Trends in insomnia and excessive daytime sleepiness among US adults from 2002 to 2012

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Abstract

Objective—Insomnia is a prevalent disorder in the United States and elsewhere. It has been associated with a range of somatic and psychiatric conditions, and adversely affects quality of life, productivity at work, and school performance. The objective of this study was to examine the trend in self-reported insomnia and excessive daytime sleepiness among US adults.

Methods—We used data of participants aged 18 years from the National Health Interview Survey for the years 2002 (30,970 participants), 2007 (23,344 participants), and 2012 (34,509 participants).

Results—The unadjusted prevalence of insomnia or trouble sleeping increased from 17.5% (representing 37.5 million adults) in 2002 to 19.2% (representing 46.2 million adults) in 2012 (relative increase: +8.0%) (P trend <0.001). The age-adjusted prevalence increased from 17.4% to 18.8%. Significant increases were present among participants aged 18–24, 25–34, 55–64, and 65–74 years, men, women, whites, Hispanics, participants with diabetes, and participants with joint pain. Large relative increases occurred among participants aged 18–24 years (+30.9%) and participants with diabetes (+27.0%). The age-adjusted percentage of participants who reported regularly having excessive daytime sleepiness increased from 9.8% to 12.7% (P trend <0.001). Significant increases were present in most demographic groups. The largest relative increase was among participants aged 25–34 years (+49%). Increases were also found among participants with hypertension, chronic obstructive pulmonary disease, asthma, and joint pain.

Conclusions—Given the deleterious effects of insomnia on health and performance, the increasing prevalence of insomnia and excessive daytime sleepiness among US adults is a potentially troubling development.

Keywords

Arthralgia; Diabetes; Health surveys; Insomnia; Population surveillance; Trends

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1. Introduction

Inadequate sleep as a public health concern has awakened from a deep slumber in recent decades [1]. Sleep health is a multidimensional field of study, and insomnia constitutes a key component of sleep health. The 2006 Institute of Medicine (IOM) report defined insomnia as "having difficulty falling asleep, maintaining sleep, or by short sleep duration, despite adequate opportunity for a full night's sleep" [1]. Although several approaches to the nosology of insomnia exist (International Classification of Diseases-10, Diagnostic and Statistical Manual for Mental Disorders and the International Classification of Sleep Disorders) [2–4], national estimates of the prevalence of insomnia emanate from surveys that employ simple questions. Insomnia in the United States is common with reported population-based estimates ranging from about 15% to 24% [5,6].

Insomnia affects cognitive functioning [7], leads to depression [8], and may be comorbid with several psychiatric and medical conditions [9]. Furthermore, insomnia has been associated with heart disease in prospective and retrospective epidemiologic studies [10–13], and insomnia or symptoms thereof have been associated with increased mortality in some prospective studies [13–15] but not in others [16–18]. Among those who report to be suffering from insomnia, those who sleep fewer than six hours have been reported to be at increased risk for adverse health events [14]. Furthermore, insomnia increases the risk for automobile accidents and results in worse quality of life, increased disability, increased work absenteeism [19], and increased use of the health care system. The economic costs of insomnia are poorly understood but are nevertheless thought to be substantial: the direct economic costs attributed to insomnia were estimated to have been $13.9 billion in 1995 [20], and estimates of total costs have ranged from $30 billion to $107.5 billion [20,21].

Given the range of adverse impacts and the economic costs associated with this disorder, having current information about trends in the prevalence of insomnia is vital to describing the scope of the problem in part to provide guidance about allocation of resources for preventing and treating insomnia. Because little information about recent trends in insomnia is available, our objective was to examine the trend on self-reported insomnia and excessive daytime sleepiness among adults in the United States.

2. Methods

We used cross-sectional data about insomnia from the National Health Interview Survey, which was available for the years 2002, 2007, and 2012 [22]. Since 1957, the National Health Interview Survey, conducted by the National Center for Health Statistics, has selected a representative sample of the civilian noninstitutionalized population using a multistage area probability design. During the first stage, a sample was drawn from a universe of primary sampling units (single counties or groups of adjacent counties or equivalent jurisdictions and/or metropolitan areas) that were divided into self-representing and non-self-representing primary sampling units. During the second stage, substrata were created from Census blocks or combined blocks, and clusters of dwelling units were created within the substrata and were subsequently systematically sampled. From selected dwelling units, one adult was randomly sampled for the Sample Adult component. Interviewers

employed by the U.S. Census Bureau received annual training in the procedures of the surveys and conducted the interviews using computer assisted personal interviewing with selected participants in their homes. Black and Hispanic persons were oversampled in all three surveys and Asians were oversampled in 2007 and 2012. A revised survey sampling design was introduced in 2006. The overall household response rates for the three years were 89.6%, 87.1%, and 77.6%, respectively. Household response rates were calculated as: interviewed households /(interviewed households + Type A non-response households). Reasons for being classified as a Type A non-response households include language problems, no one was at home after repeated contact attempts, family temporarily absent, refusal, household records rejected for insufficient data, household records rejected for other CAPI related problems, or other reasons for no interview. The final response rates for the Sample Adult component (final family response rate * [interviewed sample adults / eligible sample adults from Interviewed families]) were 74.3%, 67.8%, and 61.2%, respectively. Sampling weights were constructed based on probabilities of selection with adjustments for nonresponse and post-stratification. Because this study used publically available data, it was exempt from human subjects review.

Participants who responded affirmatively to the question "During the past 12 months, have you regularly had insomnia or trouble sleeping?" were defined as having insomnia. Participants who responded affirmatively to the question "During the past 12 months, have you regularly had excessive sleepiness during the day?" were deemed to have experienced excessive daytime sleepiness. Covariates included age, gender, and race or ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, other).

We also examined the trends in several factors that may be related to insomnia including heavy drinking, binge drinking, smoking status, obesity, and employment status. Heavy drinking was defined as men who had on average more than two alcoholic beverages per day and women who had on average more than one alcoholic beverage per day. Binge drinking was defined as adults who on at least one day during the past year had five or more drinks (In the past year, on how many days did you have five or more drinks of any alcoholic beverage?). Current smoking was defined as having smoked at least 100 cigarettes during one's life and still smoking at the time of the interview. Obesity was defined as a body mass index ≥ 30 kg/m^2 calculated from self-reported weight and height. Participants who were seeking work were identified from the question "Which of the following was person doing last week?"

We limited analyses to adults aged ≥ 18 years. Age-adjusted estimates were calculated using the direct method with the year 2000 projected US population as the standard. Analyses using sampling weights were performed in SAS and SUDAAN to account for the complex sampling design.

3. Results

The number of participants aged ≥ 18 years were 31,044 in 2002, 23,393 in 2007, and 34,525 in 2012. After excluding participants with missing values for the questions about insomnia and excessive daytime sleepiness, the sample sizes for this study were reduced to 30,970

(99.8%), 23,344 (99.8%), 34,509 (99.9%), respectively. Mean age increased significantly from 45.2 years in 2002 to 46.6 years in 2012 (P trend <0.001). The percentage of men remained stable (P trend = 0.799), and the percentage of white participants decreased significantly from 73.1% in 2002 to 67.2% in 2012 (P < 0.001).

The unadjusted prevalence of insomnia increased from 17.5% (an estimated 37.5 million adults) in 2002 to 19.2% (an estimated 46.2 million adults) in 2012. The age-adjusted prevalence of insomnia or trouble sleeping increased from 17.4% to 18.8% (relative increase: +8.0%, P trend <0.001). Significant increases were observed among participants aged 18–24 years, 25–34 years, 55–64 years, and 65–74 years, men, women, whites and Hispanics (Table 1). Among the demographic groups, the largest relative increase occurred among participants aged 18–24 years (+30.9%). The prevalence of insomnia tended to increase with age although the prevalence peaked among participants aged 55–64 years in 2002 and 2012. In all three years, the prevalence was higher in women than men and was highest among whites.

Among participants with a comorbid condition, the prevalence of insomnia increased only among participants with diabetes and among participants with joint pain (Table 1). The relative increase in the prevalence of insomnia was particularly large among participants with diabetes (+27.0%). In each year, people with a chronic condition had a significantly higher prevalence of insomnia than those without the condition.

The prevalence of insomnia increased significantly among adults who were current smokers and those who were not, among those who were heavy drinkers and those who were not, among those who reported binge drinking and those who did not, and among those with a body mass index <30 kg/m2(Table 1). Furthermore, participants who were smokers, heavy drinkers, binge drinkers (2012 only), and obese had a significantly higher prevalence of insomnia than their counterparts in each of the survey years.

We also examined trends in adults reporting excessive daytime sleepiness (Table 2). The age-adjusted percentage of participants who reported regularly having excessive daytime sleepiness increased from 9.8% in 2002 (21.0 million adults) to 12.7% (30.5 million adults) in 2012 (P trend <0.001). Significant increases were present in all demographic groups except among participants of described as being of another race or ethnicity not white, black, or Hispanic. The largest relative increase was among participants aged 25–34 years (+49%). Furthermore, significant increases were also found among participants with hypertension, chronic obstructive pulmonary disease, asthma, and joint pain. In each year, adults with a chronic condition had a significantly higher prevalence of excessive daytime sleepiness than those without a chronic condition.

Among persons reporting insomnia only about a third also reported excessive daytime sleepiness during each survey. Trends in combinations of insomnia and excessive daytime sleepiness are shown in Table 3.

Figure 1 shows the age-adjusted estimates for several lifestyle factors that could have influenced the trend in insomnia. Significant trends were noted for binge drinking, smoking

status, obesity, and employment status (all P trend <0.001) but not heavy drinking (P trend = 0.747).

4. Discussion

As the importance of adequate sleep has become increasingly appreciated, surveillance of sleep health is vital in describing the magnitude of a public health problem. Insomnia represents an important aspect of sleep health. Our analyses of national samples of US adults show that the percentages of adults who report regularly having insomnia or trouble sleeping and/or daytime sleepiness increased from 2002 to 2012. Our unadjusted estimates of insomnia increased from 17.5% to 19.2%, of excessive daytime sleepiness from 9.8% to 12.7%, and the combination of insomnia and excessive daytime sleepiness from 6.2% to 7.0%. Because of the adverse health consequences that have been attributed to insomnia, the increasing trend is an unwelcome development.

A prevalence of insomnia of about 10% among US adults is a commonly cited figure, but some estimates are much higher [1,23]. In an analysis of data from the 1979 National Survey of Psychotherapeutic Drug Use, the prevalence of insomnia among noninstitutionalized US adults aged 18–79 years was 35% [24]. Different approaches to defining insomnia are quite likely to produce varying prevalence estimates.

Previously, little was known about trends in the prevalence of insomnia in the United States, and, therefore, the information contained in this report helps to fill a gap in the knowledge base concerning sleep health. The increasing trend in the prevalence of insomnia and excessive daytime sleepiness in US adults that we demonstrated appears to parallel trends in several countries. In Finland, the prevalence of occasional insomnia in working age adults increased from the 1970s to the early 2000s [25]. In England, insomnia symptoms, insomnia of at least moderate severity, insomnia and fatigue, and insomnia diagnosis among survey participants aged 16– 64 years increased by 6%, 5%, 4%, and 3%, respectively, from 1993 to 2007 [26]. In Taiwan, the prevalence of insomnia defined on the basis of International Classification of Diseases, Ninth Revision, Clinical Modification codes among National Health Insurance enrollees increased significantly from 2.5% in 2002 to 4.2% during 2009 [27]. In Norway, the prevalence of insomnia increased significantly from 13.1% during 1999–2000 to 15.2% during 2009–2010 [28].

The reasons why people experience insomnia are numerous and include behavioral, health-related, psychological, and societal reasons [9]. Thus, population-level changes in any of these domains may have influenced the numbers of adults who experienced insomnia. The following explanations for increases in the prevalence of insomnia in other countries have been postulated: increases in health problems, increases in body mass index, changes in occupational factors such as stress and shiftwork, sleep habits, and the increasingly ubiquitous availability of electronic devices [25,28]. The jump in the prevalence of diabetes in the United States in recent decades is one example of how health problems have increased. Interestingly, the increase in reported insomnia by participants with diabetes was especially noteworthy. We noted significantly increasing trends in the prevalence of consumption of 5 drinks in a single day at least once during the past year and in obesity.

Furthermore, the percentage of adults seeking work was substantially higher in 2012 than earlier years. The trends of these factors could possibly have influenced the trend in the prevalence of insomnia [29–31]. However, the declining prevalence of smoking could have counterbalanced some of these other influences [32]. An alternative explanation for the findings is that the trends possibly reflect a type of awareness bias.

Young adulthood is a critical period during the life course when behaviors may start to settle in, and the foundations for chronic conditions that emerge later in life take hold. Thus, the large relative increase in the prevalence of insomnia that occurred among participants aged 18–24 years is a cause for concern. This may reflect lifestyles including access to technologies and beverage choices that inhibit sleep. A personal history of insomnia has been shown to be a risk factor for subsequent insomnia [33], and consequently the onset of insomnia during early adulthood may portend a steeper burden of lifetime insomnia. Furthermore, insomnia has been linked to conditions such as obesity, diabetes, and cardiovascular disease, and if insomnia indeed plays a role in the etiology of these conditions, an early manifestation of insomnia could speed the onset of these conditions. Insomnia has also been linked to depression in prospective studies in young adults [34]. Unfortunately, information was not obtained about depression from respondents. Nevertheless, our findings should stimulate investigations into the reasons underlying the trend in young adulthood and of the potential ramifications thereof. From 1978 to 1988, the percentage of college students who reported being dissatisfied with their sleep increased from 24.4% to 53.4% [35].

Several limitations bear mention. First, the validity and reliability of the NHIS questions used to define insomnia and excessive daytime sleepiness are unproven. No uniformly accepted approach to defining insomnia in epidemiological studies and national surveillance systems currently exists although a number of insomnia questionnaires have been developed. Epidemiological definitions of insomnia differ from clinical definitions of insomnia that employ more stringent criteria [6,36]. Hence, we cannot say unambiguously that the trends we described for our epidemiological definition of insomnia might have been mimicked by a clinical definition of insomnia. The consistent wording of the questions across time increases confidence in the trends that we reported. Second, we were unable to distinguish primary from secondary insomnia. Third, all data of the NHIS were self-reported and subject to a variety of biases.

In conclusion, the prevalence of insomnia as reported by US adults rose steadily from 2002 to 2012. If our results are confirmed by other data sources, more research on the reasons underlying any increase is warranted to develop evidence-based approaches in alleviating an apparently growing public health problem.
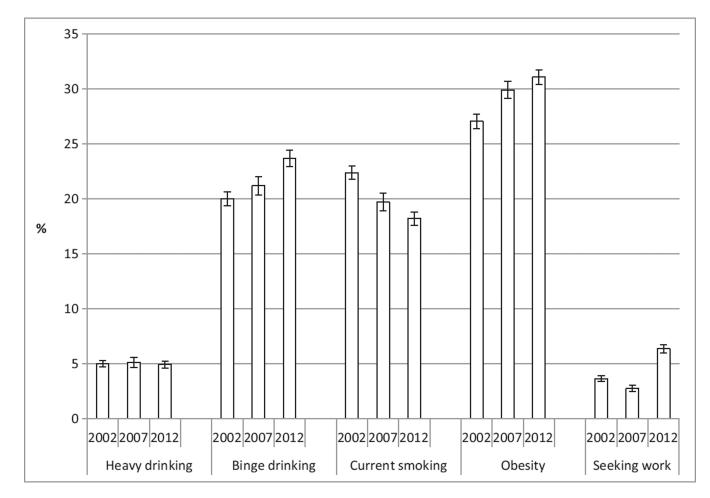
Acknowledgments

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Fig. 1.
Age-adjusted percentages (95% confidence interval) of selected factors among US adults
aged 18 years, National Health Interview Survey. Sample sizes ranged from 29,971 to
31,044 in 2002, 22,331 to 23,393 in 2007, and 33,635 to 34,525 in 2012.

Table 1

Age-adjusted prevalence (standard error) of insomnia among participants aged ≥18 years, National Health Interview Survey 2002–2012.

	2002		2007		2012		P trend
	N	% (SE)	N	% (SE)	N	% (SE)	
Total-crude	30970	17.5 (0.3)	23344	18.1 (0.3)	34509	19.2 (0.3)	<0.001
Total-age-adjusted	30970	17.4 (0.3)	23344	18.0 (0.3)	34509	18.8 (0.3)	<0.001
Age (years)							
18–24	3358	11.4 (0.7)	2493	11.8 (0.8)	3416	14.9 (0.8)	0.001
25–34	5865	12.9 (0.5)	4189	14.1 (0.7)	6111	15.6 (0.6)	0.001
35–44	6480	17.6 (0.5)	4334	16.6 (0.7)	5759	16.6 (0.6)	0.210
45–54	5470	21.1 (0.7)	4364	20.5 (0.7)	5952	22.0 (0.7)	0.358
55–64	3962	22.1 (0.8)	3397	22.1 (0.8)	5893	24.2 (0.7)	0.043
65–74	2955	18.6 (0.8)	2408	21.6 (1.0)	3975	21.3 (0.9)	0.022
75 +	2880	20.5 (0.9)	2159	24.6 (1.1)	3403	20.7 (0.9)	0.871
Sex							
Men	13474	14.2 (0.4)	10343	15.2 (0.4)	15267	15.6 (0.4)	0.008
Women	17496	20.3 (0.4)	13001	20.5 (0.4)	19242	21.8 (0.4)	0.009
Race or ethnicity							
White	20382	18.2 (0.3)	14019	19.0 (0.4)	20831	19.8 (0.4)	0.001
African American	4178	15.8 (0.7)	3696	16.8 (0.8)	5279	16.5 (0.6)	0.442
Hispanic	5267	16.6 (0.7)	4192	16.9 (0.8)	5858	19.3 (0.7)	0.005
Others	1143	11.5 (1.1)	1437	13.1 (1.2)	2541	13.3 (0.9)	0.209
Hypertension							
Yes	6366	29.4 (1.2)	5447	27.5 (1.1)	8320	31.0 (1.2)	0.343
No	24492	15.3 (0.3)	17838	15.4 (0.3)	24566	16.6 (0.3)	0.004
Any coronary heart disease							
Yes	2010	37.8 (3.3)	1553	40.8 (4.2)	2520	38.3 (3.2)	0.917
No	28893	16.4 (0.3)	21752	17.1 (0.3)	31943	18.1 (0.3)	<0.001
Stroke							
Yes	787	37.3 (4.4)	646	37.1 (4.0)	1113	39.8 (4.1)	0.675
No	30147	17.1 (0.3)	22680	17.6 (0.3)	33377	18.4 (0.3)	0.001

	2002		2007		2012		P trend
	N	% (SE)	N	% (SE)	N	% (SE)	
Cancer							
Yes	2258	32.0 (2.1)	1780	31.6 (2.2)	3115	31.1 (2.1)	0.761
No	28684	16.7 (0.3)	21549	17.2 (0.3)	31380	18.2 (0.3)	<0.001
Diabetes							
Yes	2179	25.3 (1.7)	2028	31.6 (3.3)	3526	32.1 (2.0)	0.009
No	28476	16.6 (0.3)	21089	17.2 (0.3)	30473	17.9 (0.3)	0.001
Chronic obstructive pulmonary disease							
Yes	1791	39.9 (1.5)	1090	44.3 (2.1)	1773	43.9 (1.9)	0.098
No	29168	16.2 (0.3)	22247	16.8 (0.3)	32731	17.7 (0.3)	<0.001
Asthma							
Yes	2159	35.7 (1.1)	1746	32.4 (1.4)	2865	33.4 (1.1)	0.142
No	28729	16.1 (0.3)	21558	16.8 (0.3)	31591	17.5 (0.3)	<0.001
Joint pain							
Yes	9305	32.0 (0.7)	6554	34.4 (0.9)	10974	35.0 (0.7)	0.002
No	21624	11.7 (0.3)	16773	12.2 (0.3)	23522	12.5 (0.3)	0.025
Current smoking							
Yes	6913	21.9 (0.6)	4365	24.7 (0.9)	6435	25.6 (0.8)	<0.001
No	23733	15.9 (0.3)	18588	16.0 (0.3)	27808	17.0 (0.3)	0.005
Heavy drinking							
Yes	1534	21.3 (1.1)	1106	22.7 (1.5)	1759	26.1 (1.4)	0.008
No	28451	17.4 (0.3)	21342	17.9 (0.3)	32021	18.5 (0.3)	0.005
Binge drinking							
Yes	5732	17.3 (0.8)	4262	19.7 (1.0)	7227	20.0 (0.7)	0.009
No	24189	17.1 (0.3)	18035	17.5 (0.4)	26395	18.1 (0.3)	0.029
Looking for work							
Yes	1103	23.0 (1.8)	647	22.5 (1.8)	2077	26.8 (2.8)	0.247
No	29804	17.2 (0.3)	22664	17.8 (0.3)	32408	18.3 (0.3)	0.005
Body mass index 30 kg/m^2							
Yes	8663	21.0 (0.5)	7116	21.6 (0.6)	10918	22.4 (0.5)	0.053
No	22307	16.0 (0.3)	16228	16.3 (0.3)	23591	17.2 (0.3)	0.010

Table 2

Age-adjusted prevalence (standard error) of excessive daytime sleepiness among participants aged ≥ 18 years, National Health Interview Survey 2002–2012.

	2002		2007		2012		P trend
	N	% (SE)	N	% (SE)	N	% (SE)	
Total-crude	30970	9.8 (0.2)	23344	10.2 (0.2)	34509	12.7 (0.3)	<0.001
Total-age-adjusted	30970	9.8 (0.2)	23344	10.2 (0.2)	34509	12.7 (0.3)	<0.001
Age (years)							
18–24	3358	10.7 (0.7)	2493	9.6 (0.8)	3416	14.5 (0.8)	<0.001
25–34	5865	8.8 (0.5)	4189	9.7 (0.5)	6111	13.1 (0.5)	<0.001
35–44	6480	9.4 (0.4)	4334	9.2 (0.5)	5759	11.3 (0.5)	0.006
45–54	5470	10.1 (0.5)	4364	9.9 (0.6)	5952	12.5 (0.6)	0.002
55–64	3962	9.4 (0.5)	3397	10.5 (0.6)	5893	12.1 (0.5)	<0.001
65–74	2955	8.8 (0.6)	2408	10.8 (0.8)	3975	11.5 (0.6)	0.003
75 +	2880	12.5 (0.7)	2159	14.5 (0.9)	3403	15.1 (0.9)	0.019
Sex							
Men	13474	8.6 (0.3)	10343	8.9 (0.3)	15267	10.8 (0.3)	<0.001
Women	17496	11.0 (0.3)	13001	11.5 (0.3)	19242	14.5 (0.3)	<0.001
Race or ethnicity							
White	20382	10.2 (0.3)	14019	10.9 (0.3)	20831	13.7 (0.4)	<0.001
African American	4178	9.4 (0.5)	3696	9.5 (0.6)	5279	12.0 (0.5)	0.001
Hispanic	5267	8.8 (0.5)	4192	9.2 (0.6)	5858	10.9 (0.5)	0.005
Others	1143	8.1 (1.0)	1437	8.5 (0.9)	2541	10.0 (1.0)	0.155
Hypertension							
Yes	6366	17.5 (1.0)	5447	17.3 (1.0)	8320	22.8 (1.3)	0.001
No	24492	8.4 (0.2)	17838	8.6 (0.2)	24566	10.8 (0.3)	<0.001
Any coronary heart disease							
Yes	2010	25.6 (3.2)	1553	17.9 (1.7)	2520	32.7 (2.9)	0.102
No	28893	9.1 (0.2)	21752	9.7 (0.2)	31943	11.9 (0.2)	<0.001
Stroke							
Yes	787	32.9 (4.8)	646	21.1 (2.9)	1113	35.0 (4.2)	0.739

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	2002		2007		2012		P trend
	N	% (SE)	N	% (SE)	N	% (SE)	
No	30147	9.4 (0.2)	22680	9.8 (0.2)	33377	12.2 (0.3)	<0.001
Cancer							
Yes	2258	20.4 (1.7)	1780	21.9 (2.4)	3115	24.2 (2.2)	0.171
No	28684	9.3 (0.2)	21549	9.9 (0.2)	31380	12.1 (0.2)	<0.001
Diabetes							
Yes	2179	21.9 (1.8)	2028	20.3 (2.0)	3526	24.5 (2.2)	0.362
No	28476	9.0 (0.2)	21089	9.3 (0.2)	30473	11.6 (0.2)	<0.001
Chronic obstructive pulmonary disease							
Yes	1791	28.0 (1.5)	1090	30.7 (2.1)	1773	35.3 (2.0)	0.003
No	29168	8.8 (0.2)	22247	9.3 (0.2)	32731	11.6 (0.2)	<0.001
Asthma							
Yes	2159	20.6 (1.1)	1746	19.8 (1.1)	2865	24.9 (1.1)	0.005
No	28729	9.0 (0.2)	21558	9.4 (0.2)	31591	11.6 (0.3)	<0.001
Joint pain							
Yes	9305	19.3 (0.6)	6554	20.9 (0.8)	10974	24.7 (0.7)	<0.001
No	21624	6.3 (0.2)	16773	6.6 (0.2)	23522	8.1 (0.2)	<0.001
Current smoking							
Yes	6913	13.6 (0.5)	4365	13.7 (0.7)	6435	17.8 (0.7)	<0.001
No	23733	8.6 (0.2)	18588	9.1 (0.3)	27808	11.4 (0.3)	<0.001
Heavy drinking							
Yes	1534	9.5 (0.9)	1106	10.3 (1.1)	1759	14.0 (1.1)	0.001
No	28451	9.9 (0.2)	21342	10.3 (0.3)	32021	12.5 (0.3)	<0.001
Binge drinking							
Yes	5732	10.3 (0.6)	4262	10.4 (0.7)	7227	12.2 (0.6)	0.021
No	24189	9.6 (0.3)	18035	10.1 (0.3)	26395	12.4 (0.3)	<0.001
Looking for work							
Yes	1103	11.8 (1.4)	647	11.3 (1.4)	2077	14.1 (0.9)	0.180
No	29804	9.7 (0.2)	22664	10.1 (0.2)	32408	12.4 (0.3)	<0.001
Body mass index $\geq$ 30 kg/m^2							
Yes	8663	13.4 (0.4)	7116	14.0 (0.5)	10918	16.8 (0.5)	<0.001

	2002		2007		2012		P trend
	N	% (SE)	N	% (SE)	N	% (SE)	
No	22307	8.4 (0.2)	16228	8.5 (0.3)	23591	10.7 (0.3)	<0.001

Table 3

Age-adjusted prevalence (standard error) of insomnia and excessive daytime sleepiness among adults aged ≥18 years, National Health Interview Survey 2002–2012.

	Insomnia +, excessive daytime sleepiness +				Insomnia +, excessive daytime sleepiness −			
	2002	2007	2012	P trend	2002	2007	2012	P trend
Total-crude	6.2 (0.2)	6.2 (0.2)	7.0 (0.2)	0.002	11.2 (0.2)	11.9 (0.3)	12.2 (0.2)	0.003
Total-age-adjusted	6.2 (0.2)	6.1 (0.2)	7.0 (0.2)	0.002	11.2 (0.2)	11.8 (0.2)	11.8 (0.2)	0.060
Age (years)								
18–24	6.3 (0.5)	5.2 (0.6)	7.1 (0.6)	0.341	5.1 (0.5)	6.6 (0.6)	7.8 (0.6)	<0.001
25–34	5.6 (0.3)	5.2 (0.4)	6.7 (0.4)	0.031	7.4 (0.4)	9.0 (0.6)	8.9 (0.5)	0.015
35–44	6.6 (0.3)	5.6 (0.4)	6.8 (0.4)	0.732	11.0 (0.4)	11.0 (0.6)	9.8 (0.5)	0.067
45–54	7.3 (0.4)	6.8 (0.4)	7.6 (0.5)	0.531	13.8 (0.5)	13.7 (0.6)	14.3 (0.6)	0.523
55–64	6.2 (0.4)	7.4 (0.6)	7.8 (0.4)	0.007	15.9 (0.7)	14.7 (0.7)	16.4 (0.6)	0.617
65–74	4.7 (0.4)	6.5 (0.6)	6.0 (0.5)	0.055	13.9 (0.7)	15.1 (0.8)	15.3 (0.7)	0.155
75 +	5.7 (0.5)	7.8 (0.7)	6.6 (0.5)	0.236	14.8 (0.8)	16.7 (0.9)	14.1 (0.8)	0.564
Sex								
Men	5.3 (0.2)	5.1 (0.3)	5.8 (0.3)	0.093	9.0 (0.3)	10.1 (0.4)	9.8 (0.3)	0.057
Women	7.1 (0.2)	7.1 (0.3)	8.1 (0.3)	0.006	13.2 (0.3)	13.4 (0.3)	13.7 (0.3)	0.286
Race or ethnicity								
White	6.5 (0.2)	6.6 (0.3)	7.6 (0.3)	0.002	11.7 (0.3)	12.4 (0.3)	12.3 (0.3)	0.146
African American	5.9 (0.5)	5.3 (0.4)	6.5 (0.4)	0.291	10.0 (0.5)	11.5 (0.7)	10.0 (0.5)	0.945
Hispanic	5.9 (0.5)	5.8 (0.5)	6.1 (0.3)	0.795	10.6 (0.6)	11.1 (0.6)	13.2 (0.7)	0.003
Others	4.1 (0.6)	4.7 (0.8)	5.0 (0.6)	0.277	7.5 (0.9)	8.4 (0.8)	8.3 (0.7)	0.477

	Insomnia −, excessive daytime sleepiness +				Insomnia −, excessive daytime sleepiness −			
	2002	2007	2012	P trend	2002	2007	2012	P trend
Total-crude	3.6 (0.1)	4.0 (0.2)	5.7 (0.2)	<0.001	79.0 (0.3)	77.8 (0.3)	75.1 (0.3)	<0.001
Total-age-adjusted	17.4 (0.3)	18.0 (0.3)	18.8 (0.3)	<0.001	79.0 (0.3)	78.0 (0.3)	75.5 (0.3)	<0.001
Age (years)								
18–24	4.4 (0.4)	4.4 (0.5)	7.4 (0.6)	<0.001	84.2 (0.8)	83.8 (0.9)	77.7 (0.9)	<0.001
25–34	3.3 (0.3)	4.6 (0.4)	6.4 (0.4)	<0.001	83.8 (0.6)	81.3 (0.8)	78.0 (0.7)	<0.001

	Insomnia +, excessive daytime sleepiness +				Insomnia +, excessive daytime sleepiness –			
	2002	2007	2012	P trend	2002	2007	2012	P trend
35–44	2.8 (0.2)	3.7 (0.3)	4.5 (0.4)	<0.001	79.6 (0.5)	79.7 (0.8)	78.9 (0.7)	0.451
45–54	2.9 (0.3)	3.1 (0.4)	4.8 (0.4)	<0.001	76.1 (0.7)	76.4 (0.8)	73.2 (0.8)	0.007
55–64	3.2 (0.3)	3.2 (0.3)	4.3 (0.3)	0.015	74.7 (0.8)	74.8 (0.8)	71.5 (0.7)	0.003
65–74	4.0 (0.4)	4.4 (0.5)	5.4 (0.5)	0.024	77.3 (0.9)	74.0 (1.1)	73.2 (0.9)	0.001
75 +	6.8 (0.6)	6.7 (0.6)	8.5 (0.7)	0.044	72.7 (1.0)	68.7 (1.1)	70.7 (1.1)	0.169
Sex								
Men	3.3 (0.2)	3.8 (0.2)	5.0 (0.2)	<0.001	82.4 (0.4)	81.0 (0.5)	79.4 (0.4)	<0.001
Women	3.9 (0.2)	4.4 (0.2)	6.4 (0.2)	<0.001	75.8 (0.4)	75.1 (0.5)	71.9 (0.4)	<0.001
Race or ethnicity								
White	3.7 (0.2)	4.2 (0.2)	6.1 (0.2)	<0.001	78.1 (0.4)	76.8 (0.4)	74.0 (0.4)	<0.001
African American	3.6 (0.3)	4.2 (0.4)	5.5 (0.4)	<0.001	80.6 (0.7)	79.0 (0.9)	78.0 (0.7)	0.012
Hispanic	2.9 (0.3)	3.5 (0.4)	4.9 (0.4)	<0.001	80.6 (0.7)	79.6 (0.8)	75.9 (0.8)	<0.001
Others	4.0 (0.8)	3.8 (0.7)	5.0 (0.7)	0.336	84.5 (1.4)	83.1 (1.3)	81.6 (1.1)	0.108