Published in final edited form as:

Med Care Res Rev. 2011 February ; 68(1): 96–111. doi:10.1177/1077558710374197.

Characterizing declines in pediatric antidepressant use after new risk disclosures

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Abstract

Steep declines in pediatric antidepressant use were documented following the 2004 release of new safety information associating antidepressants with a risk of suicidality. We examine whether declines in pediatric antidepressant use were steeper among individuals with certain clinical or family characteristics. We find that declines in antidepressant use were associated with new (as compared to ongoing) treatment episodes. Also, although rates of antidepressant use were higher among children of college educated parents prior to risk disclosures, these children were more likely to forgo antidepressant medication than children of less educated parents after risk disclosures. We find that both children with and without psychiatric impairment experienced declines in antidepressant medication use following the risk warnings, although the decline occurred more quickly in the latter group. Our findings highlight the need for additional data to assess the effects of risk disclosures on treatment patterns and health outcomes.

Keywords

FDA; black box; antidepressants; pediatric; suicidality

Risk disclosures regarding pharmaceutical treatments have become more common in recent years (Hartman, 2009), and are likely to increase if the FDA successfully implements a 'Sentinel' system to identify adverse drug events as planned (Avorn & Schneeweiss, 2009). Yet, little is known about how the release of new risk information affects treatment choices for individuals. Providers may adopt an across-the-board change in their practice style, forgoing suspected medications altogether, they may carefully consider the risks and benefits for each patient before choosing whether and which medication to use, or they may respond to individual patient preferences regarding concerns about potential risks. We examine one case study – the release of new information about pediatric antidepressant use

and suicidality risk – to better understand who is affected by new safety information. This case highlights the need for additional data on differences in treatment risk across groups and the effects of risk disclosures on treatment patterns and health outcomes.

New information surfaced in mid 2003 regarding a possible association between pediatric antidepressant use and suicidality risk. After further investigation, evidence available to the Food and Drug Administration (FDA) suggested there were possible risks associated with pediatric antidepressant use. The evidence on risks came from a meta-analysis of clinical trial data, and indicated an increased risk of suicidality in pediatric patients on antidepressants (2% in placebo versus 4% in drug arms). It is important to emphasize this evidence related to suicidality -- no trial participant committed suicide.

In response to these risks, the FDA issued several public health advisories, and made the decision to add a black box warning (BBW) to antidepressant packaging in October 2004. This was the most serious action the FDA could take short of banning pediatric antidepressant use. Media coverage of this risk disclosure was extensive, and research suggests that the media coverage emphasized the suicidality risk compared with the risks associated with untreated depression (Barry & Busch, 2010).

In response to this new risk information, there were sharp declines in pediatric antidepressant use resulting in an increase in the undertreatment of an already undertreated disease (Busch & Barry, 2009; Gibbons et al, 2007; Harris, 2004; Libby et al. 2007; Nemeroff et al. 2007; Olfson, Marcus & Druss, 2008; Rosack, 2005). Against this backdrop, and following a decade of steady reductions in youth suicide, an unexpected increase in national youth suicide rates led to speculation that the decline in antidepressant use may have played a role (Bridge, Greenhouse & Weldon, 2008). Although a causal association could not be established and other hypotheses, such as changes in youth access to firearms, the prevalence of alcohol use, or web-based social networks were posited, the coinciding trends of reductions in pediatric antidepressant use and increasing youth suicide rates raised public health concerns about the possible unintended consequences of the FDA advisories.

New Contribution

This study goes beyond previous work by examining whether clinical and family characteristics are associated with differential declines in pediatric antidepressant medication use following this risk disclosure. Specifically, we examine whether there was a differential decline in antidepressant use among new versus experienced pediatric antidepressant users, by the degree of a child's impairment, and by children with more versus less educated parents.

To our knowledge, all prior work in this area has relied on pharmacy or outpatient claims data and examines a limited subset of the population (i.e., privately insured, enrollees of a single health plan). In contrast, we use the Medical Expenditure Panel Survey (MEPS) to examine pediatric antidepressant use from 2002 through 2006. The advantage of this survey data is that more detailed information on child and parent characteristics is available, both on treated and untreated children. A second strength is that these data are from a national sample, allowing us to make national estimates of declines in pediatric antidepressant use. This information can help regulators, providers and health plans anticipate the effects of future risk disclosures, as well as provide information on how new health information is diffused more generally. This work highlights that additional data will be needed to understand differences in treatment risks (and benefits) by individual demographic and clinical characteristics, allowing new risk disclosures to be tailored to allow continued treatment use when appropriate (and discourage use when risks may outweigh benefits).

Potential Determinants of Child Antidepressant Use

We expected that patients and providers decide whether to use antidepressant medication as a treatment for children based on patient clinical characteristics and family preferences. First, we examined whether reduced utilization was due to fewer children being started on antidepressants, as compared to previously treated children stopping medication. We hypothesized that declines would be among the former group because the risk of suicidality has been estimated to be highest during the first month after starting antidepressants, and especially during the first four weeks (Jick, Kaye & Jick, 2004; Brent et al., 2009), and that known risk information, including that in the meta-analysis presented at an FDA advisory meeting, is based on clinical trial data of typically under twelve weeks' duration (Hammad, Laughren & Racoosin, 2006). Second, we explored the severity of symptoms in children forgoing antidepressants after safety warnings. Clinical trial evidence on the efficacy of SSRIs in children is limited to children with specific clinical symptoms (e.g., DSM-IV diagnosis of major depressive disorder (MDD) or Children's Depression Rating Scale-Revised score of 45 or higher). If reductions in antidepressant use were concentrated among children with less severe symptoms, the potential health impact of untreated depression would be less than if declines occurred primarily among children with greater psychiatric impairment.

We also examined whether parent characteristics play a role in how FDA safety warnings were interpreted. Prior research has suggested that more educated individuals adopt new medical technology more quickly than others (Glied & Lleras-Muney, 2003; Rosenzweig & Schultz, 1989). College-educated parents may have greater exposure or access to scientific information about drug risks, and may be more likely to make treatment decisions on the basis of this information than other parents. Conversely, more educated parents, with a heightened awareness of the effects of untreated depression on long-term outcomes, may be more reticent to forgo medication for their child. Results from this analysis can inform models of the education-health gradient and improve our understanding of the effect of education on treatment choice.

Study Data and Methods

We used the MEPS, an ongoing nationally representative panel survey of the U.S. civilian non-institutionalized population, with approximately 17,000 individuals in each cohort. A household remains in the panel for two and a half years, and is surveyed five times over that period. During each round, household respondents are asked to record all health care utilization, including prescribed medication, since the prior round. For families reporting prescription drug use, pharmacies identified by the household were contacted to identify the date a prescription was filled, national drug code (NDC), medication name, strength (amount and unit), and quantity (package size and amount dispensed). Once each year, adult household members complete a written questionnaire. We limited our sample to children, adolescents and young adults ages 5 to 21, excluding individuals without information for all survey rounds or not in their household for the entire calendar year. For our analysis of heterogeneous response by child impairment or parent education, we limit the sample to children ages 5–17 because we expect parent education to have less impact (or at least a different mechanism for impact) in children age 18 and over and because our measure of mental health impairment is not collected for individuals age 18 and over.

Measures

Antidepressant use—We created three variables reflecting each subject's antidepressant use, based on use of any of the 36 drugs mentioned in the FDA BBW (see Table 1). First, we created a dichotomous variable indicating whether the subject filled a prescription for

any antidepressant during the calendar year. The first time an individual reported using a prescription drug, they were asked 'When was the first year you took this drug?' We used this variable to categorize antidepressant users into two distinct groups: new users (those whose first experience using an antidepressant drug was in the current year) and experienced users. The latter group included individuals in the midst of a treatment episode that began in the prior year, as well as individuals beginning a new treatment episode but who had previously used an antidepressant. In the MEPS, only current users of antidepressants are asked about their medication history. Thus, we are unable to identify children who have taken an antidepressant in the past, but are not currently taking medication. These children are not 'at risk' of being new users, and, ideally, should not be included in the denominator when calculating rates of new antidepressant use. Because this is a small number of children (relative to never users), we do not expect this bias to significantly affect results.

Mental health impairment—The MEPS includes the Columbia Impairment Scale (CIS), a 13-item global measure of impairment administered to parents by a lay interviewer. Four areas of functioning are addressed: interpersonal relations, broad psychopathological domains, functioning in job or school, and use of leisure time. Items are scored on a range of 0 to 4, with total scores ranging from 0 to 52. We note that because this measure is parent reported, it is possible that some aspects of the child's mental health and functioning may be misreported, although a study by Bird et al. (1996) found that, when administered to parents (as in the MEPS), the CIS correlates with the clinicians' Children's Global Assessment Scale (CGAS) score ($r = -.58$). We used the cutoff score of ≥ 16 established by Bird and colleagues to indicate more severe psychiatric impairment. As noted above, this measure was only available for subjects ages 5–17, so we limited analyses including this variable to children within this age range.

Parents' education—We created a dichotomous variable indicating whether either the child's mother or father had a bachelor's degree or higher at the time of the survey. As we note above, analyses using this variable are limited to children in the 5–17 age range since treatment decisions for those ages 18–21 are less likely to be determined by a parent.

Other independent variables—Our model also included three age categories (age 5–9; 10–13; or 14–17), gender, whether the child had private insurance, public insurance or was uninsured, whether the child's family was low income (defined as $<200\%$ the federally defined poverty level), and whether the child's race was black, white, or other.

Estimation Strategy

We first examine unadjusted rates of decline among new users and current users with prior experience using antidepressants. Regarding the latter group, the correct estimate of the effects of the safety warning on "experienced users" would be based on a sample of children who have used an antidepressant (which includes both current and non-current prior users). Unfortunately, these data are not adequate to compute this estimate, both because there are simply too few experienced users, and because some experienced users would be misclassified as never users (if they are not currently taking antidepressants). To glean some information about rates of use among experienced users, we calculate the number of current users who have previously taken an antidepressant (or are on maintenance treatment), divided by the total sample. We refer to this group as the experienced user group although, due to the concerns noted above, we do not evaluate effects for this group in our main analyses. We calculate odds of receiving an antidepressant after the warning for the total sample and for new users.

We next estimate utilization trends by degree of child's psychiatric impairment and parent's education. We stacked the four calendar years, and included year dummies and interacted each of these characteristics with the years of our study, controlling for the other independent variables noted above.

To determine the effects on the original scale, we used the method of recycled predictions, calculating the adjusted probability of the relevant outcome for each individual in our sample, assuming the individual was treated in each of the relevant time periods (Kleinman & Norton, 2009). In all estimates, we adjust for the complex sampling strategy used in the MEPS, including the estimation weight, sampling strata, and primary sampling unit (Machlin, Yu & Zodet, 2005).

Prior studies had found steady increases in pediatric antidepressant use in the period prior to risk disclosures (Libby, Brent & Morrato, 2007). Generally, these studies estimated the impact of the new risk information by subtracting actual utilization rates from the predicted level, assuming that upward utilization trends would continue. We instead test whether utilization rates in each year of our data are statistically significantly different from 2003 utilization rates. This produced a more conservative estimate of the number of untreated children following safety warnings.

Study Results

Because the MEPS is a national sample, we find few differences in demographic characteristics across time periods (see Table 2). The unadjusted 12-month prevalence rates of antidepressant use in the pre- and post-risk disclosure periods are presented in Table 3, Row 1. Table 3, rows 2 and 3 shows the unadjusted changes in antidepressant use, stratified by new or experienced user status. Overall antidepressant use declined from 2.91% to 2.16%, a 26% reduction, with 512,182 fewer individuals treated with antidepressants. The entire decline occurred among new antidepressant users, with rates going from 1.65% to 0.87%, representing a 47% reduction. We find no evidence of declines among experienced users. Because the decline in antidepressant use was solely among new users, we focused on this group in the analyses that follow (although it is possible that there are heterogeneous effects in the population of experienced users). Table 3 indicates a similar absolute number of new and experienced users in these data. This is because, as noted above, the experienced user category only includes children with prior use who are currently on an antidepressant. Children may receive treatment and then have relatively long periods with no treatment. These children are not counted in our experienced user category.

We next examined whether there were differential declines in new antidepressant use by impairment score ($CIS \geq 16$). We run regressions for two outcomes: any antidepressant use and new antidepressant use. Full regression results are noted in Table 4. We focus on the new users here because this is where most of the declines in use occurred. To aid interpretation of the magnitude of effects, we show the adjusted probability of new antidepressant use by impairment in Figure 1. Antidepressant use declined substantially in the post risk disclosure period in both groups, although the decline started earlier and was steeper in the no impairment group (in 2004 versus 2005) as indicated in Panel A. There was almost no decline between 2003 and 2004 in the impairment group (Panel B). For the no impairment group, use declined from 0.85% in 2003 to 0.35% in 2004. Although these proportions were low, given that most individuals in the population had no impairment, this group reflects approximately half of those individuals using antidepressants. As expected, children and adolescents with impairment ($CIS \geq 16$) were more likely to use an antidepressant compared with those without, and declines were also seen in this group: antidepressant use went from 5.93% in 2003 to 2.55% in 2006.

Figure 2 indicates results examining whether there were differential declines in new antidepressant use after risk disclosure by parent education level. While both groups showed lower use of antidepressants after risk warnings, children and adolescents of more educated parents experienced significantly larger declines in antidepressant use. We found that in 2003, 1.65% of children whose parents had a college degree were new users of antidepressants, compared with 1.19% of children whose parents did not have a college degree. Antidepressant use declined by 2004 to 0.73% for children of college educated parents, and to 1.09% for children whose parents did not have a college degree. The decline for children of more educated parents was so steep that in 2004, these children had lower rates of new antidepressant use than children of less educated parents. In a robustness check, we find qualitatively similar results when reclassifying education as three levels (i.e., no high school/GED; high school graduate; some college).

Discussion

Consistent with prior research, we find that the use of antidepressant medications among children, adolescents and young adults declined significantly between 2002 and 2006, with estimates suggesting over half a million fewer individuals treated each calendar year. Preliminary evidence from this study suggests that declines in antidepressant use were almost entirely attributable to fewer newly treated individuals receiving care. We found evidence of declines in new antidepressant use among individuals both with and without psychiatric impairment, although the decline in the first year post risk disclosure was steeper in the no impairment group. In addition, children and adolescents of college educated parents appeared to have a more pronounced decline in antidepressant treatment compared with those of less educated parents. While the data presented here provide preliminary evidence of important effects, the small sample size reduces our ability to provide conclusive results. However, we note two important strengths of this study compared with prior work. First, data are derived from a national representative sample allowing us to consider effects for all children and adolescents. Second, unlike pharmacy claims data used in prior studies, we are able to examine individual and family characteristics that may affect treatment choice.

These trends highlight the need for better data on both the risks and benefits of pharmaceutical treatments, including those in patients treated with FDA-approved drugs but for off-label use. A better understanding of the risks and benefits for different subgroups of patients is also needed. At the time of this controversy, the data available to the FDA consisted mostly of clinical trial data. Clinical trials indicate average effects in a sample of patients subject to strict inclusion and exclusion criteria. However, better information on the effect of risks and benefits in heterogeneous groups of patients might have helped the FDA provide additional guidance to providers on which patients had a favorable risk/benefit profile for pediatric antidepressant use, given new safety information. In this case, the evidence on which children were most likely to experience suicidality was limited, thus it is difficult to draw firm conclusions about whether the 'correct' children opted against taking antidepressants in response to the FDA risk warning. Since 2004, significant steps have been taken to improve the types of information available to the FDA, including legislation that requires the creation of large post marketing surveillance datasets, and the development of research centers to evaluate safety information (i.e., the CERTs). These new data collection efforts should yield better information on the effects of prescription medications within heterogeneous patient populations.

In addition, data is not available to examine potential long term benefits of pediatric antidepressant use. When assessing whether to begin a child or adolescent on antidepressant medication, clinicians and families are forced to weigh the risk of suicidality against the

significant risks associated with untreated depression. Prior research indicates that pediatric depression can interfere with human capital accumulation, particularly in adolescent girls (Fletcher, 2009; Ding et al., 2009). If antidepressants are an effective treatment, reductions in their use may have long term negative effects on productivity, as well as other outcomes. Linking data on untreated depression resulting from this controversy with outcomes related to education, delinquency or productivity may yield results relevant to policymakers interested in improving access to mental health treatments for youth.

Another issue with these data is our inability to adequately identify all children who have previously used an antidepressant. The ideal data would include treatment history for all children. In addition, it would be interesting to be able to distinguish previous antidepressant users (who were not using an antidepressant in the relevant time period) from maintenance users.

Our finding related to mental health impairment should be interpreted in the context of the measure's inherent limitations within MEPS. For one, measures of impairment were taken at a single point in time, and we were unable to determine impairment status at the moment when the decision was made whether to prescribe antidepressants. That so many subjects with no measured impairment were receiving treatment may be indicative of the efficacy of treatment (and prevalence of maintenance treatment), or it may suggest that milder and less impairing conditions (e.g. adjustment disorders) were also being treated. Ideal data would have confirmation from a provider on a child's diagnosis or more objective data on clinical diagnosis at treatment initiation. We note that other studies, which use more compelling measures of clinical severity, have also found a misallocation between presence of disorder and treatment receipt (US DHHS, 1999; Currie and Stabile 2009). Also relevant, because our measure of impairment is parent-reported, there may be systematic bias across child/household characteristics – for example, more educated parents may be more likely to underreport functional impairment compared with less educated parents.

Findings related to parent education highlight the need for further study of the mechanisms driving these disparities. We cannot determine whether any educational effect detected is due to differences in the types of providers chosen by more educated parents, or differences in parent decision making. Moreover, college educated parents may be exposed to different information (perhaps due to differential exposure to news media sources), or the same information may be used differently by college educated and non-college educated parents. Regardless of the source of these differences, these findings confirm other studies, and imply that in times of increases in medical knowledge (either new technology or new risk disclosures) the education gradient related to receipt of health care treatments may be larger compared with eras with fewer advancements in medical knowledge (Aizer and Stroud, 2010; Glied and Lleras-Muney, 2008).

More generally, these analyses highlight difficulties identifying the relative importance of different inputs of medical decision making. For example, these results could be due to changes in provider prescribing behavior or a change in parent attitude toward medication. If researchers could link administrative and survey data to specific providers, one could determine if the decline in antidepressant use was due to providers changing prescribing patterns for entire patient panels or evaluating the benefit risk profile for individual patients.

Our findings provide evidence on how treatment patterns changed following the release of new risk information on pediatric antidepressant use. Whether similar effects would be found for newly identified risks of other treatments is unknown. Responses to safety warnings may differ for treatments not related to mental health disorders or for different populations (e.g., adults, pregnant women). Moreover, the risk in this case concerned a

potentially life threatening side effect. Different treatment patterns may emerge in response to disclosure of less severe risks.

As this study highlights, more research on how new risk information is incorporated into treatment decisions would be useful to better guide the FDA in future releases of safety warnings to medical professionals and the public. In addition, more information on relative safety risks is needed to allow the FDA to better target safety messages to specific groups to increase the positive health effects of the information conveyed.

Acknowledgments

This research was funded by NIMH (R01 MH080883). We thank Laura Snow for excellent research assistance.

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Figure 1.

Adjusted probability of new antidepressant use by psychiatric impairment status among children ages 5 – 17, calendar years 2002–2006

Panel A: No Psychiatric Impairment (CIS < 16)

Panel B: Psychiatric Impairment (CIS ≥ 16)

Source: Authors' calculations using 2002–2006.

Notes: MEPS = Medical Expenditure Panel Survey. Results adjusted by age, sex, low income status, race/ethnicity, and insurance status. The scale for Panel A differs from the scale for Panel B. Significance levels indicate differences between noted year and 2003.

*p < .10; **p < .05; ***p < .01.

Figure 2.

Adjusted probability of new antidepressant use by parent education among children ages 5 – 17, calendar years 2002–2006

Source: Authors' calculations using 2002–2006.

Notes: MEPS = Medical Expenditure Panel Survey. Results adjusted by age, sex, low income status, race/ethnicity, and insurance status. Significance levels indicate differences between noted year and 2003.

* $p < .10$; ** $p < .05$; *** $p < .01$.

Table 1**Drugs Included in Analysis**

Anafranil (clomipramine)
Asendin (amoxapine)
Aventyl (nortriptyline)
Celexa (citalopram hydrobromide)
Cymbalta (duloxetine)
Desyrel (trazodone HCl)
Elavil (amitriptyline)
Effexor (venlafaxine HCl)
Emsam (selegiline)
Etrafon (perphenazine/amitriptyline)
fluvoxamine maleate
Lexapro (escitalopram oxalate)
Limbitrol (chlordiazepoxide/amitriptyline)
Ludiomil (maprotiline)
Marplan (isocarboxazid)
Nardil (phenelzine sulfate)
nefazodone HCl
Norpramin (desipramine HCl)
Pamelor (nortriptyline)
Parnate (tranlycypromine sulfate)
Paxil (paroxetine HCl)
Pexeva (paroxetine mesylate)
Prozac (fluoxetine HCl)
Remeron (mirtazapine)
Sarafem (fluoxetine HCl)
Seroquel (quetiapine)
Sinequan (doxepin)
Surmontil (trimipramine)
Symbyax (olanzapine/fluoxetine)
Tofranil (imipramine)
Tofranil-PM (imipramine pamoate)
Triavil (perphenazine/amitriptyline)
Vivactil (protriptyline)
Wellbutrin (bupropion HCl)
Zoloft (sertraline HCl)
Zyban (bupropion HCl)

Table 2

Sample characteristics for subjects ages 5 – 21, calendar years 2002/2003 and 2005/2006

Variable	Total Population				Population using antidepressants			
	(1) 2002/2003		(2) 2005/2006		(3) 2002/2003		(4) 2005/2006	
	N (unweighted)	% (weighted)	N (unweighted)	% (weighted)	N (unweighted)	% (weighted)	N (unweighted)	% (weighted)
Total (N, %)	19,447	100	17,659	100	475	2.91	335	2.16
Age (N, %)								
Age 5–9	5,893	28.6	5,407	28.8	42	0.8	30	0.6
Age 10–13	4,983	24.6	4,367	23.1	117	2.5	83	2.2
Age 14–18	5,777	30.1	5,316	31.1	199	4.1	139	2.6
Age 19–21	2,794	16.7	2,569	17.0	117	4.8	83	3.9
Income (N, %)								
Low income (<200 % FPL)	10,134	37.1	9,608	36.9	259	2.6	163	1.9
Non-low income (≥200 % FPL)	9,313	62.9	8,051	63.1	216	2.9	172	2.3
Male (N, %)	9,848	51.1	8,871	50.9	214	2.5	157	2.0
Female (N, %)	9,599	48.9	8,788	49.1	261	3.3	178	2.4
Insurance status (N, %)								
Private	10,365	66.6	8,657	65.3	274	3.0	180	2.2
Public	6,641	22.9	6,974	25.4	170	3.2	138	2.4
Uninsured	2,441	10.5	2,028	9.3	31	1.7	17	1.0
Race (N, %)								
Black	3,611	15.2	3,549	15.1	38	0.9	37	1.0
White	14,404	77.5	12,743	76.6	408	3.4	276	2.4
Other	1,432	7.3	1,367	8.3	29	2.0	22	1.6
Education (N, %)								
Parents have no college degree	11,272	56.0	9,831	44.0	206	2.2	155	1.7
At least one parent has a college degree	4,710	40.7	4,551	44.0	125	2.9	80	1.8
Psychiatric Impairment (N, %)								
Poor (CIS ≥ 16)	1,555	11.2	1,347	11.5	144	11.9	99	8.3

Variable	Total Population				Population using antidepressants			
	(1) 2002/2003		(2) 2005/2006		(3) 2002/2003		(4) 2005/2006	
	N (unweighted)	% (weighted)	N (unweighted)	% (weighted)	N (unweighted)	% (weighted)	N (unweighted)	% (weighted)
Good (CIS <16)	11,712	88.8	10,862	88.5	1,420	1.2	79	0.8

Source: Authors calculations using pooled calendar years 2002/2003 and 2005/2006 MEPS data.
Note: MEPS = Medical Expenditure Panel Survey; FPL = Federal Poverty Guidelines; CIS = Columbia Impairment Scale.

Table 3

Antidepressant use for individuals ages 5 – 21, 2002/2003 and 2005/2006

	2002–2003			2005–2006			Change		
	N unweighted	% annual weighted	N annual weighted	N unweighted	% annual weighted	N annual weighted	% annual weighted	N annual weighted	% Change
(1) Any antidepressant use	475	2.91	2,004,724	335	2.16	1,492,542	– 0.76	– 512,182	–26.0
(2) New antidepressant user	266	1.65	1,139,804	140	0.87	601,431	– 0.78	– 538,373	– 47.2
(3) Experienced antidepressant user	209	1.25	864,920	195	1.28	891,111	+0.03	+26,191	+ 2.4
Total population	68,943,981			69,358,504					

Source: Authors calculations using pooled calendar years 2002/2003 and 2005/2006 MEPS data.

Note: MEPS = Medical Expenditure Panel Survey.

All estimates are for the civilian noninstitutionalized population ages 5–21 and are person weighted using MEPS sampling weights.

*p<.10; **p<.05; ***p<.01

Table 4

Use of antidepressants among children ages 5–17, 2002–2006

Variable	Logistic Regression Odds ratio (SE)	
	Any Antidepressant (N=30466)	New Antidepressant (N=30206)
Age 5–9		
Age 10–13	2.34 *** (0.47)	1.82 *** (0.41)
Age 14–17	4.14 *** (0.75)	3.05 *** (0.67)
Female	1.09 (0.14)	1.45 ** (0.22)
Private coverage	2.63 *** (0.69)	2.18 ** (0.81)
Public coverage	3.75 *** (1.09)	3.26 *** (1.32)
Uninsured		
Low income	0.73 ** (0.11)	0.76 (0.14)
Black	0.38 *** (0.13)	0.43 ** (0.16)
White	1.48 (0.44)	1.44 (0.47)
Other race		
Year 2002	0.77 (0.19)	0.71 (0.25)
Year 2003		
Year 2004	0.62 * (0.18)	0.58 (0.23)
Year 2005	0.64 (0.20)	0.40 * (0.20)
Year 2006	0.66 (0.19)	0.59 (0.25)
Psychiatric impairment	10.25 *** (2.23)	7.54 *** (2.66)
Parent has a college degree	1.36 (0.30)	1.40 (0.40)
Psychiatric impairment * Year02	1.24 (0.33)	1.50 (0.60)
Psychiatric impairment * Year03		
Psychiatric impairment * Year04	1.84 * (0.59)	2.29 * (1.02)
Psychiatric impairment * Year05	1.23 (0.43)	1.77 (1.01)
Psychiatric impairment * Year06	0.84 (0.27)	0.85 (0.44)
Parent has a college degree * Year02	1.14 (0.33)	1.16 (0.48)
Parent has a college degree * Year03		
Parent has a college degree * Year04	0.80 (0.23)	0.47 * (0.21)
Parent has a college degree * Year05	0.98 (0.33)	0.66 (0.34)
Parent has a college degree * Year06	0.76 (0.29)	0.64 (0.35)

Source: Authors' calculations using MEPS 2002–2006.

Note: MEPS = Medical Expenditure Panel Survey.

All estimates are for the civilian noninstitutionalized population ages 5–17 and are person weighted using MEPS sampling weights. Standard errors (in parentheses) are corrected for the complex design of the MEPS survey.

p<0.01,**
p<0.05,

*
p<0.1