illnesses, the less likely a respondent was to quit smoking. The results from our investigation both confirm and further add to the

scant empirical evidence documenting smoking prevalence, intensity, frequency, and quit attempts by adults with diagnosed mental disorders at the population level.

We were also able to examine the association between mental illness comorbidities and smoking. Persons with 3 comorbid psychiatric disorders reported the highest prevalence of lifetime smoking and current smoking when compared with adults who reported no diagnosis of a lifetime mental illness or who reported 1 or 2 mental illnesses. Our findings corroborate those of previous research in which smoking rates and frequency of smoking were higher among persons with more than 1 psychiatric disorder diagnosis.<sup>10</sup> Another study found that, when compared with persons who had at least 1 active psychiatric disorder, persons with 4 or more psychiatric disorders were at higher risk for smoking and nicotine dependence.<sup>11</sup> Comorbid psychiatric diagnoses are

common and complicate treatment<sup>21</sup> because they can complicate assessment and diagnosis and produce overlapping symptoms of mental illness and nicotine withdrawal.<sup>22</sup>

We observed heavier and more frequent smoking by adults reporting particular mental illnesses. For example, adults reporting diagnoses of ADD or hyperactivity, or phobias or fears, and those with serious psychological distress reported smoking every day, more so than did adults with no such mental illness. By contrast, adults with bipolar disorder or schizophrenia did not report smoking every day. Additionally, adults with phobias or fears or serious psychological distress were more likely to report heavier smoking than were adults without a specified lifetime mental illness. Heavier and more frequent smoking suggests higher nicotine dependence.<sup>23</sup> Nicotine dependence has been shown to be associated with poor health-related quality of life<sup>24,25</sup>



**TABLE 2—Age-Adjusted Percentage of Smoking Characteristics Among Persons With a Diagnosed Lifetime Mental Illness or Serious Psychological Distress: National Health Interview Survey, United States, 2007**

Smoking Characteristic	Lifetime Mental Illness <sup>a</sup>									
	Bipolar Disorder (n = 387)		Schizophrenia (n = 150)		ADD or Hyperactivity (n = 557)		Phobias or Fears (n = 949)		Serious Psychological Distress (n = 671)	
	No.	Age-Adjusted % (95% CI)	No.	Age-Adjusted % (95% CI)	No.	Age-Adjusted % (95% CI)	No.	Age-Adjusted % (95% CI)	No.	Age-Adjusted % (95% CI)
Smoking intensity <sup>b</sup>										
Light	80	36.8 (27.5, 47.1)	29	47.9 (30.2, 66.1)	115	39.3 (32.3, 46.8)	129	39.0 (32.0, 46.4)	105	33.0 (25.7, 41.3)
Moderate	79	48.1 (38.7, 57.6)	26	34.3 (19.7, 52.7)	79	49.3 (41.6, 57.1)	119	41.2 (33.9, 49.0)	93	38.2 (30.2, 46.9)
Heavy	32	15.1 (10.8, 20.7)	17	17.8 (10.2, 29.4)	27	11.4 (7.3, 17.2)	41	19.8 (13.7, 27.7)	57	28.8 (22.2, 36.4)
Smoking frequency <sup>b</sup>										
Every day	167	86.6 (74.9, 93.3)	62	85.7 (73.1, 93.0)	181	86.9 (82.2, 90.6)	248	87.3 (81.7, 91.5)	223	89.1 (82.6, 93.4)
Some days	25	13.4 (6.7, 25.1)	11	14.3 (7.1, 26.9)	42	13.1 (9.4, 17.8)	44	12.7 (8.5, 18.4)	35	10.9 (6.6, 17.4)
Quit attempt <sup>b</sup>										
Yes	93	50.5 (39.2, 61.8)	28	38.9 (26.3, 53.3)	126	47.9 (40.0, 56.0)	135	43.5 (37.2, 50.0)	124	45.1 (36.7, 53.7)
No	98	49.5 (38.2, 60.8)	45	61.1 (46.8, 73.8)	97	52.1 (44.0, 60.0)	156	56.5 (50.0, 62.8)	133	54.9 (46.3, 63.3)

Note. ADD = attention deficit disorder; CI = confidence interval. Percentages are age-adjusted to standardized population estimates for 2000. Because of item nonresponse on the 2007 National Health Interview Survey, column sample sizes for each smoking characteristic may not sum to the column total for each mental illness or serious psychological distress.

<sup>a</sup>Lifetime mental illnesses included schizophrenia, bipolar disorder, ADD or hyperactivity, dementia, and phobias or fears. Because fewer than 50 respondents with dementia reported currently smoking, estimates related to current smoking were suppressed among persons self-reporting dementia. Because comorbidity is possible, categories of mental illnesses were not mutually exclusive.

<sup>b</sup>Among current smokers (persons who reported smoking 100 cigarettes in their lifetime and currently smoke every day or some days).

and has historically been related to comorbid medical conditions in persons in community-based mental health settings.<sup>20</sup> Consequently, this greater frequency of smoking also places adults with psychiatric disorders at greater risk for smoking-related morbidity and mortality.<sup>26</sup>

Biological, social, and psychological factors have been proposed to explain why persons with mental illnesses smoke at a higher rate than do those without mental illnesses.<sup>26</sup> For example, it has been noted among schizophrenic patients that cigarette smoking can have

a positive effect on sensorimotor gating defects and can modulate the functioning of neurotransmitters, including dopamine and glutamine, which contribute to schizophrenia.<sup>27</sup> Additionally, smoking may blunt distress, reduce symptoms of the disorder, and decrease symptoms of

**TABLE 3—Age-Adjusted Percentage of Smoking Characteristics Among Adults With No Specified or One or More Diagnosed Lifetime Mental Illnesses: National Health Interview Survey, United States, 2007**

Smoking Characteristic	No Specified Lifetime Mental Illness (n = 21 545)		1 Lifetime Mental Illness (n = 1440)		2 Lifetime Mental Illnesses (n = 245)		≥ 3 Lifetime Mental Illnesses (n = 76)	
	No.	Age-Adjusted % (95% CI)	No.	Age-Adjusted % (95% CI)	No.	Age-Adjusted % (95% CI)	No.	Age-Adjusted % (95% CI)
Smoking intensity <sup>a</sup>								
Light	2237	56.9 (54.8, 59.0)	212	43.3 (37.2, 49.6)	39	35.1 (24.1, 47.9)	19	36.5 (22.8, 52.9)
Moderate	1121	32.8 (30.9, 34.7)	162	40.1 (33.6, 47.0)	36	48.2 (36.7, 59.8)	22	44.4 (30.2, 59.5)
Heavy	353	10.3 (9.2, 11.7)	51	16.6 (11.9, 22.8)	19	16.7 (10.4, 25.8)	9	19.1 (9.6, 34.3)
Smoking frequency <sup>a</sup>								
Every day	2860	77.1 (75.3, 78.7)	355	85.7 (81.3, 89.2)	82	90.0 (82.2, 94.6)	44	88.9 (74.8, 95.6)
Some days	913	22.9 (21.3, 24.7)	73	14.3 (10.9, 18.7)	14	10.0 (5.4, 17.8)	6	11.1 (4.5, 25.2)
Quit attempt in past year <sup>a</sup>								
Yes	1595	41.8 (39.9, 43.8)	216	45.9 (40.1, 51.7)	48	44.9 (33.1, 57.2)	23	42.2 (31.5, 53.6)
No	2162	58.2 (56.2, 60.1)	212	54.1 (48.3, 59.9)	48	55.1 (42.8, 66.9)	27	57.8 (46.4, 68.5)

Note. CI = confidence interval. Percentages are age-adjusted percentage to standardized population estimates for 2000. Lifetime mental illnesses included schizophrenia, bipolar disorder, attention deficit disorder (ADD) or hyperactivity, dementia, and phobias or fears.

<sup>a</sup>Among current smokers (persons who reported smoking 100 cigarettes in their lifetime and currently smoke every day or some days).

anxiety and depression in persons with schizophrenia.<sup>20,28</sup> The available literature also indicates that individuals with psychotic and substance use disorders, depression, anxiety, and personality disorders have high rates of smoking, a likely outcome because smoking ameliorates the unpleasant affective states often experienced by persons with those conditions.<sup>10,26</sup> For persons with ADD or hyperactivity, it has been suggested that symptoms of ADD<sup>29</sup> and problems with attention and cognitive performance<sup>30</sup> may be mitigated by nicotine, a possible reason why smoking prevalence is so high in this group. Such individuals may smoke to reduce the symptoms associated with ADD<sup>30</sup>; nicotine has been shown to reduce these symptoms when administered in laboratory settings.<sup>29</sup>

These findings may be of particular importance considering the higher mortality observed among persons with mental illness.<sup>26</sup> A recent National Association of State and Mental Health Program Directors report indicated that individuals with serious mental illnesses die at least 25 years earlier on average than do individuals among the general population<sup>31</sup> and that cardiovascular disease is the leading cause of death of individuals with mental illnesses.<sup>32</sup> Because smoking increases one's risk for coronary heart disease 2- to 4-fold<sup>33</sup> and doubles one's risk for stroke,<sup>34</sup> it is plausible that the high prevalence of smoking among mentally ill populations observed in our study also contributes to this premature death of persons with mental illnesses. This conclusion seems particularly reasonable because cigarette smoking has been linked to the excessive mortality of persons with schizophrenia.<sup>7</sup>

We had the unique opportunity to examine cessation attempts of persons with diagnosed mental illnesses. The present findings suggest that a significant number of US adults with a diagnosed mental illness or experiencing serious psychological distress have made quit attempts, a possible indication of an interest in quitting, despite rates of successful cessation lower than those among adults without a specified mental illness. Our results indicate that adults with mental illnesses or serious psychological distress attempt to quit at a rate similar to that of adults without these illnesses; adults with mental illnesses, however, are less successful in doing so. This event is particularly true for adults with multiple diagnosed mental

disorders. Attempts at smoking cessation by adults with psychiatric disorders is complicated by several issues, including the impact that smoking may have on symptom reduction and the exacerbation of psychiatric symptoms that can occur as the result of nicotine withdrawal.<sup>4,28</sup>

Although we were unable to examine an institutionalized population of adults with mental illnesses, these treatment issues persist in psychiatric treatment facilities. Traditionally, cigarettes have been given as rewards in psychiatric settings, thereby limiting cessation efforts<sup>35</sup> mainly because of health care providers' concerns about the effect of major life changes, such as smoking cessation, on psychiatric treatment.<sup>36</sup> A survey of state-operated psychiatric facilities conducted by the National Association of State Mental Health Program Directors revealed that both short- and long-term hospitals provided an average of 5 smoking breaks per day to patients.<sup>37</sup> Moreover, resistance to tobacco-free policies in psychiatric treatment facilities has been heavily documented, particularly among facility staff.<sup>37,38</sup> As a result, smoking, like other substance abuses, is habitually viewed as a lower priority compared with the immediate symptoms of patients' mental illnesses.<sup>39</sup>

Our study demonstrates that individuals who suffer from mental illness and serious psychological distress are smoking at exceptionally high rates that place them at substantial risk of smoking-related disease and identify them as a population of disparately high tobacco use. Thus, there is a great need to target prevention and cessation efforts at the community and individual levels for persons with psychiatric disorders. For example, cessation services such as telephone quitlines need to offer services specifically tailored to adults with mental illnesses. Previous research has shown that a significant proportion of callers to telephone quitlines report some form of mental health problems and that these smokers may benefit from specially developed protocols that coordinate between clinicians and quitlines.<sup>40</sup> However, quitlines are still assessing how best to meet those callers' unique needs.<sup>41</sup> Our findings underscore the importance of this assessment and support these recommendations. Furthermore, smoking cessation must also be addressed among populations with comorbid psychiatric conditions, notably institutionalized persons,

including persons receiving inpatient care or participating in day-treatment programs.<sup>21</sup>

### Limitations

Our study had several limitations. We used cross-sectional data; therefore, we cannot infer temporality and causality. Because of the self-reported nature of the survey, no biological markers of smoking were assessed, and mental disorder diagnoses were not confirmed by measure or mental health professional. However, previous research has demonstrated that self-reported smoking status is a reliable measure of smoking status,<sup>42</sup> although these findings were validated in the general population and not in a mentally ill population. A comprehensive list of mental illnesses was not included in the survey, and therefore the category of adults with no specified mental illness does not necessarily indicate the complete absence of mental illness. For example, the effect of disorders such as major depression could not be assessed. However, the K6 has been found to be useful as a screening tool for depression in population health surveys.<sup>43</sup> Small cell sizes prevented some analysis (e.g., dementia and smoking intensity, quit attempts) and resulted in large variances for some estimates. Finally, institutionalized populations were not included in the NHIS, and as a result, our results can be generalized only to noninstitutionalized adults with diagnosed mental illnesses in the United States.

Despite these limitations, we used the most recently available NHIS data set, thereby making the sample nationally representative, which can be generalized to the US adult noninstitutionalized population. Unlike previous epidemiological studies of smoking by adults with mental illness, we also provided age-adjusted estimates to account for the variable age at diagnosis of these mental illnesses. In addition, we were able to also examine several dimensions of smoking behaviors, including intensity, frequency, and cessation, by using standard tobacco control research definitions.

### Conclusions

The high smoking prevalence in combination with low quit ratios observed in our study indicate that cigarette smoking remains a significant public health issue among persons with mental illness. The decline in smoking by the

general US population in the past 50 years has arguably been the result of 1 of the most successful public health efforts to date. Despite these continued efforts, however, estimates of smoking prevalence in adults have declined at a much slower rate over the past decade than in previous decades.<sup>3</sup> Smoking by persons with mental disorders and serious psychological distress remains largely unaddressed as a major public health problem, despite considerable disproportionate smoking-related morbidity and mortality in this population from cancer, cardiovascular disease, and respiratory disease.<sup>26,44,45</sup>

Mental illnesses are complex and their biological, social, and psychological etiologies vary; therefore, the reasons that mentally ill adults smoke and the best approaches for cessation are accordingly multifaceted. In 2008, the US Public Health Service advised clinicians to overcome their reluctance to treat this population of smokers and suggested that recommended tobacco dependence treatments be used with broad populations of tobacco users, including those with psychiatric disorders and mental illness.<sup>46</sup> Available research suggests that current smoking cessation management approaches be flexible and consider the unique needs of this population,<sup>28</sup> and be implemented when psychiatric symptoms are not severe<sup>46</sup> may be successful in promoting smoking abstinence. Further research is needed to determine the most efficacious approach for smoking cessation for persons with psychiatric disorders.<sup>28</sup> ■

### About the Authors

Annette K. McClave, Shane P. Davis, and Shanta R. Dube are with the Office on Smoking and Health, Centers for Disease Control and Prevention, Atlanta, GA. Lela R. McKnight-Eily is with the Division of Adult and Community Health, Centers for Disease Control and Prevention, Atlanta.

Correspondence should be sent to Annette McClave, Office on Smoking and Health, Centers for Disease Control and Prevention, 4770 Buford Highway, MS-K50, Atlanta GA, 30341 (e-mail: AMcClave@cdc.gov). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints/Eprints" link.

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### Contributors

A.K. McClave was the principal investigator, organized all contributions to the article, and performed the

analysis. L.R. McKnight-Eily and S.P. Davis advised on the analysis and study design and wrote sections of the article. S.R. Dube provided feedback on the study design and wrote a section of the article.

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This was a secondary analysis of National Health Interview Survey data and therefore institutional review board approval was not required.

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