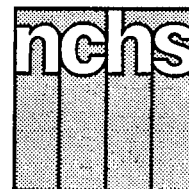


# Advance Data



From Vital and Health Statistics of the CENTERS FOR DISEASE CONTROL AND PREVENTION/National Center for Health Statistics

## Negative Moods as Correlates of Smoking and Heavier Drinking: Implications for Health Promotion

by Charlotte A. Schoenborn, M.P.H., and John Horm, M.Sc.

### Highlights

- Of the five negative moods reported (depression, loneliness, restlessness, boredom, and upset), the most prevalent among women was depression (11.4 percent) and among men restlessness (10.9 percent).
- About 40 million adults were often depressed, lonely, restless, bored, and/or upset in the past 2 weeks.
- Over 8 million adults—3 million men and 5 million women—experienced three or more of these negative moods in the past 2 weeks.
- Adults who were often depressed were about 40–50 percent more likely to smoke than adults who were never depressed.
- Men and women who were often lonely were about 60–70 percent more likely to smoke than persons who were never lonely.
- On a negative mood scale ranging from 0 to 20, women with the highest negative mood score were almost three times as likely to smoke as women who had a score of zero.
- Men with the highest negative mood score were almost twice as

likely to smoke as men with no negative moods.

- Men who were often lonely or bored were almost twice as likely to drink heavily as men who never felt this way.
- Odds of being a heavier drinker more than tripled between men who had no negative moods and those with the highest levels of negative moods; no relationship was found between negative moods and heavier drinking for women.
- Men with the highest levels of negative moods were four times as likely to combine smoking with heavier drinking (three or more drinks daily) than were men reporting no negative moods.

### Introduction

#### History of health promotion

Since 1912, the United States Public Health Service has taken the lead protecting and promoting the health of the American people (1). In the early part of the 20th century, prevention of acute, infectious diseases such as tuberculosis, diphtheria, and typhoid fever, were at the forefront of public health concerns. The techniques for bringing

about change largely involved quarantine, improved sanitation, and later, immunization programs (2).

In the past several decades, with management of most infectious diseases (with the notable exception of AIDS) largely under control, public health officials have increasingly turned attention to prevention of chronic diseases such as heart disease and cancer—which often result in years of disability, reduced productivity, and premature death. Multiple causal agents and a long lag time between exposure and first manifestations of disease make identification of the etiology of many chronic diseases very complex. Numerous epidemiological investigations have been devoted to identifying causal relationships between environmental factors and morbidity or mortality outcomes (3). Studies have also examined the role that personal health behaviors have in increasing risks for disease, disability, and death (4–11). Public health efforts today are becoming increasingly broader based, encompassing environmental regulation, health education, and behavior change programs in order to reduce risks of adverse health outcomes (2).



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service  
Centers for Disease Control and Prevention  
National Center for Health Statistics



In 1978, the World Health Organization hosted an International Conference on Primary Health Care at Alma-Ata, U.S.S.R. (12). An outgrowth of this conference was the establishment of a worldwide goal of achieving "health for all by the year 2000" (13). This declaration was the start of a formalized goal-setting strategy for health promotion by numerous governments and international organizations (14). In accordance with this new strategy, the U.S. Department of Health and Human Services began a process of establishing national health promotion objectives for the United States, setting specific target dates for their accomplishment. The first U.S. health promotion objectives, commonly referred to as the 1990 Health Objectives for the Nation, were established in 1980, with a target date of 1990 (15). In 1990, the status of progress in these objectives was evaluated (16). Simultaneously, drawing on lessons of the 1980's, a new set of objectives were established for the next decade. These are the National Health Promotion Objectives for the Year 2000, also referred to as *Healthy People 2000* (17). Although the objectives were developed under the sponsorship of the Public Health Service, the project was a national, not a Federal, effort. Both the process of setting health promotion goals and working toward achieving them involves representatives from Federal, State, and local governments, nonprofit and for-profit organizations, as well as consumers of health services.

### **Significance of smoking, alcohol, and mental health issues**

Tobacco and alcohol use were prominent in both the 1990 and year 2000 health promotion objectives. Cigarette smoking and alcohol consumption have been the subject of extensive scientific investigation for many years. Since 1964, with the establishment of a National Clearinghouse on Smoking (18) (which later became the Office on Smoking and Health) and the first

Surgeon General's Report on Smoking and Health (19), more than 20 reports to Congress have been prepared on the health consequences of smoking and other tobacco use. Similarly, since 1971, seven major reports to Congress have been prepared by the National Institute on Alcoholism and Alcohol Abuse (NIAAA) outlining the current state of knowledge of the causes and consequences of alcohol abuse and dependence (20).

Attention to mental health as a national health priority came somewhat later. Mental health was first included as a priority area for health objectives for the year 2000. Since 1983, the National Institute of Mental Health (NIMH) has published five reports to Congress, entitled *Mental Health, United States*, summarizing the most current information available on the Nation's mental health care delivery system (21,22). In 1989, the National Health Interview Survey (NHIS) included, for the first time, a special section on prevalence of chronic mental illness in the U.S. adult, noninstitutionalized population (22,23).

### **Interrelationships: smoking, drinking, and mental health**

In the national health promotion objectives for the year 2000, tobacco use, alcohol use, and mental health are treated as discrete entities; their interrelationships are not addressed. However, this is not to say that these have been ignored by the scientific community. Heavy alcohol consumption and cigarette smoking have repeatedly been shown to be associated: Smokers are more likely to be heavy drinkers and heavy drinkers are more likely to smoke (24-27). The relationships between mental health and these behaviors have also been studied (28-32). Greater knowledge of these interrelationships provides a foundation for developing more effective public health education campaigns and advancing progress toward meeting the health objectives for the year 2000.

### **Rationale**

In a climate of increased knowledge of the adverse health consequences of smoking and heavy drinking, a decrease has been observed in the prevalence of these behaviors in the adult population. Some of this reduction may be due to people quitting smoking and drinking because of health problems known to be associated with these behaviors. Some people have quit as a result of their knowledge of the risks they pose, while others who otherwise might have taken them up, resisted doing so. Thus, those individuals who still smoke and drink heavily, in today's environment of widespread knowledge of the associated health risks, may be people who find it more difficult than others to avoid these harmful behaviors. Assessment of the relationships between harmful health practices and selected negative moods may provide important clues for reaching these individuals. It is hypothesized that emotional health status may play an important role in people's decisions to engage in behaviors that they know pose certain health risks. Unfortunately, with cross-sectional data (33) such as the 1991 National Health Interview Survey of Health Promotion and Disease Prevention (1991 NHIS-HPDP), the direction of causality cannot be determined. However, whether it is the negative mood that is causing the behavior, the behavior that is causing the negative mood, or both being triggered by a common third factor, evidence of their co-occurrence would suggest that mental health issues should be addressed in tandem with more traditional health education and behavior modification approaches.

### **Contents of this report**

This report presents prevalence estimates for the adult U.S. population for five negative mood states (frequency of being depressed, lonely, restless, bored, and upset) drawn from the classic Bradburn Affect Balance Scale (34) and used in earlier population-based studies of

mental health (35). The report then describes the relationship between each of these moods and cigarette smoking and heavy drinking. It goes on to examine the relationship between a total negative mood score (an additive score composed of responses to all five items), and smoking and drinking, individually and combined. The term "negative mood" is used throughout this report to describe these five measures of negative affect, also termed "negative feelings" by Bradburn.

## Methods

The 1991 NHIS-HPDP was developed to gather baseline data for tracking the year 2000 national health promotion objectives, in order to assess success or progress in achieving the objectives by the turn of the century. The 1991 NHIS-HPDP was a component of the ongoing NHIS, which has gathered information on the health of the U.S. resident household population each year since 1956 (36). In 1990, the National Health Interview Survey of Health Promotion and Disease Prevention (1990 NHIS-HPDP) was fielded to measure achievement of the 1990 Health Promotion Objectives for the Nation (37). Although similarly titled and both devoted to health promotion issues, these two surveys contained many different questions because their purposes were to measure progress toward different sets of objectives.

The 1991 NHIS-HPDP contained a wide range of questions on personal health behaviors, including tobacco and alcohol use. The survey also included a short section on mental health, composed of the negative affect items of the Bradburn Affect Balance Scale (34).

The questions related to negative moods in the 1991 NHIS-HPDP were prefaced by telling respondents that they were going to be asked questions about how they had been feeling emotionally. Respondents were then asked how often in the past 2 weeks they had felt depressed, lonely, restless, bored, or upset. These

emotions have been shown to be associated with other indicators of mental health status such as anxiety, marital tension, and job dissatisfaction (34-35,38), but are not the same as psychiatric diagnoses. For example, a person who reported being often depressed in the 1991 NHIS-HPDP may or may not be clinically depressed according to psychiatric diagnostic criteria (39-41). Instruments exist to assess clinical depression in population-based surveys—most notably the Diagnostic Interview Schedule, which has been used in the National Health and Nutrition Examination Survey (42). The items included in the 1991 NHIS-HPDP are simply respondent reports of the experience of negative emotions or moods.

Like the questions related to negative moods, the reference period for the questions on alcohol consumption was also the past 2 weeks; smoking status was based on smoking practices at the time of interview (see technical notes for description of these variables).

One adult per family was randomly selected from the full NHIS sample for personal interview with the health promotion questionnaire. A total of 43,732 adults aged 18 years and older responded to the 1991 NHIS-HPDP. The overall response rate was 87.8 percent, which is the product of the response rate for the basic NHIS household survey (95.7 percent) and the response rate for those persons identified in the household as being eligible for the HPDP component (91.7 percent). Self-response was required for all questions in the HPDP.

Statistics shown and discussed in this report were generated using Software for Survey Data Analysis (SUDAAN) (43). SUDAAN is a software package, designed specifically for analysis of complex survey data, that takes into account the effects of the complex sample design in the calculation of standard errors. The SUDAAN Proc Descript procedure was used to generate prevalence estimates and their associated standard errors for each of

the five negative moods for men and women. Logistic regression, using SUDAAN Proc Logistic with unequal probabilities of selection, was then run in order to test the hypothesis that cigarette smoking and heavy alcohol consumption were related to severity of negative mood. Sociodemographic and health characteristics known to be associated with these behaviors (age, education, income, race, marital status, and physical health status) were controlled in order to assess the net effect of negative moods. Response categories for the negative moods consisted of five levels ranging from "never" to "very often." The two highest and two lowest categories were combined in each case for clearer presentation and because the differences between "very often" and "often" as well as between "rarely" and "never" are analytically relatively unimportant. For clarity in the discussion, the term "often" is used for the category "often or very often" and the term "never" is used for the category "rarely or never."

Beta coefficients and their associated standard errors were then transformed into the odds ratios ( $OR = e^{\beta}$ ) and their associated 95 percent confidence limits ( $95\% CI = e^{(\beta \pm 1.96 \cdot SE^{\beta})}$ ) (44) and are shown in tables 1 and 2. The frequencies shown in these tables represent the weighted population estimates for each of the negative moods, excluding any cases for whom data for the particular health behavior were missing. This presentation allows the reader to estimate at a glance, not only the prevalence of each negative mood, but also, with a simple calculation (that is, prevalence of the behavior multiplied by the population estimate for a given mood), derive the number of people in the adult U.S. population with combined risks. For example, 6,006,000 men were often depressed, and 41.5 percent of these men were current smokers. Thus, 2,493,000 men ( $6,006,000 \cdot 41.5$  percent) were both often depressed and current cigarette smokers. Similarly, 10,639,000 women

were often depressed, and 33.3 percent of these women were current smokers. Thus, 3,543,000 women ( $10,639,000 \cdot 33.3$  percent) had both of these characteristics.

## Findings

### Prevalence of negative moods

Negative moods were experienced by a substantial proportion of U.S. men and women in 1991 (figure 1). Depression was the most prevalent negative mood among women and rates of depression were higher for women (11.4 percent) than for men (7.1 percent). Restlessness was the most prevalent negative mood among men (10.9 percent); and rates of restlessness were about the same for women (10.3 percent). Boredom ranked second for both women (11.2 percent) and men (9.4 percent).

Feelings of loneliness and frequent upset were less common than the other moods studied. Like depression and boredom, prevalence estimates for loneliness and upset were higher for women than for men: 5.8 percent of women often felt lonely compared with 3.4 percent of men, and 4.5 percent of women reported often feeling upset compared with 2.7 percent of men. These estimates are unadjusted for any other characteristics.

Rates shown in figure 1 were transformed into population estimates in figure 2. The estimates represent the numbers of persons often experiencing specific negative moods in the past 2 weeks; a person may have had more than one of these moods. The percent and number of men and women by total number of negative moods experienced often or very often in the past 2 weeks are shown in figure 3.

Overall, almost 17 million adults said they often felt depressed in the past 2 weeks: 10.7 million women and 6.1 million men (figure 2). At out 19 million men and women often felt bored or restless. Loneliness was experienced by about 3 million men and almost 5.5 million women.

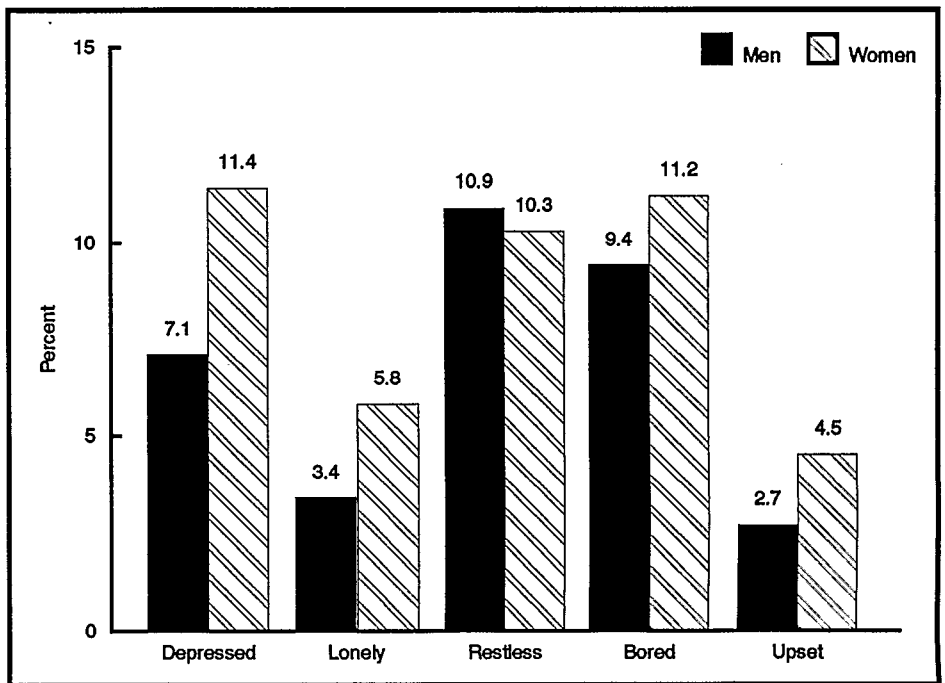


Figure 1. Percent of men and women who often or very often felt depressed, lonely, restless, bored, or upset in the past 2 weeks: United States, 1991

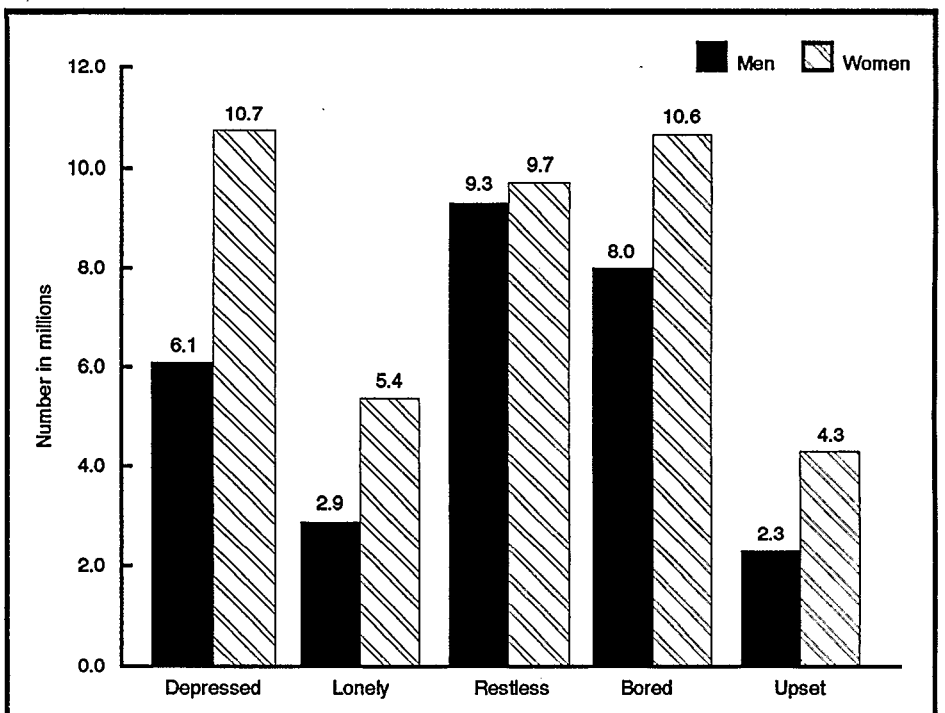


Figure 2. Number of men and women who often or very often felt depressed, lonely, restless, bored, or upset in the past 2 weeks: United States, 1991

Frequent feelings of upset affected fewer adults than any of the other negative moods; almost twice as many women (4.3 million) as men (2.3 million) said they were often upset.

Figure 3 indicates that almost 40 million adults—17 million men and

22.5 million women—often experienced at least one of these negative moods during the 2 weeks preceding the NHIS interview, and over 8 million adults experienced three or more negative moods often during this period.

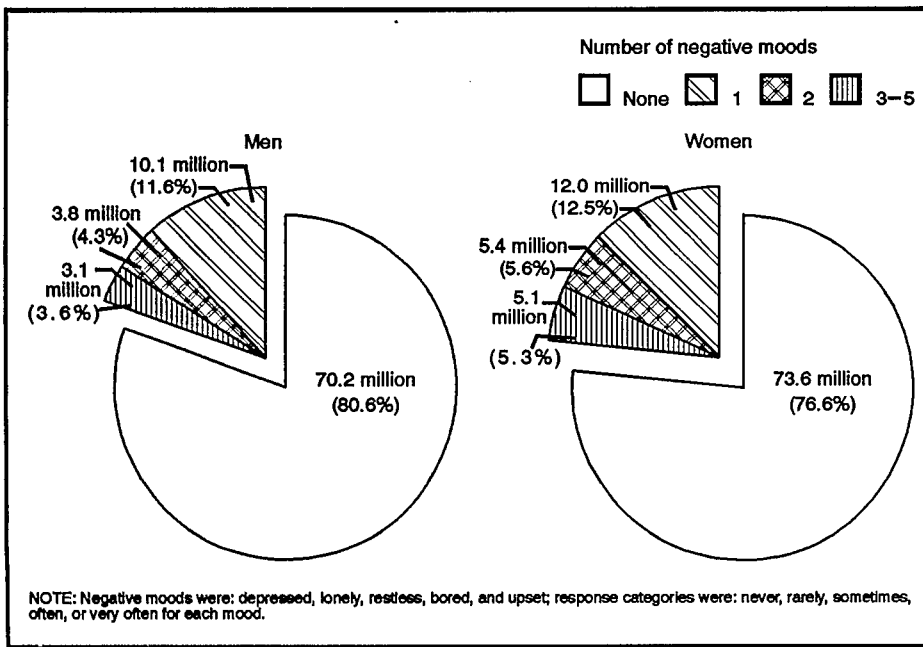


Figure 3. Number and percent of men and women by total number of negative moods experienced often or very often in the past 2 weeks: United States, 1991

### Negative moods and smoking

Table 1 shows the percent of U.S. men and women who smoked cigarettes according to level of depression, loneliness, restlessness, boredom, and feeling upset. Smoking prevalence was markedly higher among persons who often experienced these negative moods than among persons who never experienced them. Smoking rates for persons who sometimes had these feelings were also higher than for those who never had them. Of the negative moods studied, loneliness was the strongest predictor of smoking for men and boredom was the strongest predictor for women. The prevalence estimates shown in table 1 are unadjusted for other characteristics that might influence smoking behavior.

Many studies have shown that smoking varies by sex, age, race, income, education, and marital status (37,45-46). Smoking also affects and is affected by physical health status (47-48). To better assess the relationship between negative moods and smoking, the influence of these other factors must be neutralized. This was accomplished by calculating

odds ratios, controlling for these other characteristics (44). The odds ratio is used as an approximation of relative risk. Relative risk is defined as the incidence rate among exposed individuals divided by the incidence rate among nonexposed individuals (49). In this analysis, the exposed groups are those with the negative moods and the nonexposed are those without the negative moods.

The odds ratios presented in table 1 show the probability that persons who have recently experienced particular negative moods will be smokers compared with persons who have not had these moods, after controlling for the effects of sex, age, race, education, income, marital status, and health status. Confidence limits, shown next to each odds ratio, indicate whether or not the increased probability is sufficiently large that it is not likely to occur by chance. When the lower confidence limit is greater than one, the odds ratio is statistically significant.

Men and women who often felt depressed had an odds ratio of 1.4 and 1.5, respectively, for smoking

compared with men and women who never felt depressed. In other words, frequently depressed adults were about 40-50 percent more likely to smoke than those who were never depressed. Women who sometimes felt depressed also had a higher risk of smoking than nondepressed women (OR = 1.3); the odds ratio for men with this level of depression (OR = 1.1) was not statistically significant at the  $p \leq .05$  level.

Frequent loneliness was a strong predictor of smoking for both men (OR = 1.7) and women (OR = 1.6); occasional loneliness also predicted smoking for women (OR = 1.2). Although the odds ratio for men who were sometimes lonely was also 1.2, this was not statistically significant.

Women who were often restless or bored had the highest odds ratio for smoking (OR = 1.7). Frequent boredom was similarly predictive of smoking for men (OR = 1.6); frequent restlessness was less so (OR = 1.3).

Figure 4 shows the odds ratios for smoking by men and women, according to level of negative mood, after adjusting for the effects of age, race, education, income, marital status, and health status. For women, the odds of smoking cigarettes almost tripled between those with the lowest and those with the highest negative mood scores (OR = 2.7 for women with a score of 20). The odds of smoking also went up for men as negative mood scores increased, although the relationship was not as dramatic as for women: men with a maximum score of 20 on the negative mood index had an odds ratio of 1.8, indicating that men with a lot of negative moods were about 80 percent more likely to smoke than men who had no such moods.

### Negative moods and drinking

Table 2 shows prevalence rates of heavier drinking for men and women according to levels of depression, loneliness, restlessness, boredom, and feeling upset. Odds ratios, described

Table 1. Prevalence (unadjusted) of cigarette smoking for men and women, by selected negative moods and odds ratios adjusted for age, race, education, income, marital status, and health status: United States, 1991

Negative moods	Men				Women			
	Population (in thousands)	Prevalence	Odds ratio	95-percent confidence limits	Population (in thousands)	Prevalence	Odds ratio	95-percent confidence limits
<b>Depressed</b>								
Very often or often . . . . .	6,006	41.5	1.4	1.2,1.7	10,639	33.3	1.5	1.4,1.7
Sometimes . . . . .	12,824	31.8	1.1	1.0,1.2	20,423	27.2	1.3	1.2,1.4
Rarely or never . . . . .	65,514	26.9	1.0	...	62,379	21.4	1.0	...
<b>Lonely</b>								
Very often or often . . . . .	2,842	44.9	1.7	1.4,2.1	5,405	35.7	1.6	1.4,1.9
Sometimes . . . . .	5,479	36.2	1.2	1.0,1.4	9,868	28.0	1.2	1.1,1.3
Rarely or never . . . . .	76,090	27.5	1.0	...	78,182	22.7	1.0	...
<b>Restless</b>								
Very often or often . . . . .	9,220	39.2	1.3	1.1,1.5	9,637	35.8	1.7	1.5,1.9
Sometimes . . . . .	13,040	29.9	1.0	0.9,1.2	13,977	28.1	1.3	1.1,1.4
Rarely or never . . . . .	61,956	26.8	1.0	...	69,708	21.6	1.0	...
<b>Bored</b>								
Very often or often . . . . .	7,886	42.8	1.6	1.4,1.9	10,455	36.4	1.7	1.5,1.9
Sometimes . . . . .	16,810	32.3	1.2	1.1,1.4	19,169	26.6	1.2	1.1,1.3
Rarely or never . . . . .	59,479	25.8	1.0	...	63,660	21.3	1.0	...
<b>Upset</b>								
Very often or often . . . . .	2,271	38.0	1.2	0.9,1.6	4,215	34.2	1.3	1.1,1.5
Sometimes . . . . .	7,506	31.8	1.0	0.9,1.2	10,840	24.0	0.9	0.8,1.0
Rarely or never . . . . .	74,504	28.1	1.0	...	78,225	23.5	1.0	...

NOTES: The population columns represent the number of men or women with specified levels of selected negative moods. Population estimates for smoking among these individuals can be derived by multiplying the population estimate for a particular negative mood category by the prevalence estimates.

above, are also shown. Heavier drinking was defined as an average of three or more drinks per day for men and an average of two or more drinks

per day for women. Because alcohol affects women's bodies more quickly (thus taking less alcohol to make a woman drunk) (50-53) and because

consumption of large amounts of alcohol is considerably less common among women than among men (20,37,54-55), the number of drinks defined as "heavier drinking" was set lower for women. Even with this lower cutoff, prevalence of heavier drinking remained consistently lower for women (less than 3 percent) than for men across all categories and levels of negative moods. The highest odds ratios, 1.4 for women who were often bored or restless, failed to reach statistical significance at  $p \leq .05$ .

Findings for men and alcohol use present quite a different picture. Nearly 5 percent of men who did not experience these negative moods consumed an average of three drinks or more daily. Among men who often felt depressed, lonely, restless, bored, or upset, rates of heavier drinking were considerably higher. Among men who were often lonely, over 9 percent drank heavily; among those who were often restless or bored, about 8 percent could be classified as heavier drinkers. Prevalence of

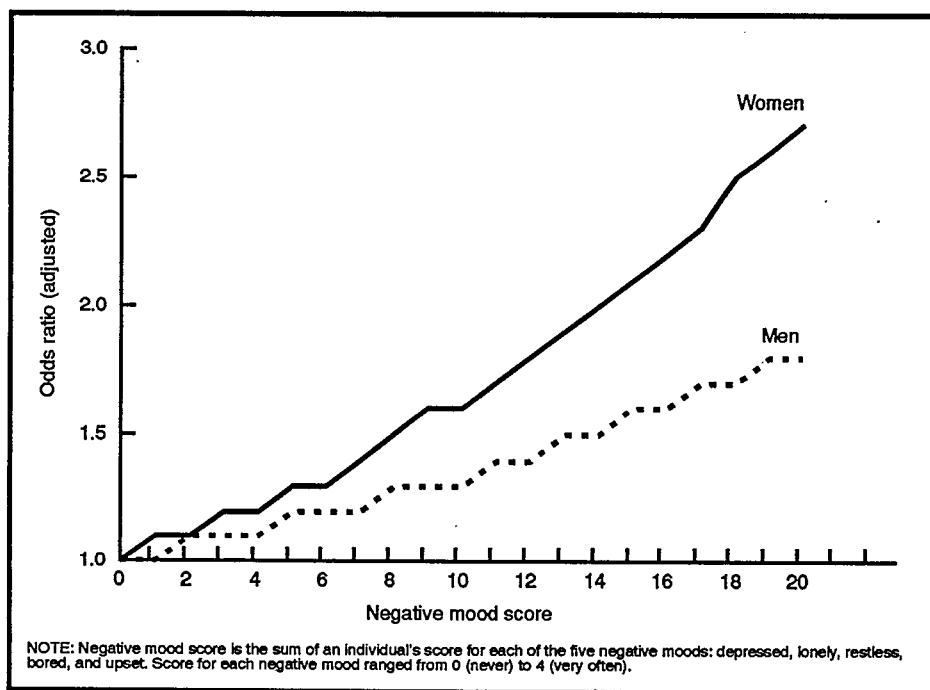


Figure 4. Odds ratios for smoking according to negative mood score, by sex, adjusted for age, race, education, income, marital status, and health status: United States, 1991

**Table 2. Prevalence (unadjusted) of heavier drinking for men and women by selected negative moods and odds ratios adjusted for age, race, education, income, marital status, and health status: United States, 1991**

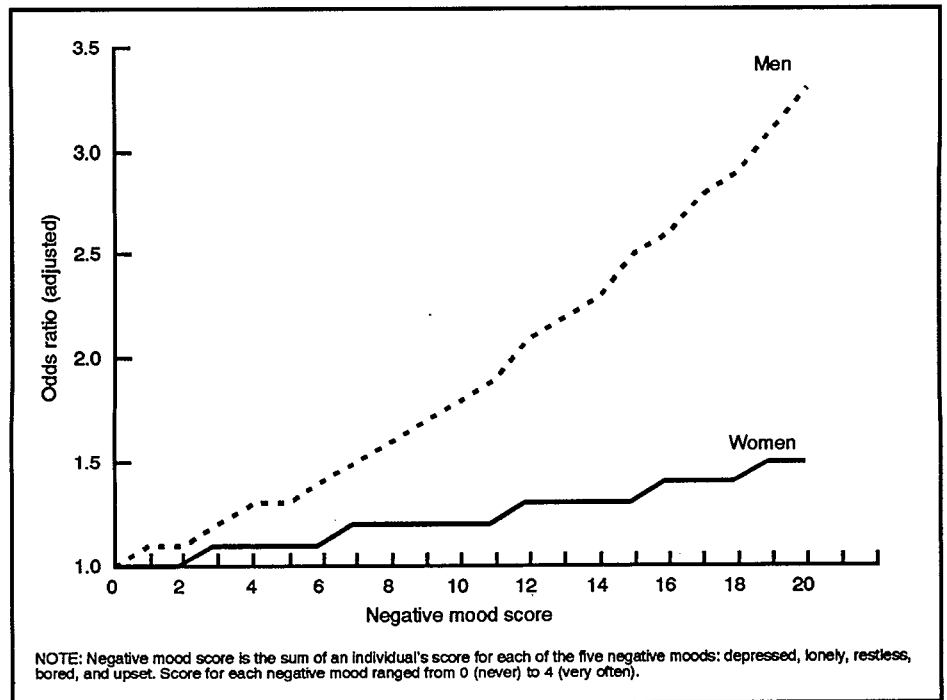
Negative moods	Men				Women			
	Population	Prevalence	Odds ratio	95-percent confidence limits	Population	Prevalence	Odds ratio	95-percent confidence limits
<b>Depressed</b>								
Very often or often . . . . .	5,960	7.1	1.6	1.2,2.1	10,618	2.5	1.1	0.8,1.5
Sometimes . . . . .	12,788	5.4	1.2	0.9,1.5	20,456	2.3	1.1	0.8,1.4
Rarely or never . . . . .	65,594	4.7	1.0	...	62,570	2.3	1.0	...
<b>Lonely</b>								
Very often or often . . . . .	2,819	9.4	1.9	1.3,2.7	5,409	2.8	1.3	0.9,2.1
Sometimes . . . . .	5,499	6.0	1.2	0.9,1.6	9,870	1.9	1.0	0.7,1.4
Rarely or never . . . . .	76,092	4.8	1.0	...	78,383	2.3	1.0	...
<b>Restless</b>								
Very often or often . . . . .	9,186	7.7	1.7	1.3,2.1	9,625	2.9	1.4	1.0,1.8
Sometimes . . . . .	13,004	4.8	1.1	0.9,1.4	14,074	1.9	0.9	0.7,1.2
Rarely or never . . . . .	62,029	4.6	1.0	...	69,824	2.3	1.0	...
<b>Bored</b>								
Very often or often . . . . .	7,840	8.2	1.9	1.5,2.4	10,452	2.9	1.4	1.0,1.8
Sometimes . . . . .	16,742	5.3	1.2	1.0,1.5	19,227	1.9	0.8	0.6,1.1
Rarely or never . . . . .	59,600	4.5	1.0	...	63,804	2.3	1.0	...
<b>Upset</b>								
Very often or often . . . . .	2,256	6.8	1.4	0.9,2.2	4,223	2.6	1.3	0.8,2.0
Sometimes . . . . .	7,487	6.4	1.3	1.0,1.7	10,891	2.2	1.1	0.8,1.5
Rarely or never . . . . .	74,543	4.8	1.0	...	78,379	2.3	1.0	...

NOTES: The population columns represent the number of persons with specified levels of negative moods. Population estimates for heavier drinking (men: three or more drinks per day; women: 2 or more drinks per day) among these individuals can be derived by multiplying the population in a particular negative mood category by the prevalence estimates.

heavier drinking among men who were often depressed or upset was about 7 percent.

Odds ratios shown in table 2 confirm that men who often experienced selected negative moods were considerably more likely to be heavier drinkers than men who had not had these moods, even after adjusting for the effects of age, race, education, income, marital status, and health status. After controlling for these other factors, men who were often lonely or often bored were almost twice as likely to drink heavily as men who had not felt these negative emotions in the past 2 weeks (OR = 1.9).

Figure 5 graphs the relationship between total negative mood score and heavier drinking in men and women. As with the individual problems, heavier drinking was related to total score for men but not for women. After adjusting for possible confounding characteristics, the odds of being a heavier drinker more than tripled between men with no negative moods and those with a



**Figure 5. Odds ratios for heavier drinking among men (3 or more drinks daily) and women (2 or more drinks daily), by negative mood score, adjusted for age, race, education, income, marital status, and health status: United States, 1991**

maximum score of 20 (OR = 3.3). Among women, the odds ratio did not rise significantly between those with the lowest and highest negative mood scores (OR = 1.5).

### Negative moods and combined smoking and drinking—men

A combination of smoking and alcohol consumption has been identified as significantly increasing risks of life-threatening illnesses, primarily cancers at various sites (56–57). The association between negative mood score and the co-occurrence of these behaviors is shown for men in figure 6 for two levels of alcohol consumption: three or more drinks defined as heavier drinking earlier in this report and a somewhat more moderate level of two or more drinks per day. Results are consistent with other findings presented: men with high negative mood scores were at increased risk of engaging in both of these behaviors simultaneously. Men with the maximum negative mood score of 20 were four times more likely to combine smoking with drinking an average of three or more drinks per day (OR = 4.1) than men with no

negative moods. Odds ratios for combining smoking with drinking an average of two or more drinks daily, also were substantially higher for men with the highest negative mood scores (OR = 3.3).

### Discussion

These findings suggest that emotional well-being may play a role in cigarette smoking and heavy drinking. If this is the case, it is likely that programs designed to promote behavior change could be made more successful by addressing issues related to emotional well-being. The link found between negative moods and these behaviors also lends support to the suggestion by other researchers that physicians could use information on smoking and drinking practices, routinely gathered in clinical practice, as clues to probe for underlying emotional or mental conditions that may deserve attention in their own right as well as a means of improving the prognosis for improvements in physical health (58).

The issue of the direction of causality in this analysis is problematic. Certainly, engaging in personal behaviors detrimental to

health can be seen as a sign of less than optimal mental health. Indeed, both nicotine dependence and alcohol abuse and dependence are classified as psychiatric diagnoses in the *Diagnostic and Statistical Manual, Third Edition, Revised (DSM-III-R)*, published by the American Psychiatric Association. On the other hand, it is entirely logical that emotional status can be influenced by these health behaviors as well. The neurological effects of alcohol abuse have been well documented (20). Further, in today's antismoking climate, stress associated with the smoking habit may be sufficient to have consequences for emotional well-being of smokers.

The NHIS-HPDP, being a cross-sectional survey, cannot address the issue of causality. While the Survey design would allow longitudinal followup, there are no current plans to conduct such an investigation. Thus, the question posed can only be addressed in its most basic form: Are emotional health status and addictive personal health behaviors sufficiently related to warrant increased public health initiatives that attempt to address both issues together rather than one at a time. Evidence suggests that they are.

### Conclusions

These findings have important implications for current health promotion activities and for setting and attaining future health promotion goals. Since the early days of public sanitation and quarantine, activities surrounding promotion of the public's health have continued to evolve. Initial efforts to establish national (1990) health promotion objectives resulted in a set of 15 broad groups of objectives, only some of which were readily quantifiable. In the next generation of health promotion objectives (year 2000), very specific, quantifiable goals were set that encompassed not only a wider range of health problems, but also dealt

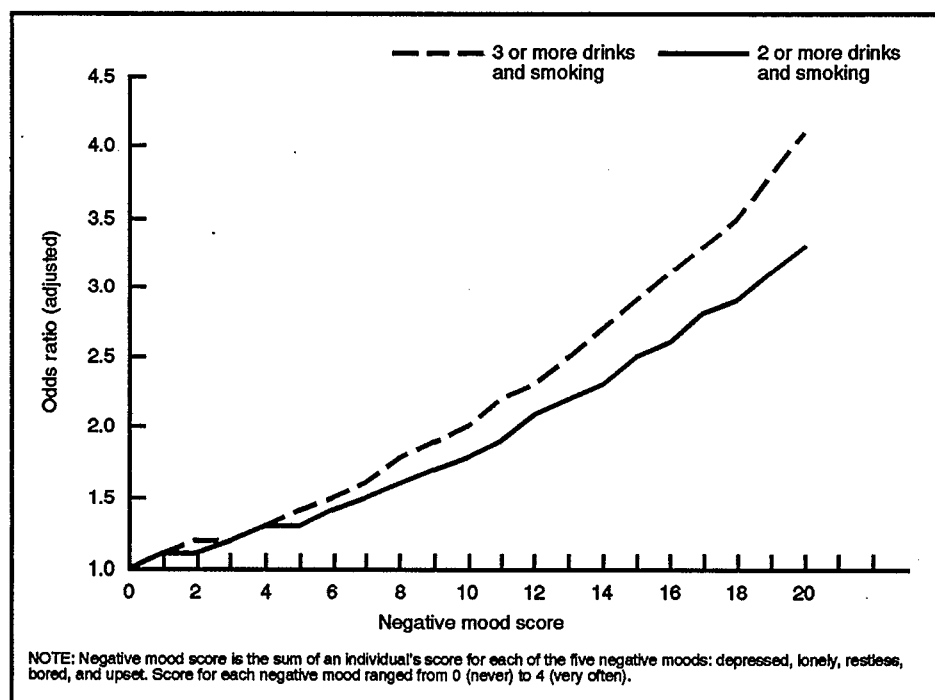


Figure 6. Odds ratios for combined smoking and heavy drinking among men, by negative mood score adjusted for age, race, education, income, marital status, and health status: United States, 1991



with objectives related to special populations, such as children, the aged, racial-ethnic minorities, and the disabled. Findings such as those presented here suggest that current health promotion activities designed to reduce prevalence of harmful health behaviors—such as smoking and heavy drinking—might have increased success if they could address emotional (and by extension, mental) health issues at the same time. Such a step could help accelerate progress toward attaining current objectives to reduce prevalence of harmful behaviors and increase the health of the Nation's population. Beyond this, in developing the next generation of health objectives for the Nation, establishment of cross-cutting objectives that address harmful personal health behaviors in the context of emotional and mental well-being should be seriously considered.

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## Technical notes

### Target population

The estimates presented in this report are based on data from the National Health Interview Survey (NHIS), an ongoing survey of households in the United States conducted by the National Center for Health Statistics. Each week, a probability sample of the civilian noninstitutionalized population of the United States is interviewed by personnel of the U.S. Bureau of the Census. Interviewers obtain information about the health and other characteristics of each member of the households included in the NHIS sample.

### Description of the survey

The NHIS consists of two parts: a basic health and demographic questionnaire that remains almost the same from year to year and is completed for each household member, and special topic questionnaires that vary from year to year and usually are asked of just one person in each family. In 1991, the special topics included health promotion and disease prevention, encompassing environmental health; tobacco; nutrition; immunization and infectious disease; occupational safety and health; heart disease and stroke; other chronic and disabling conditions; clinical and preventive services; physical activity and fitness; alcohol; mental health; and oral health. Other special topics in 1991 were pregnancy and smoking; child health; Acquired Immunodeficiency Syndrome (AIDS) knowledge and attitudes; and drug and alcohol use. With the exception of the questions on drug use, all 1991 special topic questionnaires were administered in a face-to-face interview, with telephone followup as needed. Self-response was required for all items. The drug questionnaire was self-administered with no telephone followup permitted. Data tapes for these surveys are available from the Division of Health Interview Statistics

and can be linked for investigation of cross-cutting research issues.

### Response rates

The total sample interviewed for 1991 for the basic health questionnaire consisted of 46,761 households containing 120,032 individuals. The response rate for the basic health and demographic questionnaire was about 95.7 percent, with proxy responses accepted for household members not home at the time of interview. For the NHIS-HPDP, one adult per family aged 18 years or over was selected for interview and self-response was required. A total of 43,732 HPDP questionnaires were completed, representing 91.7 percent of respondents identified as eligible at the time of the household interview and an overall response rate of 87.8 percent (the product of the response rate for the basic questionnaire and the response rate for the special topic questionnaire). Item nonresponse ranged from 1.3 to 2.1 percent for the questions discussed in this report.

### Sample design and statistical testing

Because the estimates shown in this report are based on a sample, they are subject to sampling error. The standard errors for the statistics shown in this report were calculated using Software for Survey Data Analysis (SUDAAN), developed by the Research Triangle Institute (43). SUDAAN is a software package, designed specifically for analysis of complex survey data, which takes into account the effects of the complex sample design in the calculation of standard errors (59). The sampling design of the NHIS has been fully described elsewhere (60). Briefly, the NHIS has a multistage sampling design with stratification and clustering. The first stage of the NHIS sample selection is the selection of 198 primary sampling units (PSU's) from approximately 1,900 geographically defined PSU's. Within the sample PSU area,

segments are systematically selected, and then clusters of housing units are selected within the sample segments. Finally, a sample person within each household is selected for the HPDP survey. Generally, variances and standard errors are larger for such designs than for simple random samples of the same size. The SUDAAN procedures used were Proc Descript and Proc Logistic and the design was Uneqwor (without replacement sampling with unequal probabilities of selection at the first stage).

All differences cited in this report are statistically significant at the 0.05 level. A *t*-test, with a critical value of 1.96 was used to test all comparisons that are discussed. Lack of comment regarding the difference between any two estimates does not mean that the difference was tested and found not to be statistically significant.

### Definition of terms

*Negative mood score*—Additive score of five negative moods experienced in the 2 weeks preceding the interview: depressed, lonely, restless, bored, and upset. Response options for each were: 0 = never; 1 = rarely; 2 = sometimes; 3 = often; 4 = very often.

*Smokers*—Persons who had smoked at least 100 cigarettes in their lifetime and currently smoked any amount.

*Heavier drinkers*—Average daily consumption of alcohol was determined by multiplying the number of days drank any alcoholic beverages in the 2 weeks preceding the interview by the number of drinks consumed on the days drank divided by 14 days. Although the total amount of alcohol consumed in a 2-week period was averaged over 14 days, consumption was not necessarily spread out evenly over this period. Heavier drinking was defined as an average of three or more drinks per day for men and an average of two or more drinks per day for women.

*Odds ratio*—The odds ratio is an approximation of relative risk. Relative risk is defined as the

probability of a particular outcome (smoking or heavier drinking) among exposed individuals (persons experiencing negative moods), divided by the probability of this outcome among unexposed individuals (persons experiencing no or lower levels of negative moods). In mathematical terms, it is the exponential of the beta coefficient generated by SUDAAN's logistic regression procedure (Proc Logist). That is,  $OR = e^{\beta}$ .

*95-percent confidence limits of the odds ratio*—In 95 percent of the cases, the true odds ratio will fall within these limits. When the lower limit exceeds 1.0, the odds ratio is statistically significant. In other words, those in the exposed group (with negative moods) are more likely to smoke and/or drink than those in the unexposed group (without negative moods). In mathematical terms, these limits were calculated as the exponential of [the beta coefficient (generated by Proc Logist)  $\pm$  1.96 • the standard error of the beta coefficient], or  $CI = e^{(\beta \pm 1.96 \cdot SE^{\beta})}$ .

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**Symbols**

- - - Data not available
  - . . . Category not applicable
  - Quantity zero
  - 0.0 Quantity more than zero but less than 0.05
  - Z Quantity more than zero but less than 500 where numbers are rounded to thousands
  - \* Figure does not meet standard of reliability or precision
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**National Center for Health Statistics**

Director  
Manning Feinleib, M.D., Dr. P.H.  
Deputy Director  
Jack R. Anderson

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U.S. DEPARTMENT OF HEALTH AND  
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