PATTERNS OF MEDICATION USE

IN THE UNITED STATES

2006

A Report from the Slone Survey

KEY FINDINGS – ***Adults***

- In a given week, an average of 82% of adults in the U.S. are taking at least one medication (prescription or nonprescription drug, vitamin/mineral, herbal/natural supplement); 29% are taking five or more.
- Men and women aged 65 years or older continue to be the biggest consumers of medications: 17-19% in this age group take at least ten in a given week.
- The prevalence of use of medications overall and prescription drugs has not changed materially since the Survey began in 1998. However, polypharmacy has increased since 2000, from 23% to 29% for use of five or more medications and from 6.3% to 12% for use of at least five prescription drugs.
- Acetaminophen continues to be the most commonly used drug among U.S. adults; 19% are taking it in a given week.
- Two cholesterol-lowering drugs rank in the top ten most commonly used: atorvastatin (fourth overall, and the most frequently used prescription drug) and simvastatin (eighth).
- Use of pseudoephedrine, a drug for which access has been restricted in recent years, has decreased since 2005, from 5.3% to 4.5%; however, it is the tenth most commonly used drug.
- 41% of U.S. adults use a vitamin product in a given week; use is highest in older women (≥65 years), at 63%.
- Herbals/natural supplements are used by 22% of U.S. adults; lutein remains the most commonly used herbal, mostly as a component of multivitamins.
- Among prescription drug users, 32% are also taking a herbal/natural supplement.
- For all drugs reported, the most common indication is hypertension (13%).

KEY FINDINGS – ***Children (age <18 years)***

- In any given week, 56% of children are taking at least one medication and 27% take two or more; 21% use at least one prescription drug.
- The prevalence of use of medications and prescription drugs has fluctuated from year to year since 1998/1999, with no obvious pattern.
- Two over the counter products, acetaminophen (11%) and ibuprofen (8.9%), continue to be the most commonly used drugs.
- Two prescription drugs used in the treatment of asthma, montelukast (4.1%) and albuterol (3.7%), rank third and fourth in the top ten most commonly taken drugs in children.
- Compared to 2005, use of pseudoephedrine has decreased from 5.7% to 2.8%, a larger decline than observed for adults.
- Among children younger than five, 6.4% use amoxicillin; nearly 80% of this use is for otitis. Fewer than 1.0% of older children use this drug.
- Vitamin preparations are used by 25% of children; more than three quarters of this use is a multivitamin product.
- Herbal/natural supplements are used by 4.0% of children, compared to 5.3% in 2005.
- Upper respiratory infection is the most frequently reported reason for medication use (18%). Attention deficit hyperactivity disorder has dropped in rank since 2005, from fifth to eighth, and in frequency, from 7.3% to 4.4%.

Expenditures on prescription and OTC drugs, vitamins/minerals, and herbal/natural supplements represent a large proportion of health care dollars in the United States; consumption of medications is widespread, involving the large majority of the U.S. population. Since 1998, the Slone Epidemiology Center of Boston University has collected information from a random sample of the noninstitutionalized U.S. population[1-3] in order to estimate the prevalence of use of all medications. In this, the third annual summary report, we describe general patterns of medication use in the ambulatory U.S. adult and pediatric populations in 2006.

SURVEY METHODOLOGY

Sampling

The Slone Survey covers the 48 contiguous U.S. states and the District of Columbia. Random digit dialing (RDD) methods are used on a simple random sample of telephone numbers generated by the GENESYS system.[4] Residents of households are included in the Survey; institutionalized individuals (e.g., nursing home residents) and individuals in group living arrangements (e.g., active military) are not eligible.

One individual in each contacted household is selected for interview by a computer-generated random number procedure. Information is obtained directly from the identified subject. For children younger than 14 years, a parent/guardian provides the information. A surrogate (e.g., spouse, caretaker) who has knowledge of the subject's medications can serve as the respondent for individuals unable to complete the interview due to conditions such as Alzheimer's disease. Interviews are conducted in English or Spanish.

Survey Information

The interviewer explains that information is being sought on use of all medications, including prescription and nonprescription drugs, vitamins/minerals, and herbal/natural supplements, taken

during the preceding seven days. The subject is asked to gather the relevant bottles or packages. After recording the product names, a list of reasons for use (e.g., pain/headache/backache, allergy) is read to enhance recall of other medication use. After all of the medication names have been recorded, detailed information (e.g. reason for use and duration of use) is obtained for each.

Information is also obtained on age, sex, race, Hispanic origin, years of education, income (in ranges), and for women aged 18-50 years, pregnancy status. Since August 2005, the interview has also included a brief series of medical history questions.

Medications

Medication names are coded for analysis using the Slone Drug Dictionary (http://128.197.222.56/slonedrugdictionary/index.php). This database, developed and maintained by the Slone Epidemiology Center, is a computerized linkage system composed of single medication components and multi-component products, including herbal/natural supplements, each assigned specific code numbers. All combination products are linked to their individual components. Drugs are classified as "prescription only"' based on the product name and dose; drugs available both by prescription and OTC are not given this designation. Products containing plant extracts (except those marketed in regulated medications, e.g., senna laxatives), amino acids, animal extracts, enzymes, or other unclassified agents (e.g., glucosamine, melatonin) are classified as herbal/natural supplements.

Participation

The present report includes data from 3027 subjects interviewed in 2006: 2529 adults and 498 children (individuals aged <18 years). During this one-year period, the participation rate among eligible subjects was 51%.

Comparison with U.S. Census Data

In order to assess representativeness, demographic information from the Survey subjects was compared to data from the 2000 U.S. Census (race, ethnicity, education, income, region)[5] and the

U.S. Census projections for 2006 (age, sex).[6] Survey participants were somewhat older (median age 41 years in Survey, 37 years in U.S.) and a higher proportion were female (55% in Survey, 51% in U.S.). The distribution of Survey subjects according to race was not materially different from that of the U.S. population (white – 77% in Survey, 75% in U.S.). Similarly, the proportion living within each of four broad regions (Northeast, Midwest, South, and West) did not differ appreciably. There were somewhat fewer individuals of Hispanic origin (10% vs. 12%). Survey subjects had more education (36% college graduate vs. 25%) and higher annual household incomes (68% with at least $35,000, among those who responded to the income question, vs. 58%) than the U.S. population. Disproportionate participation by women and persons with higher levels of education are known features of telephone surveys.[7]

Analytical Details

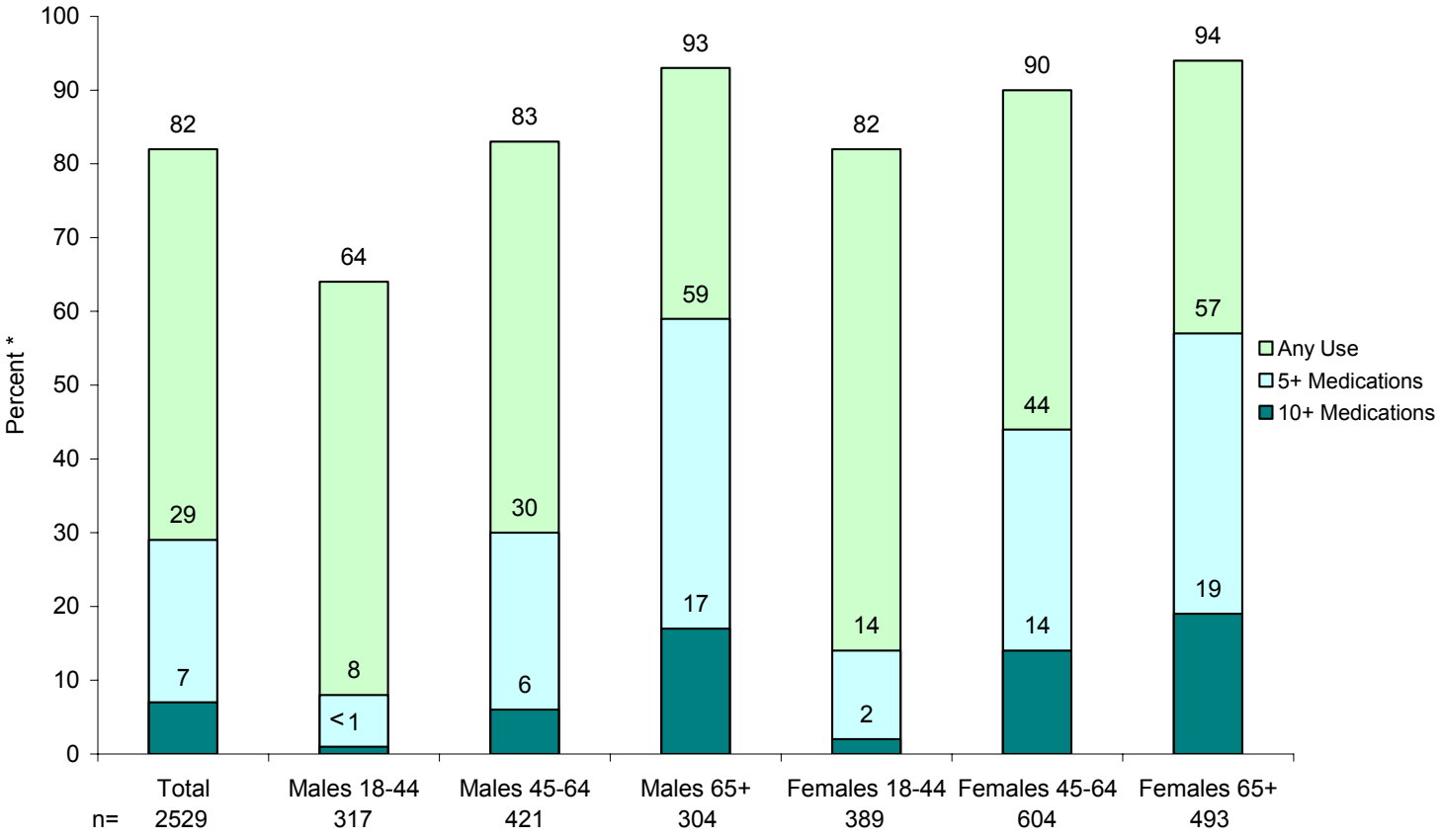
Results are given separately for the 2529 adults and 498 children. Any use during the seven days preceding the interview is reported as a one-week prevalence. The estimates are weighted according to household size, a factor that is inversely related to the probability of selection within each household. In addition, estimates are adjusted to the age and sex distribution (adults) and the age distribution (children) of the U.S. Census Population Projections for 2006.[6] As examples of the precision of the results, in the full sample of 2529 adults, for a prevalence of use of 1%, the 95% confidence limits are ±0.4%; for a prevalence of 5%, ±0.8%; for a prevalence of 10%, ±1.2%; and for a prevalence of 20%, ±1.6%. Corresponding figures among the 498 children are 1±0.9%, 5±1.9%, 10±2.6%, and 20±3.5%.

MEDICATION USE AMONG ADULTS

Overall Use

Figure 1 displays overall medication use (prescription or OTC drug, vitamin/mineral, or herbal/natural supplement) by adults in the Slone Survey. Eighty-two percent had taken at least one medication during the preceding week and 7% had taken ten or more. Prevalence of use increased with age among both males and females. The highest overall prevalence was in older men (93%) and older women (94%). Polypharmacy was particularly common in these subjects: 57-59% took at least five medications and 17-19% at least ten. Among those with the lowest prevalence, males aged younger than 45 years, the prevalence of any medication use was 64%, and 8% used five or more medications.

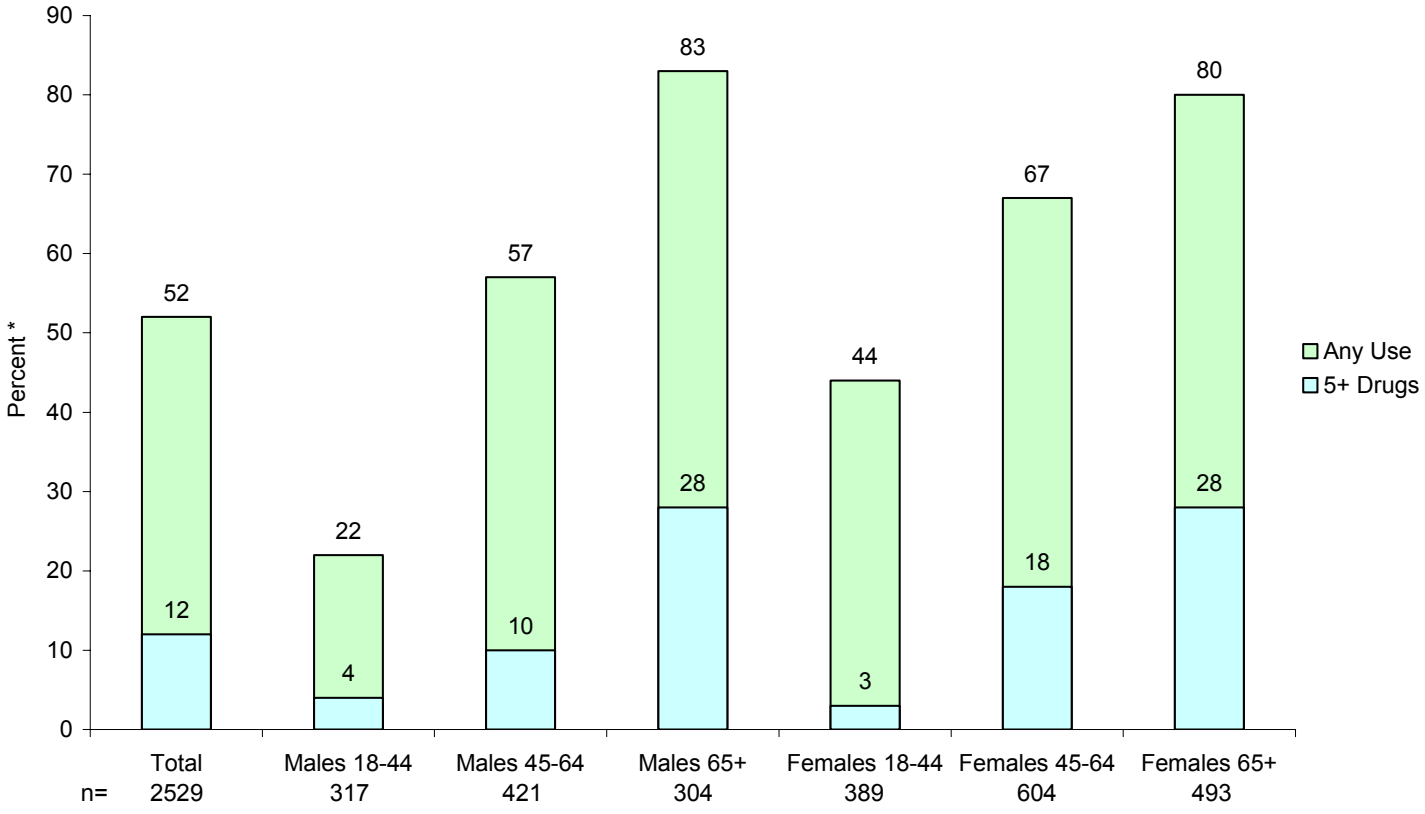
Figure 1. Use of Medications During the Preceding Week Among U.S. Adults, by Sex and Age



* Percents weighted according to household size. Total prevalence estimates also adjusted to the age/sex distribution of the U.S. 2006 Population Projections.

Use of prescription drugs is shown in Figure 2; overall, 52% used at least one prescription drug during the preceding week. Use increased with age: from the youngest to the oldest age group, use rose from 22% to 83% in men and from 44% to 80% in women. In the oldest age group, more than one in four males and females were using five or more prescription drugs in a given week.

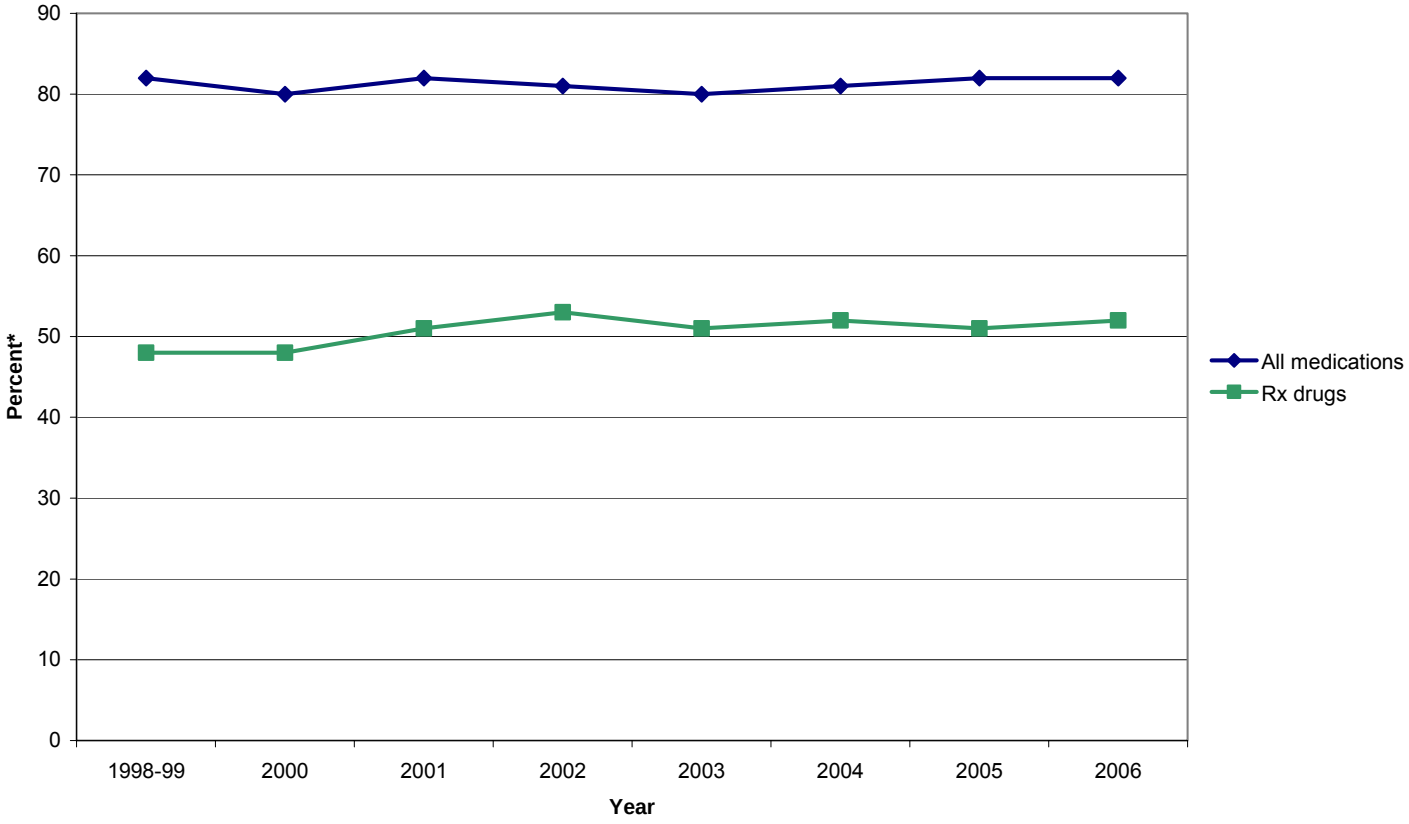
Figure 2. Use of Prescription Drugs During the Preceding Week Among U.S. Adults, by Sex and Age



* Percents weighted according to household size. Total prevalence estimates also adjusted to the age/sex distribution of the U.S. 2006 Population Projections.

Figure 3 displays the average weekly prevalence of any medication use and any prescription drug use for each year since the Survey began in 1998-99. The prevalence has been consistent over the years, with use of any medication between 80-82%. Use of any prescription drug was 48% in 1998-99 and 2000; the prevalence has been 51% or higher since 2001.

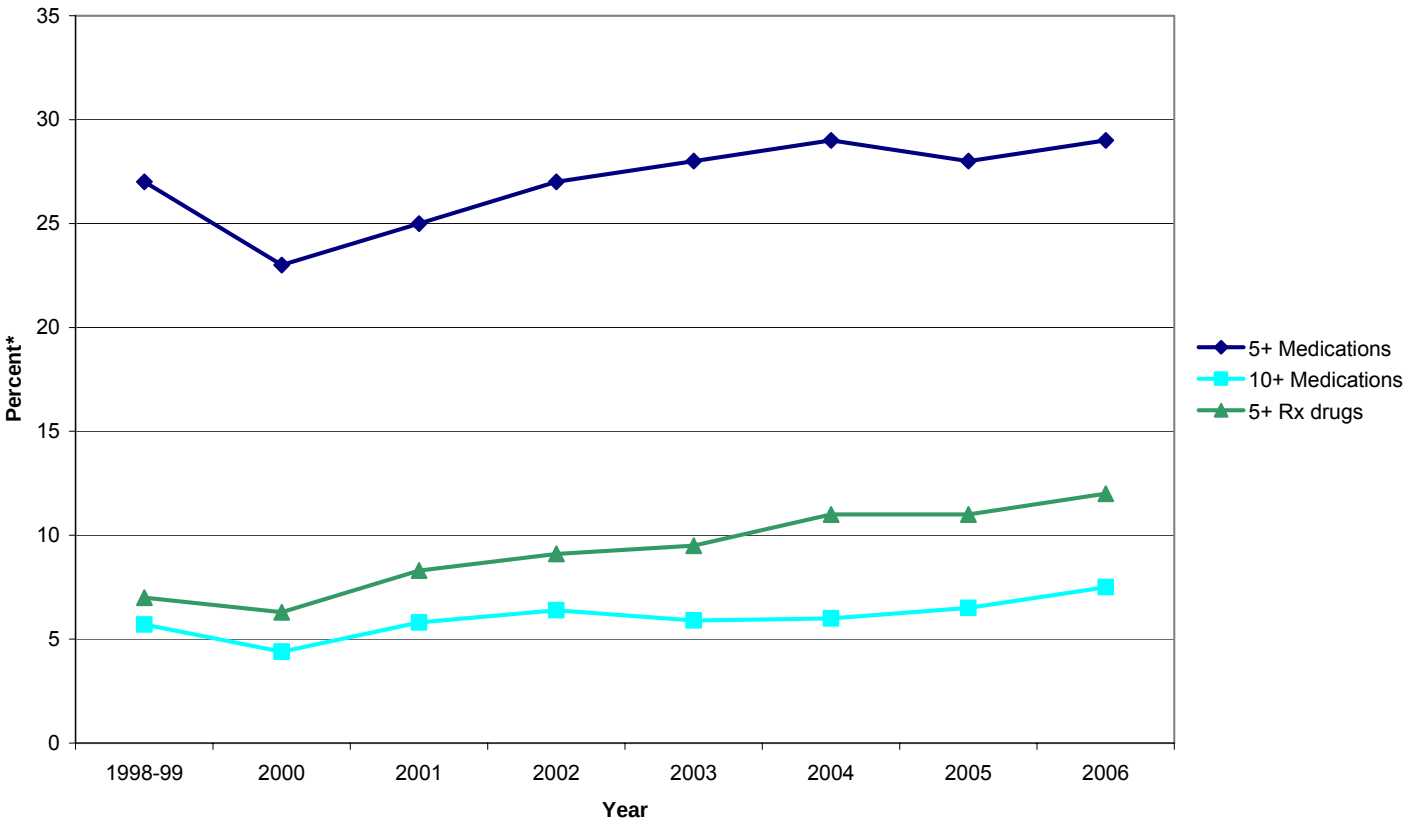
Figure 3. Use of Medications During the Preceding Week Among U.S. Adults According to Year of Interview



* Prevalence estimates weighted by household size and adjusted to the age/sex distribution of the U.S. 2006 Population Projections.

In Figure 4, average weekly use of multiple medications is shown according to year of interview. There was an apparent decline in use from 1998-99 to 2000. However, since 2000, use of at least five medications has increased from 23% to 29%. Use of at least ten medications has also increased, from 4.4% in 2000 to 7.5% in 2006. A larger proportional increase in prevalence over the same time period was seen for use of at least five prescription drugs: 6.3% to 12%.

Figure 4. Use of Multiple Medications During the Preceding Week Among U.S. Adults According to Year of Interview



* Prevalence estimates weighted by household size and adjusted to the age/sex distribution of the U.S. 2006 Population Projections.

Use of Specific Drugs, Multivitamins, and Herbal/Natural Supplements

The 30 most commonly used medication entities (not including vitamin/minerals and herbal/natural supplements) taken in single or multiple component products are shown in Table 1. As in previous years, the three most commonly used drugs were acetaminophen, aspirin, and ibuprofen. Most of the top 30 drugs are prescription products, including five of the top ten. As in 2005, the most frequently used prescription drug was atorvastatin, a cholesterol-lowering drug, and it remains fourth in the ranking. Another cholesterol-lowering drug, simvastatin, ranks eighth. The remaining drugs in the top ten include hydrochlorothiazide, a diuretic (fifth); thyroid supplements (sixth); lisinopril, an ACE-inhibitor (seventh); naproxen, an NSAID (ninth), and pseudoephedrine, a decongestant, (tenth). Four of the drugs among the 30 most commonly used in 2006 were not on last year's list: ezetimibe, losartan, dextromethorphan, and fluoxetine. These drugs replaced fexofenadine, sertraline, triamterene, and alendronate from the top 30 list of 2005. The only other drug with a somewhat lower prevalence in 2006 than 2005 was pseudoephedrine (4.5% vs. 5.3%); it is possible that new rules restricting access to products containing this component have resulted in decreased use.

Sex- or age-specific patterns of use were evident for many drugs. For example, use of aspirin increased considerably with age among both males and females; the prevalence in those aged 65 or older was 46% and 34%, respectively. Prevalence increased with age for almost all of the drugs in the top 30. Exceptions were several entities used to treat symptoms of allergies or the common cold, including pseudoephedrine, loratadine, and dextromethorphan. Ibuprofen was also used more commonly by younger than older subjects. The use of acetaminophen and naproxen did not differ substantially according to age, although females aged 18-44 years had the highest prevalence of acetaminophen (27%). Levothyroxine use was noticeably more common among women than men at all ages; use was reported by 17% of women aged $\geq$65 years compared to 5.4% of men in this age group. Other drugs used more by women than men included acetaminophen, ibuprofen, hydrochlorothiazide, and fluoxetine. Drugs appreciably more common in older men than older women include several used in the treatment of cardiovascular disease, hypertension, and elevated cholesterol: lisinopril, simvastatin, furosemide, warfarin, clopidogrel, ezetimibe, and losartan.

Table 1. Thirty Most Commonly Used Prescription and Over-the-Counter Drugs Taken by U.S. Adults in 2006 According to Sex and Age

	Males 18-44 (n=317)		Males 45-64 (n=421)		Males 65+ (n=304)		Females 18-44 (n=389)		Females 45-64 (n=604)		Females 65+ (n=493)		Total (n=2529)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)**
Acetaminophen	47	(16)	52	(14)	38	(13)	105	(27)	119	(21)	98	(19)	459	(19)
Aspirin	20	(7.5)	126	(29)	136	(46)	26	(7.0)	126	(19)	174	(34)	608	(18)
Ibuprofen	53	(18)	58	(15)	18	(6.9)	84	(23)	108	(20)	45	(9.8)	366	(17)
Atorvastatin	7	(2.3)	60	(13)	49	(16)	2	(0.8)	47	(7.7)	69	(14)	234	(6.7)
Hydrochlorothiaz	4	(0.6)	32	(7.5)	37	(12)	7	(1.7)	56	(8.6)	84	(17)	220	(5.9)
Levothyroxine	4	(1.3)	9	(2.6)	18	(5.4)	13	(3.2)	59	(9.5)	84	(17)	187	(5.5)
Lisinopril	4	(0.6)	34	(8.1)	47	(16)	4	(1.0)	42	(6.6)	51	(9.4)	182	(5.0)
Simvastatin	2	(1.0)	39	(9.2)	43	(15)	3	(0.9)	36	(5.1)	43	(8.9)	166	(4.8)
Naproxen	14	(4.2)	22	(5.2)	14	(4.5)	18	(4.4)	35	(5.2)	22	(4.8)	125	(4.7)
Pseudoephedrine	14	(4.0)	9	(2.5)	1	(0.4)	32	(8.1)	31	(5.7)	3	(0.7)	90	(4.5)
Metoprolol	1	(0.2)	24	(6.4)	43	(15)	1	(0.1)	22	(3.8)	56	(11)	147	(3.9)
Diphenhydramine	7	(1.5)	7	(1.7)	11	(3.9)	23	(5.9)	29	(5.5)	23	(4.2)	100	(3.8)
Metformin	1	(0.1)	28	(6.1)	14	(4.8)	4	(0.7)	35	(6.3)	25	(4.9)	107	(3.3)
Amlodipine	2	(0.2)	16	(4.1)	27	(8.7)	2	(0.3)	27	(4.5)	47	(9.2)	121	(3.2)
Atenolol	2	(0.2)	24	(6.0)	28	(10)	2	(0.8)	17	(2.9)	46	(7.8)	119	(3.2)
Fluticasone	6	(2.1)	10	(2.6)	14	(4.5)	10	(2.3)	31	(5.1)	13	(3.1)	84	(3.1)
Loratadine	8	(3.0)	14	(3.7)	0	(--)	13	(3.0)	24	(4.2)	5	(1.1)	64	(3.0)
Albuterol	7	(1.9)	3	(0.7)	9	(3.2)	10	(2.4)	30	(5.0)	11	(2.5)	70	(2.6)
Furosemide	0	(--)	8	(1.5)	36	(13)	1	(0.2)	21	(3.3)	39	(7.3)	105	(2.5)
Ezetimibe	2	(0.7)	19	(4.5)	22	(7.4)	1	(0.3)	22	(3.2)	17	(3.2)	83	(2.4)
Omeprazole	0	(--)	12	(3.0)	18	(5.8)	3	(0.7)	20	(3.4)	29	(5.3)	82	(2.2)
Salmeterol	5	(1.7)	8	(2.1)	10	(3.3)	6	(1.3)	17	(2.8)	11	(2.7)	57	(2.1)
Dextromethorphan	8	(2.2)	4	(1.0)	0	(--)	12	(3.2)	14	(2.9)	3	(0.7)	41	(2.1)
Esomeprazole	2	(0.4)	12	(2.8)	9	(3.5)	3	(0.7)	21	(3.0)	25	(5.2)	72	(2.0)
Fluoxetine	3	(1.1)	6	(1.5)	2	(0.9)	7	(2.1)	18	(2.7)	10	(2.5)	46	(1.9)
Warfarin	2	(0.3)	6	(1.7)	33	(11)	0	(--)	9	(1.2)	27	(4.5)	77	(1.8)
Valsartan	0	(--)	15	(3.7)	9	(3.3)	1	(0.2)	13	(2.0)	28	(5.8)	66	(1.8)
Lansoprazole	4	(1.7)	6	(1.3)	10	(3.2)	0	(--)	21	(3.3)	14	(3.2)	55	(1.8)
Losartan	0	(--)	14	(3.2)	17	(6.3)	0	(--)	11	(2.0)	24	(4.1)	66	(1.7)
Clopidogrel	0	(--)	12	(2.8)	25	(8.2)	0	(--)	10	(1.4)	20	(3.7)	67	(1.6)

* Weighted according to household size

** Weighted according to household size and adjusted to the age/sex distribution of the U.S. Census 2006 Population Projections.

Multivitamins (defined here as products containing at least four different vitamins) were taken in the week before the interview by 27% of subjects aged 18 or older (Table 2); the prevalence of use of any vitamin product, including multivitamins, was 41%. More women than men used these substances, and use increased with age for both sexes. The prevalence of use of herbal/natural supplements is closely similar to last year: 22% in 2006 compared to 23% in 2005. The ten most commonly used substances range from lutein (first, 9.2%) to flaxseed oil, ginkgo biloba, and ginseng (1.6% each). Fish oil and ginseng appear on the 2006 list, replacing saw palmetto and thea sinensis from 2005; although use of the latter increased from 1.1% to 1.4%, it is no longer among the top ten supplements. Use has declined for garlic: 2.6% in 2005 to 1.8% in 2006. The prevalence of use of all other entities on the list has increased since 2005, with the exception of gingko biloba, which has not changed. The age- and sex-specific results reveal some differences. Multivitamins are used by 38% of older women and 29% of older men; not surprisingly, lutein and lycopene, components of many mainstream multivitamin products, were used more commonly by older women than men: 22% vs. 12% for lutein and 17% vs. 13% for lycopene. Glucosamine, often used for joint discomfort, was taken by approximately 9% of subjects aged 65 or older; chondroitin, also used for this reason, was taken by approximately 7%. Use of flaxseed oil was nearly twice as high in older women (2.5%) as older men (1.3%). Use of herbal/natural supplements was particularly common among adults who used prescription drugs: 32% reported using at least one of these substances (data not shown).

Table 2. Vitamins and Herbal/Natural Supplements Used by U.S. Adults in 2006 According to Sex and Age

	Males 18-44 (n=317)		Males 45-64 (n=421)		Males 65+ (n=304)		Females 18-44 (n=389)		Females 45-64 (n=604)		Females 65+ (n=493)		Total (n=2529)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)**
Vitamins	**77**	**(25)**	**167**	**(39)**	**141**	**(48)**	**147**	**(36)**	**339**	**(55)**	**324**	**(63)**	**1195**	**(41)**
Multivitamins	52	(17)	118	(29)	85	(29)	96	(23)	210	(34)	198	(38)	759	(27)
Herbal/nat. supp	**40**	**(13)**	**108**	**(26)**	**79**	**(26)**	**74**	**(17)**	**183**	**(29)**	**182**	**(36)**	**666**	**(22)**
Lutein	12	(4.0)	49	(11)	39	(12)	22	(4.5)	72	(12)	113	(22)	307	(9.2)
Lycopene	18	(5.5)	47	(11)	41	(13)	18	(4.0)	64	(11)	90	(17)	278	(8.8)
Glucosamine	5	(1.5)	32	(7.5)	23	(8.6)	4	(1.4)	45	(6.3)	46	(9.4)	155	(4.7)
Fish oil	2	(0.4)	32	(6.7)	24	(8.0)	12	(3.2)	35	(5.2)	28	(5.6)	133	(4.1)
Chondroitin	4	(1.1)	19	(4.4)	18	(6.7)	2	(0.7)	25	(3.4)	34	(7.3)	102	(3.0)
Garlic	7	(1.9)	10	(2.0)	7	(2.8)	5	(0.8)	16	(2.0)	11	(2.3)	56	(1.8)
Co-enzyme Q	4	(1.2)	8	(1.9)	3	(1.1)	3	(0.6)	24	(3.3)	13	(2.0)	55	(1.7)
Flaxseed oil	0	(--)	9	(1.8)	4	(1.3)	10	(2.7)	11	(1.6)	13	(2.5)	47	(1.6)
Ginkgo biloba	4	(1.4)	12	(3.1)	3	(1.1)	3	(0.6)	13	(1.9)	9	(1.6)	44	(1.6)
Ginseng	8	(2.0)	8	(1.8)	3	(1.3)	8	(1.7)	6	(1.3)	4	(0.9)	37	(1.6)

* Weighted according to household size.

** Weighted according to household size and adjusted to the age/sex distribution of the 2006 U.S. Census Population Projections.

Reasons for Use

The ten most commonly reported reasons for use of prescription and OTC drugs (not including vitamins or herbal/natural supplements) are shown in Table 3; these reasons account for 60% of all drug use. Hypertension, the number one reason, accounted for 13%. Other reasons that accounted for a substantial proportion of total drug use included pain (7.7%), "cholesterol" (7.4%), and "heart" (6.9%). Each of the listed reasons was also in the top 10 for 2005, but some differences in rank order were observed: "heart" dropped from second to fourth, diabetes rose from eighth to sixth, and arthritis/joint problems fell from seventh to ninth. The proportion of total reasons for use accounted for by "cholesterol" increased from 6.3% in 2005 to 7.4% in 2006, and its rank went from fifth to third.

Table 3. Ten Most Commonly Reported Reasons for Drug Use During the Week Before Interview by U.S. Adults in 2006*

Reason	No.	(%)**	Rank in 2005
Hypertension	1009	13	1
Pain	584	7.7	3
Cholesterol	559	7.4	5
Heart	521	6.9	2
Headache/Migraine	429	5.6	4
Diabetes	340	4.5	8
Anticoagulation	299	3.9	6
Allergy	299	3.9	9
Arthritis/Joint Problems	289	3.8	7
Depression	233	3.1	10

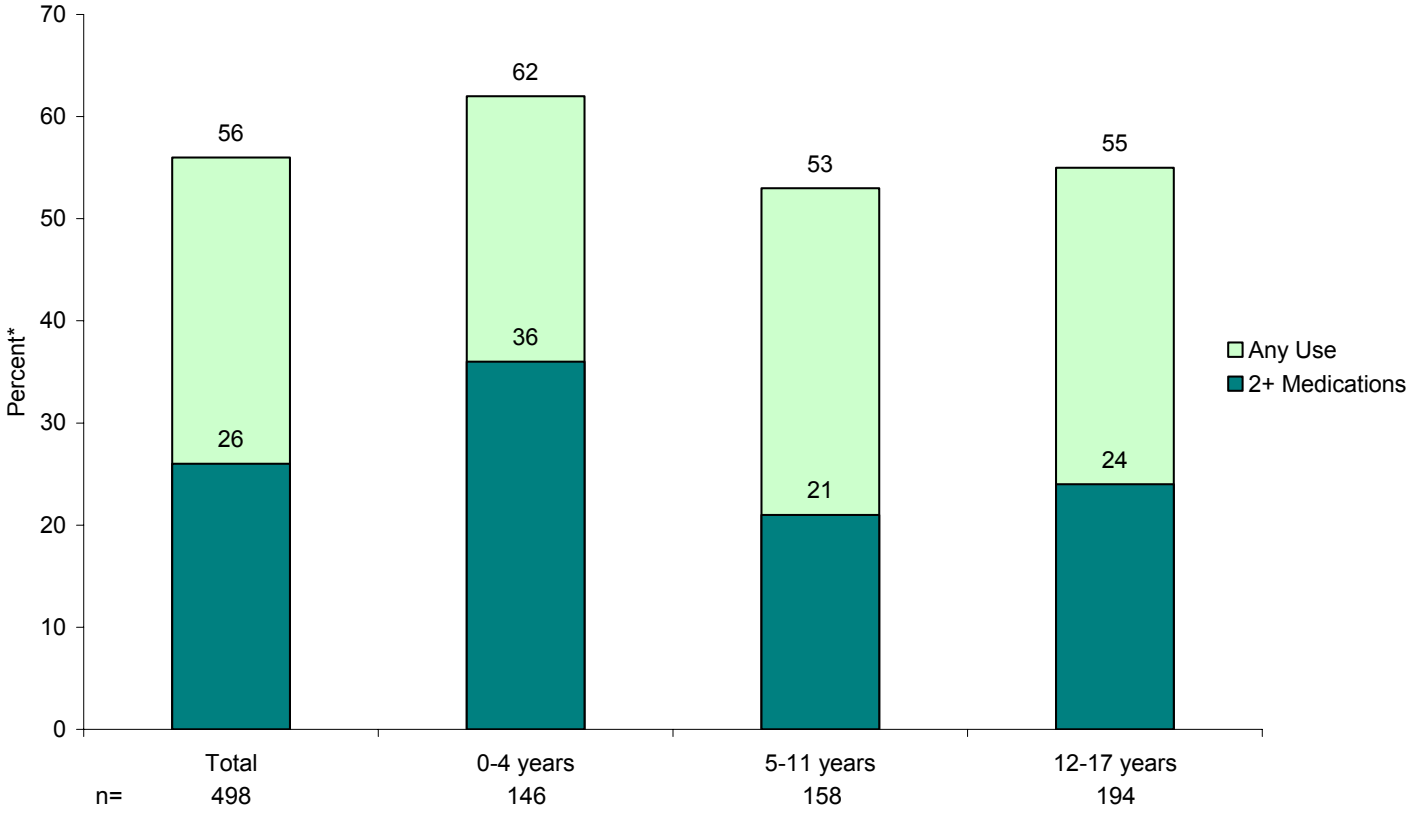
* Denominator is 7596 drugs used by 1991 subjects.
** Proportion of all reported reasons for prescription and OTC drugs.

MEDICATION USE AMONG CHILDREN

Overall Use

Overall medication use (prescription or OTC drug, vitamin/mineral, or herbal/natural supplement) during the preceding week among 498 children is shown in Figure 5. Fifty-six percent of children had taken at least one medication and 27% had taken two or more medications. These figures do not differ materially from what was observed in 2005 (54% and 28%, respectively). Prevalence of both ≥1 medication and ≥2 medications was highest in the youngest subjects, at 62% and 36%, respectively. Estimates of use for children aged 5-11 and 12-17 years were similar.

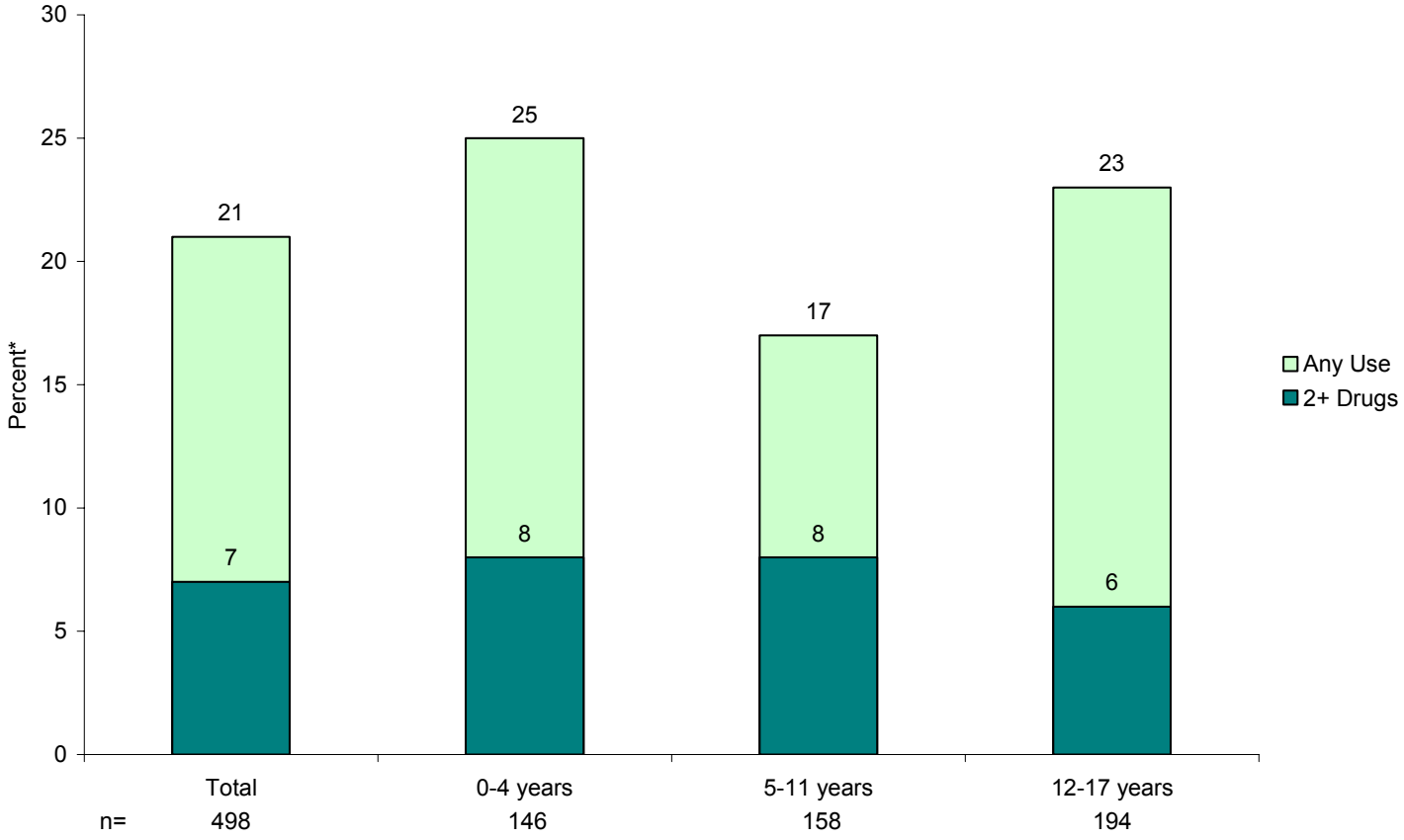
Figure 5. Use of Medications During the Preceding Week Among U.S. Children (<18 years), by Age



* Percents weighted according to household size. Percents for total sample also adjusted to the age distribution of the 2006 U.S. Census Population Projections.

Figure 6 displays use of prescription drugs among children: 21% had taken at least one prescription drug during the previous week and 7% took at least two. The overall figures do not differ substantially from the estimates in 2005, but there were some differences within the three age categories. Among children 0-4 years, use of ≥1 prescription drug increased from 18% to 25% compared to the previous year. Use of ≥2 prescription drugs also increased for this age group, from 3% to 8%.

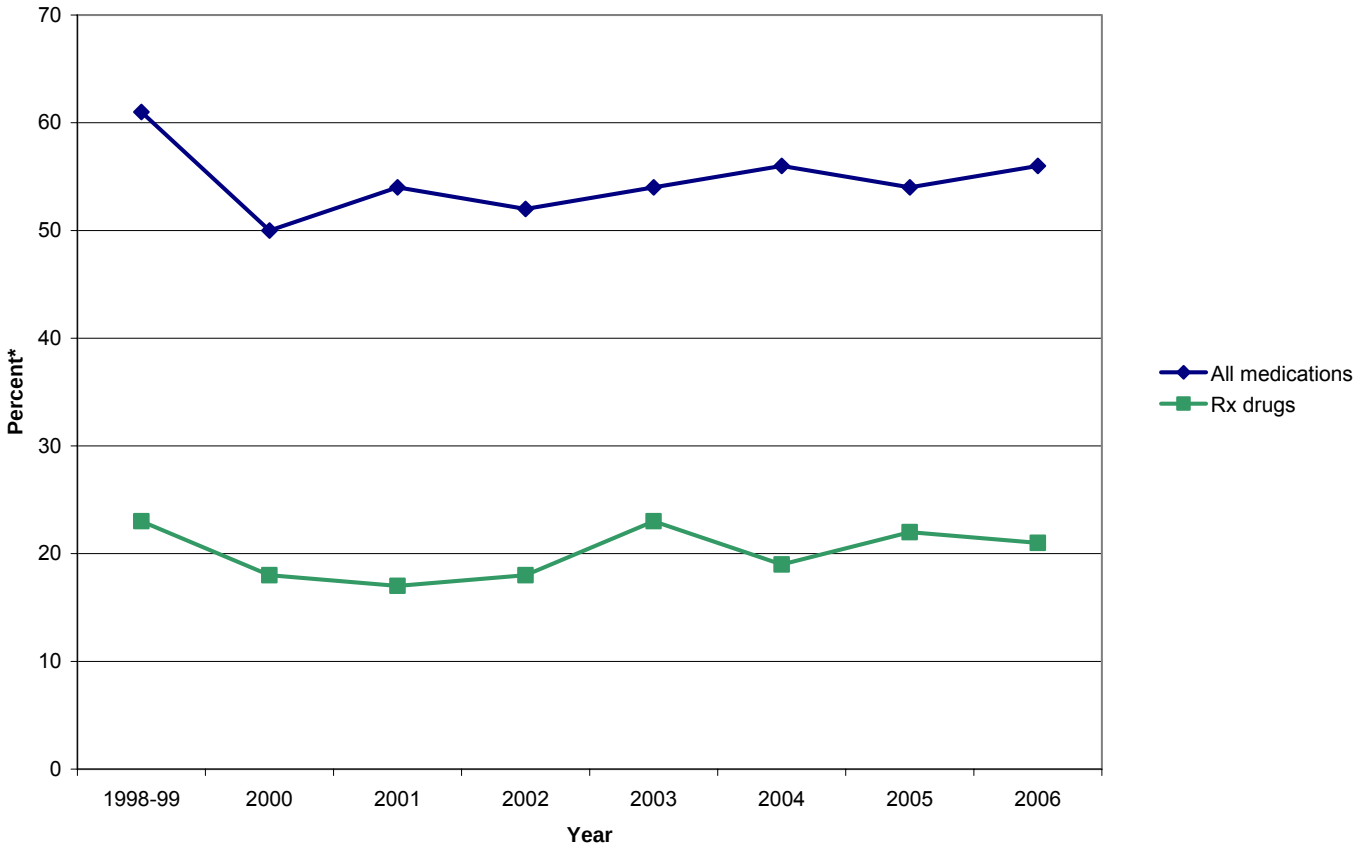
Figure 6. Use of Prescription Drugs During the Preceding Week Among U.S. Children, by Age



* Percents weighted according to household size. Percents for total sample also adjusted to the age distribution of the 2006 U.S. Census Population Projections.

Figure 7 displays the average weekly prevalence of any medication use and any prescription drug use for each year of data collection in the Survey. There were no obvious trends in use between 1998-99 and 2006.

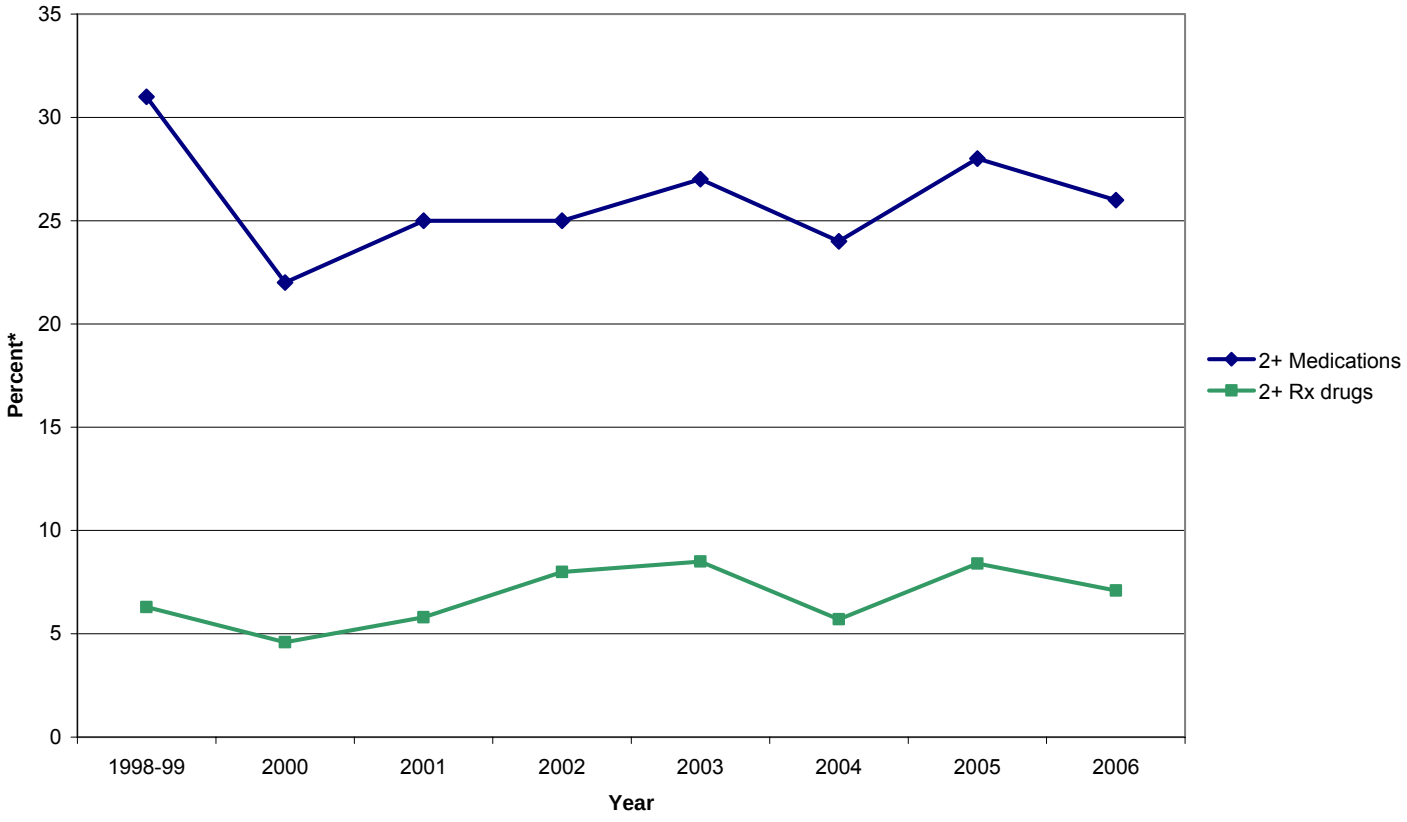
Figure 7. Use of Medications During the Preceding Week Among U.S. Children According to Year of Interview



* Percents weighted according to household size. Percents for total sample also adjusted to the age distribution of the 2006 U.S. Census Population Projections.

The average weekly use of multiple medications is shown according to year of interview in Figure 8. No clear secular patterns were observed for use of at least two medications or use of two or more prescription drugs.

Figure 8. Use of Multiple Medications During the Preceding Week Among U.S. Children According to Year of Interview



* Percents weighted according to household size. Percents for total sample also adjusted to the age distribution of the 2006 U.S. Census Population Projections.

Use of Specific Drugs, Multivitamins, and Herbal/Natural Supplements

Listed in Table 4 are the ten most commonly used prescription and OTC medication entities taken by children. The top two entities were drugs taken for pain and fever: acetaminophen (11%) and ibuprofen (8.9%). Two drugs used in the treatment of asthma, montelukast (4.1%) and albuterol (3.7%), were third and fourth on the list, although another asthma drug included in last year's list, fluticasone, is no longer in the top ten. A decongestant, pseudoephedrine, and an antihistamine, loratadine, were fifth and sixth on the list, respectively. The prevalence of use of pseudoephedrine has declined from 5.7% in 2005 to 2.8% in 2006, a larger decrease than what was observed in adults. An antibiotic, amoxicillin, ranked seventh, followed by dextromethorphan, an anti-tussive, methylphenidate (used to treat ADHD), and an antihistamine, cetirizine.

Differences in the prevalence of use according to age were observed for most of the drugs listed. Drugs with the highest prevalence in the youngest age group included acetaminophen, pseudoephedrine, albuterol, and amoxicillin; the difference was greatest for the last drug, 6.4% in the youngest compared to 0.6% in the oldest. Almost 80% of the amoxicillin use in children younger than five years was for otitis. There was no use of methylphenidate in children younger than five years. Prevalence was highest among children aged 12-17 years for ibuprofen, loratadine, and cetirizine.

Table 4. Ten Most Commonly Used Prescription and Over-the-Counter Drugs Taken by U.S. Children in 2006, by Age

Drug	0-4yrs (n=146)		5-11yrs (n=158)		12-17yrs (n=194)		Total (n=498)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)**
Acetaminophen	22	(15)	15	(9.3)	20	(11)	57	(11)
Ibuprofen	14	(9.5)	11	(5.4)	25	(12)	50	(8.9)
Montelukast	7	(4.3)	8	(4.8)	6	(3.0)	21	(4.1)
Albuterol	7	(4.5)	6	(4.1)	6	(2.8)	19	(3.7)
Pseudoephedrine	6	(4.2)	3	(2.0)	6	(2.7)	15	(2.8)
Loratadine	2	(1.1)	5	(3.0)	8	(3.7)	15	(2.7)
Amoxicillin	9	(6.4)	2	(1.0)	1	(0.6)	12	(2.3)
Dextromethorphan	3	(2.1)	4	(2.0)	6	(2.4)	13	(2.2)
Methylphenidate	0	(--)	5	(2.9)	4	(2.1)	9	(1.8)
Cetirizine	1	(1.0)	2	(1.4)	5	(2.1)	8	(1.5)

* Weighted according to household size.

** Weighted according to household size and adjusted to the age distribution of the 2006 U.S. Census Population Projections.

One fourth of children were using a vitamin product in the week before the interview (Table 5); 80% of vitamin use was in the form of multivitamins. Vitamin use was least common among children aged 12-17 years, where 18% used a vitamin and 14% used a multivitamin. Based on 20 users, the prevalence of herbal/natural supplements was 4.0%. Herbal/natural supplement use encompassed numerous individual entities. The most commonly reported were echinacea (5 users, 1.0%), and melatonin, raspberry, and vitis vinifera, each with four users. None of the other substances was reported by more than three users.

Table 5. Vitamins and Herbal/Natural Supplements Taken by U.S. Children in 2006, by Age

	0-4yrs (n=146)		5-11yrs (n=158)		12-17yrs (n=194)		Total (n=498)	
	No.	(%)*	No.	(%)*	No.	(%)*	No.	(%)**
Vitamins	**44**	**(27)**	**49**	**(30)**	**35**	**(18)**	**128**	**(25)**
Multivitamins	34	(21)	41	(25)	28	(14)	103	(20)
Herbal/natural supplements	**5**	**(3.1)**	**10**	**(6.5)**	**5**	**(2.6)**	**20**	**(4.0)**
Echinacea	0	(--)	4	(2.6)	1	(0.4)	5	(1.0)
Raspberry	2	(1.1)	2	(1.3)	0	(--)	4	(0.8)
Vitis vinifera	2	(1.1)	1	(0.7)	1	(0.5)	4	(0.8)
Melatonin	0	(--)	4	(2.6)	0	(--)	4	(0.7)

* Weighted according to household size.
** Weighted according to household size and adjusted to age distribution of the 2006 U.S. Census Population Projections.

Reasons for Use

The 10 most commonly reported reasons for use of prescription and OTC drugs are shown in Table 6; these reasons accounted for 86% of all drug use in children. The most common reason was upper respiratory infection (18%), although the proportion of all reasons for this indication declined from 23% in 2005. The next most common were allergy (14%), asthma (11%), and headache/migraine (9.3%). Although the proportion of reasons for drug use accounted for by attention deficit hyperactivity disorder had increased from 3.5% in 2004 to 7.3% in 2005, it declined to 4.4% in 2006. This change could reflect a response to warnings issued in early 2006 regarding the cardiovascular risks associated with use of stimulants to treat ADHD,[8] followed by boxed warnings later in the year.

Table 6. Ten Most Commonly Reported Reasons for Drug Use During the Week Before Interview by U.S. Children in 2006*

Reason	No.	(%)	Rank Order in 2005
Upper Respiratory Infection	69	(18)	1
Allergy	53	(14)	2
Asthma	41	(11)	4
Headache/Migraine	36	(9.3)	3
Skin Conditions	32	(8.3)	6
Fever	27	(7.0)	7
Pain	27	(7.0)	8
Attention Deficit Disorder	17	(4.4)	5
Otitis/Earache	17	(4.4)	9
Teeth/Dental	12	(3.1)	10

* Denominator is 386 drugs used by 214 subjects.
** Proportion of all reported reasons for prescription and OTC drugs.

COMMENT

Although generally similar to the U.S. population, the Slone Survey has a somewhat higher proportion of females and a higher median age. The overall prevalence estimates were standardized to the 2006 U.S. Census Population Projections to adjust for these differences. A distribution of survey participants skewed to higher socioeconomic levels is a well-known characteristic of RDD surveys, and could have affected the estimates to some degree.

Participation rates in RDD surveys have declined rather dramatically in recent year.[9] Although the Slone Survey participation rate of 51% for 2006 remains at the upper range of what has been achieved by RDD studies, it is lower than at any other period during the conduct of the Survey since 1998. Selection bias is possible insofar as medication use may differ between participants and nonparticipants. We believe that differential reporting of the use of specific products was minimized by rigorous training of interviewers and use of standardized methods. In addition, we asked subjects to confirm the names of as many medications as possible from containers and we inquired about a recent and brief period of exposure.

We conclude that the Slone Survey data from 2006 reflect medication use in the noninstitutionalized U.S. population with reasonable accuracy. The findings document the widespread use of traditional medications, vitamins, and herbal/natural supplements. Nearly one third of adult prescription medication users were also taking an herbal/natural supplement. Although the prevalence estimates of any medication use and any prescription drug use in adults have varied little between 1998 and 2006, there has been an increase in polypharmacy among adults, both for medications overall and for prescription drugs.

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