National Trends in Long-Term Use of Antidepressant Medications: Results From the US National Health and Nutrition Examination Survey

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ABSTRACT

Objective: To assess the trend in long-term use of antidepressants by persons aged ≥ 18 years, and the correlates of such use, in the United States from 1999 to 2010.

Method: We examined trends in duration of antidepressant use and correlates of long-term use in data from 6 waves of the cross-sectional National Health and Nutrition Examination Survey (N = 35,379), a representative survey of the general population.

Results: The overall prevalence of antidepressant use increased from 6.5% in 1999–2000 to 10.4% in 2009–2010 (odds ratio [OR] = 1.54; 95% CI, 1.31–1.81; $P < .001$). This included an increase from 3.0% to 6.9% in long-term use (≥ 24 months; OR = 2.12; 95% CI, 1.75–2.57; $P < .001$). Medium-term (6 to < 24 months; from 1.3% to 1.6%) and short-term use (< 6 months; from 2.2% to 1.8%) of antidepressants did not change appreciably in this period. The increasing trend in long-term antidepressant use was limited to adults who received their care from general medical providers (adjusted OR = 3.86; 95% CI, 2.57–5.80; $P < .001$).

Conclusions: From 1999 to 2010, there was a marked increase in long-term use of antidepressant medications in the United States, explaining the overall increasing trend in antidepressant use. This trend calls for greater vigilance in prescribing antidepressants for long periods of time.

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There has been a marked increase in the use of antidepressant medications in the past 2 or 3 decades.[1–8] Currently, these medications are the most commonly prescribed medication class in the United States, accounting for over 260 million prescriptions per year.[9] Antidepressants also remained the ninth most costly group of medications in the United States during the 2007–2011 period, accounting for over $20 billion in sales in 2011.[10] Similar trends have been reported in England.[11] Although the use of generic antidepressants increased over the past decade, there is no evidence that the introduction of generic antidepressants has had a major impact on total antidepressant expenditure.[12,13]

The reasons for the increased use of antidepressants in recent years remain poorly understood. Some possible explanations include a broadening of clinical indications for antidepressants and increased number of products on the market,[14] as well as increasing public acceptance of psychiatric medications.[15] It is also possible that at least part of the increase in antidepressant use arises from an increase in long-term antidepressant use observed in some European countries[11,16–19] and Canada.[20]

Little is known about trends in long-term use of antidepressants in the United States. In the quality-of-care literature, there has been an emphasis on early stopping of antidepressants as an indicator of poor quality of medication treatment.[21,22] In one national study, for example, only about one-quarter of adults initiating antidepressants for new episodes of depression continued their medications for 90 days,[23] despite the fact that only about one-half of new episodes of major depressive disorder in the general population recover during that period.[24]

Less attention has focused on prolonged use of antidepressants. Prolonged use may be indicated in maintenance treatment of major depression when it is severe (eg, associated with psychotic symptoms), chronic, recurrent, or associated with risk factors for relapse and chronicity.[25,26] Fewer specific guidelines are available regarding long-term use of antidepressant medications in management of common anxiety disorders,[27,28] although long-term use of antidepressants may be indicated in many cases of anxiety disorders as well.

Greater attention to practice guidelines and improved targeting of medication treatment may have contributed to the growing long-term use of antidepressants.[16,18] In the United Kingdom, incentives to improve targeting of antidepressant treatment to patients with more severe depression may have further contributed to increased rates of appropriate long-term use of these medications.[16] However, many patients receiving long-term antidepressant medication treatment do not meet criteria for mental disorders.[29] Other factors, such as physicians' practice styles and patients' attitudes toward psychiatric medications, may have also contributed to these trends.[30] Assessing trends in long-term use of antidepressants would allow investigators to gauge the contribution of this pattern of medication use to the overall antidepressant use trends and help identify population groups in which the long-term use trends may have been more pronounced.

In the present study, we used data from consecutive waves of the cross-sectional National Health and Nutrition Examination Survey (NHANES)[31] to examine the trend in the long-term use of antidepressant medications and its correlates in the

United States. We further examined whether the trend varied among different sociodemographic and clinical groups and the extent to which any increase in long-term use explained the recent increase in antidepressant use overall. On the basis of the previous finding of a significant increase in mean number of antidepressant prescriptions filled between 1996 and 2005 in the United States[2] and the findings of increasing trends in long-term use of these medications in other industrialized countries,[11,16–20] we anticipated an increase in the long-term use of these medications in recent years. Our subgroup analyses were exploratory as there were few data regarding variations in trends across population groups.

Clinical Points

- Antidepressants are increasingly prescribed and used on a long-term basis.
- Although there is continued need for long-term use of antidepressants where indicated, there is also a need for more vigilant monitoring of long-term use, especially in general medical settings.

METHOD

Sample

NHANES is a nationally representative cross-sectional survey of the US general population conducted by the National Center for Health Statistics[31,32] (data sets from NHANES are made available to researchers by the Centers for Disease Control and Prevention; more information about NHANES and the Data Release and Access Policy are available at http://www.cdc.gov/nchs/nhanes/about_nhanes.htm). Starting in 1999, NHANES has been conducted biennially. We used data from 6 consecutive surveys (1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008, and 2009–2010). Each survey examined a sample of approximately 5,000 adults located in counties across the country. Computerized interviews were conducted in the participants' homes (response rate, 78.4%–84.0%). A total of 35,379 adult participants across the 6 surveys completed the prescription drug interview.

Assessments

Antidepressant medications were identified from the prescription medication interview and included selective serotonin reuptake inhibitors (SSRIs; citalopram, escitalopram, fluoxetine, fluvoxamine, paroxetine, sertraline), tricyclic antidepressants (TCAs) and other cyclic compounds (amitriptyline, clomipramine, desipramine, doxepin, imipramine, maprotiline, nortriptyline, protriptyline, trimipramine), serotonin-norepinephrine reuptake inhibitors (SNRIs; duloxetine, venlafaxine), and other antidepressants (bupropion, nefazodone, mirtazapine, trazodone). In addition, the length of time the participant had been taking each medication was recorded. For participants taking more than 1 antidepressant medication, the duration of antidepressant medication use was set at the duration of the longest-used antidepressant.

Self-reports of antidepressant medication use have been demonstrated to have an acceptable concordance with pharmacy records and other administrative data, with Cohen κ estimates mostly in the 0.60 to 0.70 range.[33–40] In most,[33,34,36,38] but not all, studies,[35,39] the specificity of self-report against the gold standard of pharmacy or other administrative data was much higher (typically higher than 0.90) than the sensitivity of such reports, suggesting few false-positive self-reports of medication use. There are fewer data on the accuracy of self-reported duration of antidepressant use.[33,35] A case-control study among older women with and without breast cancer reported intraclass correlations of 0.77 to 0.79 between self-reported duration of antidepressant use and administrative records.[33]

Depressive symptoms were assessed using the depression module of the Patient Health Questionnaire (PHQ-9),[41] a commonly used screening measure for depression that assesses 9 *DSM-IV* symptoms for major depressive episodes in the past 2 weeks. Each item is scored on a 0-to-3 interval scale (total score range, 0–27). PHQ-9 scores of 5, 10, 15, and 20 represent mild, moderate, moderately severe, and severe depression, respectively.[41] Criterion and construct validity of PHQ-9 ratings have been previously established.[41,42] PHQ-9 was administered only in NHANES 2005–2006, 2007–2008, and 2009–2010.

Mental health disability was assessed by asking the participants about difficulties they may have in performing certain activities because of a long-term physical, mental, or emotional problem or illness. The list included difficulties in various physical activities (eg, pushing or pulling large objects, walking for a quarter of mile, house chores, preparing meals, standing or sitting for long periods), managing money, going out to movies or events, and attending social events or leisure activity at home. Participants who reported having "some difficulty" or "much difficulty" or reported that they were unable to do any of these activities were then asked to choose from a list up to 5 conditions or health problems that had caused the difficulty. Participants were rated as having a mental health disability if they chose "depression/anxiety/emotional problem" as a health condition that had caused their disability.

Regular source of care was assessed by asking the participants if there was a place that they usually went when they were sick or needed advice about their health. Participants who indicated that they went to an emergency room for routine care were rated as not having a regular source of care.

Past-year contact with mental health professionals was assessed by asking the participants if they had seen or talked to a mental health professional "such as a psychologist, psychiatrist, psychiatric nurse, or clinical social worker" about their health in the past 12 months. Participants who responded negatively were assumed to have been prescribed their antidepressants by a general medical provider such as a primary care physician.

Chronic physical health conditions included diabetes, hypertension, and arthritis. Participants were asked if a doctor or other health professional had ever told them that they had "diabetes or sugar diabetes," "hypertension, also called high

blood pressure," or arthritis. Participants who reported any of these conditions were rated as having a chronic physical condition.

Other variables in the analyses included sex, age, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), marital status (married or living as married, widowed, divorced or separated, never married), employment status (currently working at a job, retired, student or homemaker, disabled, unemployed but in job market), education (less than high school graduate, high school graduate or GED, at least some college), family income compared to the Federal Poverty Level, health insurance (Medicare, Medicaid, private, other types of insurance including Veterans Affairs, no insurance), and general health rating from excellent to poor.

Statistical Analyses

Analyses were conducted in 3 stages. In the first stage, trends in prescriptions of antidepressants for different durations were examined across the 12 years of NHANES data. Binary logistic regression models were used for these analyses. Three separate models were run for different lengths of use: < 6 months, 6 to < 24 months, and 24 months or longer. The independent variable in these models was the dummy-coded survey years. The trend across the years was assessed using the statistical test of trend described by Vittinghoff and colleagues.[43] For outcomes with a statistically significant trend, the odds ratio (OR) for change across the 1999–2010 period was computed.

To assess whether changes in long-term use (24 months or longer) could explain time trends in the prevalence of antidepressant use, trends in antidepressant use overall were examined after excluding the long-term users. Furthermore, incidence of new antidepressant use was estimated using the following formula[44]:

$$\frac{P}{N-P} = I\bar{D}$$

Where P represents the number of participants in the sample currently using antidepressants in each survey, N the total participants in the survey sample, I the incidence of antidepressant use (per day), and $\bar{D}$ the average duration of medication use (in days) among antidepressant users in each survey.[44] Analyses were conducted separately for the 1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008, and 2009–2010 surveys. Annual incidence of new antidepressant use was computed by multiplying the daily incidence by 365.

In the next stage of analyses, sociodemographic and clinical characteristics of the participants were included in a multivariable logistic regression model for long-term use to assess whether variations in these characteristics across survey years could account for the time trend and also to examine correlates of long-term use of antidepressants. Variables in this multivariable logistic model in addition to survey year included sex, age, race/ethnicity, marital status, employment status, education, family income, health insurance, regular source of care, visits with mental health professionals, chronic physical health conditions, mental health disability, general health, and type of antidepressants. Because the PHQ-9 was only available in NHANES 2005–2010, the multivariable analysis described above was repeated for these years including the PHQ-9 variable. To focus exclusively on correlates of long-term antidepressant use, these analyses were limited to participants who reported any antidepressant use. Thus, comparisons were between long-term users and non–long-term users (< 24 months).

Finally, to assess whether the trend was consistent across sociodemographic groups or groups with different health profiles, we conducted a series of analyses in which the interactions of different sociodemographic and clinical characteristics with the survey year were tested individually. A significant interaction term indicated variations in trends across groups. The interaction analyses were followed by stratified analyses to better characterize trends within groups.

To increase the sample size in smaller strata in stratified analyses, the 18–24 and 25–34 year age groups were combined, as were the groups with "excellent" or "very good" and those with "fair" or "poor" self-rated health and the groups using SNRIs or "other" antidepressants. Stratified analyses were not conducted for individuals from "other" racial/ethnic groups, the unemployed in the job market, and those with "other" types of insurance due to the small sample sizes of these groups. Stratified analyses were also not conducted for the PHQ-9 subgroups as PHQ-9 was administered only in the 2005–2010 period.

Taylor linearization method as implemented in STATA 12 software (StataCorp; College Station, Texas) was used to account for the complex survey design of NHANES. All percentages reported are weighted. A $P < .05$ (2-tailed) significance level was used.

RESULTS

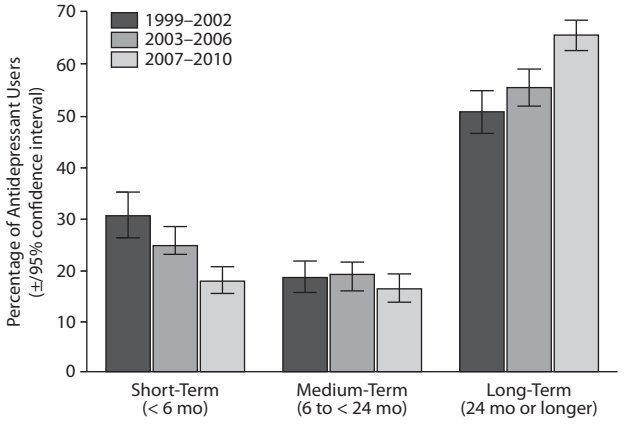
Time Trends

A total of 2,884 (10.0%) of the adult participants across the survey years reported currently using antidepressants. The prevalence of antidepressant use increased during the study period from 6.5% in 1999–2000 to 10.4% in 2009–2010 (test for trend, $F_{1,91} = 28.83$, $P < .001$; OR = 1.54; 95% confidence interval [CI], 1.31–1.81; $P < .001$).

Duration of antidepressant use was reported by 2,826 participants. The increasing trend in antidepressant use across the survey years was mainly attributable to a change in long-term (24 months or longer) use of these medications, which increased from 3.0% in 1999–2000 to 6.9% in 2009–2010 (test for trend, $F_{1,91} = 64.85$, $P < .001$; OR = 2.12; 95% CI, 1.75–2.57; $P < .001$). The prevalence of medium-term (6 to < 24 months) and short-term (< 6 months) use changed only modestly, from 1.3% to 1.6% ($F_{1,91} = 1.87$, $P = .18$) and from 2.2% to 1.8% ($F_{1,91} = 2.64$, $P = .11$), respectively. After long-term users were excluded, antidepressant use did not change appreciably over the 1999–2010 period (from 3.5% to 3.3%; test for trend, $F_{1,91} = 0.16$, $P = .69$).

As a result of these trends, the proportion of antidepressant users who reported using antidepressants for 24 months

Figure 1. Short-Term, Medium-Term, and Long-Term Antidepressant Use by Adults in the US National Health and Nutrition Examination Survey, 1999–2010



or longer increased from 45.6% in 1999–2000 to 67.4% in 2009–2010 (OR = 2.35; 95% CI, 1.82–3.04; $P < .001$). In contrast, the proportion who reported using antidepressants for < 6 months decreased from 34.4% of all antidepressant users to 17.1% (OR = 0.51; 95% CI, 0.42–0.62; $P < .001$). The proportion who reported using antidepressants for 6 months or longer but < 24 months did not change appreciably (from 19.8% to 15.4%; $F_{1,91} = 2.18$, $P = .14$). Figure 1 presents the time trends in prevalence (± 95% confidence interval) of long-term, medium-term, and short-term antidepressant use in 3 time periods: 1999–2002, 2003–2006, and 2007–2010. Survey years were combined in the figure to produce more stable estimates.

Analyses of the incidence of new antidepressant use did not reveal any increase over consecutive surveys. The incidence of new antidepressant use was estimated at 2.75 per 100 individuals per year in 1999–2000 and 2.55 per 100 individuals per year in 2009–2010.

Correlates of Long-Term Use

In multivariable logistic regression analyses among antidepressant users, age, race/ethnicity, insurance type, general health status, and type of antidepressant were significantly associated with long-term antidepressant use (Table 1). Compared to individuals in the 18–24 years age range, those 35 years or older were more likely to use antidepressants on a long-term basis, as were individuals with Medicare insurance compared to those with no insurance, individuals reporting excellent or good health compared to those reporting poor health, and those taking TCAs compared to those taking SSRIs. In contrast, members of racial/ethnic minority groups were less likely than non-Hispanic whites to report long-term use of antidepressants.

Interaction and Stratified Analyses

Interaction terms for survey year by visiting a mental health professional in the past year ($F_{1,91} = 6.96$, $P = .01$), survey year by private insurance ($F_{1,91} = 4.47$, $P = .04$), and survey year by other insurance ($F_{1,91} = 4.75$, $P = .03$) were statistically significant in multivariable models. In stratified analyses (Table 2), an increasing trend in long-term use of antidepressants was noted only among adults who had not seen a mental health professional in the past year (from 46.2% in 1999–2002 to 69.2% in 2007–2010; test for trend, $F_{1,91} = 50.18$, $P < .001$; adjusted odds ratio [AOR] = 3.86; 95% CI, 2.57–5.80; $P < .001$). The prevalence of long-term antidepressant use did not appreciably change during the study period among those who had visited a mental health professional (Table 2). Similarly, a significant trend in long-term antidepressant use was noted among individuals with private insurance (from 48.8% to 67.8%; test for trend, $F_{1,91} = 40.86$, $P < .001$; AOR = 2.90; 95% CI, 1.90–4.44; $P < .001$). The prevalence of long-term antidepressant use also increased among adults with Medicaid and Medicare insurance (Table 2). Among those with Medicaid coverage, the magnitude of change was comparable to that among the privately insured. Thus, the statistical significance of the interaction term for private insurance is most likely due to the larger sample size of this group compared to other insurance groups. The significant interaction test for survey year by the "other" sources of payment should be interpreted with caution because of the small sample sizes.

DISCUSSION

There were 3 main findings in this study. First, as in some European countries[11,16–18] and Canada,[20] the prevalence of long-term antidepressant use in the United States increased during the first decade of the 21st century. The increase in long-term use fully explained the overall increasing trend in the use of antidepressants in this period. Second, the increase in long-term antidepressant use was most evident among patients treated by general medical providers. Third, middle-aged and older adults and non-Hispanic whites were disproportionately represented among long-term antidepressant users.

An impressive increase occurred between 1999 and 2010 in long-term antidepressant use in the United States. The proportion of antidepressant use that was long-term increased from less than one-half in 1999–2000 to over two-thirds by 2009–2010. The reasons for this increase are not clear. Over the last several years, however, research and clinical practice in depression and serious anxiety disorders have increasingly recognized the persistent nature of these disorders.[45–48] In the United States, where most antidepressants are prescribed by nonpsychiatrist physicians,[49] clinical research and quality-of-care initiatives have sought to improve clinical outcomes by reorganizing care for depression and anxiety disorders along a chronic care model.[50–53] A reorientation toward maintenance antidepressant treatment, consistent with practice guideline recommendations, may have contributed to the growing trend in long-term antidepressant use. Consistent with this possibility, the increasing trend in long-term use occurred in conjunction with a declining trend in short-term use (< 6 months). Practice guidelines for treatment of major depression and anxiety disorders consistently recommend continuation of treatment for several months after remission

Table 1. Sociodemographic and Clinical Characteristics of Adult Users of Antidepressant Medications by Duration of Use in the US National Health and Nutrition Examination Survey, 1999–2010

	All Antidepressant Users		Long-Term Users (24 mo or longer)		Non–Long-Term Users (<24 mo)		Multivariable Logistic Regression for Associations With Long-Term Antidepressant Use[a]		
Characteristic	n	%	n	%	n	%	AOR	95% CI	*P*
Survey years									
1999–2000	260	10.2	124	8.0	136	13.4	1.00	Ref	…
2001–2002	428	14.3	228	13.4	200	15.6	1.54	1.00–2.36	.050
2003–2004	485	18.2	259	16.4	226	20.7	1.37	0.90–2.08	.137
2005–2006	449	18.6	255	18.6	194	18.5	1.77	1.12–2.73	.015
2007–2008	619	20.4	399	22.6	220	17.4	2.20	1.46–3.33	<.001
2009–2010	585	18.3	390	21.1	195	14.4	2.70	1.79–4.08	<.001
Sex									
Female	1,913	70.4	1,111	69.9	802	71.0	1.00	Ref	…
Male	913	29.7	544	30.1	369	29.0	1.03	0.83–1.27	.809
Age group									
18–24 y	133	4.8	42	2.5	91	8.0	1.00	Ref	…
25–34 y	247	10.5	111	7.8	136	14.3	1.80	0.98–3.31	.056
35–44 y	476	21.7	244	18.5	232	26.3	2.30	1.30–4.09	.005
45–54 y	568	25.3	356	28.6	212	20.6	4.81	2.60–8.90	<.001
55–64 y	551	19.1	350	21.5	201	15.9	4.75	2.54–8.87	<.001
65+ y	851	21.0	552	21.0	299	14.9	3.08	1.48–6.41	.003
Race/ethnicity									
Non-Hispanic white	2,000	86.4	1,229	88.6	771	83.3	1.00	Ref	…
Non-Hispanic black	322	5.1	168	4.4	154	6.0	0.57	0.42–0.75	<.001
Hispanic	415	5.3	210	4.4	205	6.6	0.62	0.46–0.85	.003
Other	89	3.2	48	2.6	41	4.1	0.55	0.31–0.98	.041
Marital status									
Married/living as married	1,549	61.2	905	61.9	644	60.3	1.00	Ref	…
Widowed	374	8.7	232	9.2	142	8.0	0.90	0.66–1.22	.490
Divorced/separated	521	17.8	318	18.5	203	16.9	1.10	0.87–1.40	.406
Never married	336	12.3	178	10.5	158	14.8	1.15	0.82–1.62	.418
Employment status									
Working at a job	1,055	50.8	575	49.0	480	53.4	1.00	Ref	…
Retired	715	16.6	469	18.9	246	13.3	0.99	0.69–1.43	.959
Student/homemaker	201	7.8	100	6.8	101	9.3	0.88	0.61–1.27	.489
Disabled	713	20.0	444	21.2	269	18.4	1.03	0.77–1.38	.820
Unemployed, in job market	141	4.7	66	4.1	75	5.6	0.84	0.51–1.39	.496
Education									
Did not graduate high school	707	16.2	400	15.9	307	16.6	1.00	Ref	…
High school graduate or GED	764	27.6	440	26.8	324	28.7	0.94	0.70–1.27	.698
Some college/college graduate	1,349	56.3	810	57.3	539	54.8	1.03	0.76–1.39	.871
Ratio of family income to Federal Poverty Level									
0 to <1	543	14.1	300	12.4	243	16.5	1.00	Ref	…
1 to <2	691	19.5	411	19.4	280	19.6	1.07	0.78–1.47	.688
2 to <3	388	15.1	241	15.8	147	14.2	1.21	0.82–1.79	.328
3+	1,037	51.3	604	52.4	433	49.8	1.09	0.72–1.65	.681
Health insurance coverage[b]									
None	231	7.9	107	6.6	124	9.7	1.00	Ref	…
Medicare	978	22.8	658	26.9	320	16.9	1.90	1.32–2.75	.001
Medicaid	409	10.1	232	9.6	177	10.7	1.27	0.93–1.75	.131
Private	1,601	67.3	944	68.0	657	66.4	1.14	0.87–1.50	.349
Other	167	5.5	99	5.3	68	5.8	1.13	0.69–1.85	.618
Regular source of care									
No	126	4.3	78	4.4	48	4.1	1.00	Ref	…
Yes	2,700	95.7	1,577	95.6	1,123	95.9	0.52	0.28–0.95	.034
Visited a mental health professional in the past year									
No	1,926	67.5	1,144	68.7	782	66.0	1.00	Ref	…
Yes	900	32.5	511	31.3	389	34.1	1.05	0.83–1.34	.674
Chronic physical health conditions									
No	908	39.4	487	36.2	421	43.9	1.00	Ref	…
Yes	1,918	60.6	1,168	63.8	750	56.1	0.95	0.76–1.19	.653
Mental health disability									
No	2,297	84.2	1,325	83.5	972	85.1	1.00	Ref	…
Yes	529	15.8	330	16.5	199	14.9	1.28	0.98–1.66	.069

(continued)

Table 1 (continued). Sociodemographic and Clinical Characteristics of Adult Users of Antidepressant Medications by Duration of Use in the US National Health and Nutrition Examination Survey, 1999–2010

	All Antidepressant Users		Long-Term Users (24 mo or longer)		Non–Long-Term Users (<24 mo)		Multivariable Logistic Regression for Associations With Long-Term Antidepressant Use[a]		
Characteristic	n	%	n	%	n	%	AOR	95% CI	*P*
General health rating									
Poor	336	8.8	194	8.8	142	8.8	1.00	Ref	…
Fair	758	21.2	443	21.1	315	21.3	1.21	0.82–1.79	.338
Good	936	35.3	563	36.0	373	34.3	1.64	1.13–2.38	.009
Very Good	612	26.7	338	25.5	274	28.3	1.32	0.87–2.01	.194
Excellent	183	8.1	116	8.7	67	7.3	1.95	1.13–3.35	.017
PHQ-9 symptom score[c]									
0–4	737	55.1	482	57.6	255	50.8	1.00	Ref	…
5–9	362	25.2	219	22.7	143	29.7	0.73	0.49–1.09	.122
10–14	205	12.1	129	12.1	76	12.1	1.00	0.62–1.61	.998
15–19	99	5.3	62	5.6	37	4.8	1.14	0.60–2.17	.678
20–27	47	2.3	27	2.0	20	2.7	0.73	0.26–2.01	.531
Antidepressant medication type[d]									
SSRIs	1,797	63.9	1,077	66.1	720	60.7	1.00	Ref	…
SNRIs	342	13.6	196	13.6	146	13.7	0.81	0.60–1.11	.194
TCAs	399	12.8	271	15.1	128	9.5	1.79	1.29–2.47	.001
Other antidepressants	627	22.2	373	22.1	254	22.4	1.02	0.82–1.28	.850

[a]Multivariable analysis are based on a sample of 2,612 participants with full data on all variables in the model.
[b]Percentages total more than 100% as some individuals reported having multiple types of insurance coverage.
[c]PHQ-9 was administered only in NHANES 2005–2006, 2007–2008, and 2009–2010. Results of multivariable analyses of PHQ-9 data were limited to these years (n = 1,361).
[d]Percentages total more than 100% as some individuals reported using more than 1 antidepressant.
Abbreviations: AOR = adjusted odds ratio, GED = general equivalency diploma, NHANES = National Health and Nutrition Examination Survey, PHQ-9 = Patient Health Questionnaire, Ref = reference group, SNRI = serotonin-norepinephrine reuptake inhibitor, SSRI = selective serotonin reuptake inhibitor, TCA = tricyclic antidepressant.

of symptoms in response to acute treatment.[26,54] It is also possible that concerns about antidepressant withdrawal may have contributed to this trend.[30]

While long-term antidepressant treatment is clinically indicated in some cases to consolidate clinical gains and prevent relapse, regular assessment of the need for continuation of treatment in patients who have received these medications over the long term is a clinically sound approach. The increase in long-term antidepressant use raises the importance of clinical research aimed at determining which patients can be safely discontinued from maintenance antidepressant treatment and the potential of long-term antidepressant use to adversely affect the course of illness in some patients.[55] There is evidence that in some clinical settings, the frequency of visits decreases with prolonged use of antidepressants,[56] thereby reducing the opportunity to regularly monitor the need for continued treatment. Furthermore, currently available practice guidelines for treatment of mood and anxiety disorders provide little specific guidance regarding regular monitoring to assess the need for continuation of treatment and indications for long-term use of antidepressants, especially for anxiety disorders.[27,28]

The increase in long-term antidepressant use was most prominent among adults who received their prescriptions from general medical providers. By contrast, the prevalence of long-term antidepressant use among people who were treated by mental health specialists was higher in 1999–2000 and remained relatively high throughout the next decade. This pattern is consistent with other recent research indicating increasing prescription of antidepressants by general medical providers along with increasing use of these medications by individuals with less severe mental health problems.[1,57] Thus, the increasing prevalence of long-term antidepressant use may at least partly explain the overall increasing antidepressant use in these groups.

Individuals who receive mental health care from general medical providers compared to those receiving care from mental health providers typically have less severe and disabling mental health problems.[1,58] During the study period, long-term use of antidepressants may have diffused to patient populations with comparatively fewer severe symptoms and lower levels of functional impairment. Unfortunately, NHANES does not record psychiatric diagnosis, and the PHQ-9 captures only recent symptoms. Future research should assess relationships between duration of antidepressant use and indicators of need for treatment.

Middle-aged and older adults as well as non-Hispanic whites were more likely than the younger age group and racial/ethnic minorities to use antidepressants on a long-term basis. Cross-sectional studies have consistently found a higher prevalence of antidepressant use in these population subgroups.[1,2] The present study suggests that these differences may be at least partly due to higher prevalence of long-term antidepressant use in these population subgroups. This finding is also consistent with higher observed antidepressant medication discontinuation in minority groups,[23] lower rates of depression treatment in minorities and younger age groups,[59,60] and other reports of higher prevalence of long-term antidepressant use in older adults.[56] The higher prevalence of long-term antidepressant use in older age may be, at least partly, attributable to a greater opportunity to be started on a long-term antidepressant treatment regimen associated with a greater number of years of life or greater chronicity of major depression in older age.[54]

Table 2. Trends in Long-Term Use[a] Among Adult Users of Antidepressant Medications Stratified by Sociodemographic and Clinical Characteristics in the United States National Health and Nutrition Examination Survey, 1999–2010

	1999–2002		2003–2006		2007–2010		Test of Trend	
Characteristic[b]	n	%	n	%	n	%	Adjusted Wald Statistic	*P*
Sex								
Female ($n_1 = 462$, $n_2 = 629$, $n_3 = 822$)	236	51.1	331	53.6	544	66.8	26.07	<.001
Male ($n_1 = 226$, $n_2 = 305$, $n_3 = 382$)	116	50.7	183	61.1	245	64.0	8.91	.004
Age group[c]								
18–34 y ($n_1 = 97$, $n_2 = 150$, $n_3 = 133$)	33	35.5	58	37.0	62	45.9	4.13	.045
35–44 y ($n_1 = 119$, $n_2 = 146$, $n_3 = 211$)	57	50.5	67	43.9	120	54.8	0.40	.527
45–54 y ($n_1 = 141$, $n_2 = 187$, $n_3 = 240$)	80	58.9	113	67.5	163	70.0	2.07	.154
55–64 y ($n_1 = 112$, $n_2 = 180$, $n_3 = 259$)	59	52.6	109	60.6	182	75.2	14.72	<.001
65+ y ($n_1 = 219$, $n_2 = 271$, $n_3 = 361$)	123	54.4	167	62.1	262	76.7	18.01	<.001
Race/ethnicity[d]								
Non-Hispanic white ($n_1 = 481$, $n_2 = 682$, $n_3 = 837$)	266	53.6	389	56.7	574	67.2	33.37	<.001
Non-Hispanic black ($n_1 = 78$, $n_2 = 105$, $n_3 = 139$)	31	41.1	51	48.2	86	58.9	2.73	.103
Hispanic ($n_1 = 101$, $n_2 = 116$, $n_3 = 198$)	43	37.5	56	51.0	111	53.9	2.12	.149
Marital status								
Married/living as married ($n_1 = 365$, $n_2 = 522$, $n_3 = 662$)	189	52.8	284	55.7	432	66.5	26.32	<.001
Widowed ($n_1 = 101$, $n_2 = 132$, $n_3 = 141$)	55	54.8	82	60.8	95	67.9	3.26	.075
Divorced/separated ($n_1 = 104$, $n_2 = 170$, $n_3 = 247$)	60	55.9	91	55.7	167	69.1	5.02	.028
Never married ($n_1 = 86$, $n_2 = 109$, $n_3 = 141$)	32	35.0	57	53.3	89	58.7	8.45	.005
Employment status[e]								
Working at a job ($n_1 = 282$, $n_2 = 371$, $n_3 = 402$)	127	46.7	192	54.4	256	65.8	33.19	<.001
Retired ($n_1 = 179$, $n_2 = 223$, $n_3 = 313$)	102	58.1	141	64.5	226	72.8	8.68	.004
Disabled ($n_1 = 154$, $n_2 = 227$, $n_3 = 332$)	86	56.7	132	58.8	226	68.1	4.98	.028
Education								
Did not graduate high school ($n_1 = 183$, $n_2 = 208$, $n_3 = 316$)	91	49.2	115	55.0	194	64.9	5.92	.017
High school graduate or GED ($n_1 = 189$, $n_2 = 279$, $n_3 = 296$)	92	48.0	146	52.0	202	69.2	9.49	.003
Some college/college graduate ($n_1 = 315$, $n_2 = 445$, $n_3 = 589$)	168	53.2	251	57.9	391	65.0	14.28	<.001
Ratio of family income to Federal Poverty Level								
0 to <1 ($n_1 = 114$, $n_2 = 164$, $n_3 = 265$)	53	45.9	82	44.8	165	62.5	4.58	.035
1 to <2 ($n_1 = 164$, $n_2 = 227$, $n_3 = 300$)	87	53.4	129	57.1	195	63.2	3.85	.053
2 to <3 ($n_1 = 94$, $n_2 = 135$, $n_3 = 159$)	49	47.6	81	63.5	111	66.7	8.97	.004
3+ ($n_1 = 272$, $n_2 = 368$, $n_3 = 397$)	140	53.0	201	56.7	263	67.3	16.47	<.001
Health insurance coverage[f]								
Medicare ($n_1 = 234$, $n_2 = 310$, $n_3 = 434$)	141	62.5	196	66.0	321	75.7	11.56	.001
Medicaid ($n_1 = 85$, $n_2 = 141$, $n_3 = 183$)	40	46.4	76	50.4	116	68.7	7.68	.007
Private ($n_1 = 430$, $n_2 = 532$, $n_3 = 639$)	209	48.8	299	57.1	436	67.8	40.86	<.001
Visited a mental health professional in the past year								
No ($n_1 = 433$, $n_2 = 631$, $n_3 = 862$)	211	46.2	354	56.5	579	69.2	50.18	<.001
Yes ($n_1 = 255$, $n_2 = 303$, $n_3 = 342$)	141	58.2	160	54.2	210	57.6	0.27	.605
Chronic physical health conditions								
No ($n_1 = 242$, $n_2 = 313$, $n_3 = 353$)	117	48.1	158	52.1	212	60.0	16.66	<.001
Yes ($n_1 = 446$, $n_2 = 621$, $n_3 = 851$)	235	53.2	356	58.2	577	69.4	22.92	<.001
Mental health disability								
No ($n_1 = 587$, $n_2 = 745$, $n_3 = 965$)	291	50.3	395	54.3	634	66.7	41.92	<.001
Yes ($n_1 = 101$, $n_2 = 189$, $n_3 = 239$)	56	55.8	119	62.5	155	62.3	2.04	.157
General health rating[g]								
Fair to poor ($n_1 = 257$, $n_2 = 340$, $n_3 = 497$)	138	55.7	183	52.7	316	65.2	3.25	.075
Good ($n_1 = 213$, $n_2 = 324$, $n_3 = 399$)	108	49.7	179	57.0	276	68.1	19.56	<.001
Excellent to very good ($n_1 = 218$, $n_2 = 270$, $n_3 = 307$)	106	48.2	152	57.1	196	64.5	15.44	<.001
Antidepressant medication type[h]								
SSRIs ($n_1 = 429$, $n_2 = 604$, $n_3 = 764$)	218	50.5	345	58.7	514	69.0	51.42	<.001
TCAs ($n_1 = 134$, $n_2 = 124$, $n_3 = 141$)	82	64.3	78	63.0	111	80.6	3.84	.053
Other antidepressants/SNRI ($n_1 = 198$, $n_2 = 302$, $n_3 = 421$)	104	55.4	161	53.5	266	61.9	3.29	.073

[a]Long-term antidepressant use was defined as use for 24 months or longer.
[b]The abbreviations n_1, n_2, and n_3 represent total number of participants in the stratum in 1999–2002, 2003–2006, and 2007–2010, respectively.
[c]The 18–24 and 25–34 years age groups were combined because of the small numbers of participants in these age groups.
[d]Separate analyses for the "other" racial/ethnic group was not conducted because of the small number of participants in this category.
[e]Separate analyses for the "unemployed, in job market" and "student/homemaker" groups were not conducted because of the small numbers of participants in these categories.
[f]Separate analyses for the "other" and "no insurance" groups were not conducted because of the small numbers of participants in these categories.
[g]The "excellent" and "very good" health ratings were combined because of the small numbers of participants in these categories, as were the "fair" and "poor" categories.
[h]The SNRIs and other antidepressant groups were combined because of the small numbers of participants in these categories.
Abbreviations: GED = general equivalency diploma, SNRI = serotonin-norepinephrine reuptake inhibitor, SSRI = selective serotonin reuptake inhibitor, TCA = tricyclic antidepressant.

We found some differences in long-term use of antidepressant medications among users of different antidepressant groups. Individuals taking TCAs were more likely to use them on a long-term basis. This trend may reflect changing patterns in use of different antidepressant medication classes. The use of TCAs dramatically declined between the 1990s and 2000s.[2] Therefore, a larger proportion of individuals who remain on these medications are likely to have been started on them in earlier years and, thus, to be long-term users. The use of TCAs for chronic medical conditions may also partly explain the higher prevalence of long-term use of these medications.[61–63] For instance, amitriptyline and imipramine have indications for use in chronic pain syndromes and are commonly used for this indication.[63]

The findings of this study should be viewed in the context of its limitations. First, because of the cross-sectional design of the study, the rates of long-term antidepressant use were much higher than in studies based on new onset of antidepressant use.[23,64] The likelihood of being captured in cross-sectional data is proportional to the duration of antidepressant use.[44] Furthermore, we combined all durations of antidepressant use <6 months, and therefore trends in very-short-term use, which is quite common in community settings,[47] could not be assessed. Second, data on antidepressant use and duration of use were based on participant self-reports. In contrast, studies of long-term antidepressant use from other countries were based on pharmacy records.[11,16–20] However, specificity of self-report is generally quite high,[33,34,36,38] and thus the large majority of individuals with positive self-reports would most likely be antidepressant users according to pharmacy records as well. Third, duration of use was assessed only for current medications. Some individuals may have switched from one antidepressant to another or continued taking antidepressants after the survey interview. Therefore, the durations recorded in this study quite likely underestimate actual duration of antidepressant use. Fourth, NHANES did not assess psychiatric diagnoses, and depressive symptoms were measured for only the past 2 weeks. Antidepressants are commonly prescribed for indications beyond depression.[65,66] The lack of association between PHQ-9 scores and long-term antidepressant use is difficult to interpret as the depressive symptoms are typically significant predictors of antidepressant use in community samples,[67] and, in turn, antidepressant treatment may impact the level of depressive symptoms. Fifth, while NHANES recorded whether or not the participant had contacted a mental health professional in the past year, it did not record the type of health care professional who had prescribed the antidepressant medication. Some of the individuals who reported using antidepressants and seeing mental health professionals may have seen psychologists or social workers for therapy in conjunction with a general medical provider who prescribed their antidepressant medications. Furthermore, NHANES did not record the number of visits for mental health problems to either mental health or general medical providers. Sixth, only a small number of physical health conditions were assessed in NHANES. However, only about 7% of antidepressants prescribed in the United States are for nonpsychiatric indications.[65]

In the context of these limitations, the data presented here provide a first glimpse at the national trends in the long-term use of antidepressant medications in the United States. Long-term use of antidepressants appears to be the major driver of the recent increase in the use of these medications. The trend has been most apparent among individuals treated in primary care settings, where most antidepressants are currently prescribed and where there are lingering questions about the quality of mental health care.[6,57,58,68] With the expected growing role of primary care under national health care reform, there is also a growing need for evidence-based guidelines concerning indications and monitoring of long-term antidepressant use in these settings.

Drug names: bupropion (Wellbutrin, Aplenzin, and others), citalopram (Celexa and others), clomipramine (Anafranil and others), desipramine (Norpramin and others), doxepin (Silenor and others), duloxetine (Cymbalta), escitalopram (Lexapro and others), fluoxetine (Prozac and others), fluvoxamine (Luvox and others), imipramine (Tofranil and others), mirtazapine (Remeron and others), nortriptyline (Pamelor, Aventyl, and others), paroxetine (Paxil, Pexeva, and others), protriptyline (Vivactil and others), sertraline (Zoloft and others), trazodone (Oleptro and others), trimipramine (Surmontil and others), venlafaxine (Effexor and others).

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