

National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults

Ramin Mojtabai, MD, PhD, MPH,^{a,b} Mark Olfson, MD, MPH,^{c,d} Beth Han, MD, PhD, MPH^e

abstract

OBJECTIVES: This study examined national trends in 12-month prevalence of major depressive episodes (MDEs) in adolescents and young adults overall and in different sociodemographic groups, as well as trends in depression treatment between 2005 and 2014.

METHODS: Data were drawn from the National Surveys on Drug Use and Health for 2005 to 2014, which are annual cross-sectional surveys of the US general population. Participants included 172 495 adolescents aged 12 to 17 and 178 755 adults aged 18 to 25. Time trends in 12-month prevalence of MDEs were examined overall and in different subgroups, as were time trends in the use of treatment services.

RESULTS: The 12-month prevalence of MDEs increased from 8.7% in 2005 to 11.3% in 2014 in adolescents and from 8.8% to 9.6% in young adults (both $P < .001$). The increase was larger and statistically significant only in the age range of 12 to 20 years. The trends remained significant after adjustment for substance use disorders and sociodemographic factors. Mental health care contacts overall did not change over time; however, the use of specialty mental health providers increased in adolescents and young adults, and the use of prescription medications and inpatient hospitalizations increased in adolescents.

CONCLUSIONS: The prevalence of depression in adolescents and young adults has increased in recent years. In the context of little change in mental health treatments, trends in prevalence translate into a growing number of young people with untreated depression. The findings call for renewed efforts to expand service capacity to best meet the mental health care needs of this age group.



Departments of ^aMental Health, Bloomberg School of Public Health, and ^bPsychiatry and Behavioral Sciences, School of Medicine, Johns Hopkins University, Baltimore, Maryland; ^cDepartment of Psychiatry, College of Physicians and Surgeons, Columbia University; ^dNew York State Psychiatric Institute, New York, New York; and ^eSubstance Abuse and Mental Health Services Administration, Rockville, Maryland

Dr Mojtabai conceptualized and designed the study, accessed data, carried the analyses, and drafted the initial manuscript; Drs Olfson and Han consulted with the research team in the design of the study and interpretation of the results, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

DOI: 10.1542/peds.2016-1878

Accepted for publication Aug 30, 2016

Address correspondence to Ramin Mojtabai, MD, PhD, MPH, 624 North Broadway, Rm 797, Baltimore, MD 21205. E-mail: rmojtab1@jhu.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2016 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

WHAT'S KNOWN ON THIS SUBJECT: There is evidence of increased prevalence of depressive symptoms in adolescents in industrialized countries in past 3 decades. Recent suicide trends in the United States suggest that depression in adolescents and young adults may have continued to increase.

WHAT THIS STUDY ADDS: This study provides data on recent trends in major depressive episodes in adolescents and young adults overall and in sociodemographic subgroups, as well as trends in depression treatment seeking and types of treatment.

To cite: Mojtabai R, Olfson M, Han B. National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults. *Pediatrics*. 2016;138(6):e20161878

The risk of depression sharply rises as children transition to adolescence.¹ In the US National Comorbidity Survey (NCS)-Adolescent Supplement of 2001 to 2004, 11.7% of adolescents 13 to 18 years of age met criteria for a lifetime major depressive disorder or dysthymia.¹ Reports of increasing antidepressant medication use by adolescents before the Food and Drug Administration (FDA) 2003 black-box warning^{2,3} and indirect evidence of increased lifetime prevalence of major depressive disorder in successive birth cohorts⁴ have raised concerns about increasing prevalence of depression among adolescents. Yet, there is little direct information from the United States on national trends in prevalence of depression in adolescents and young adults.

Studies of trends in depression from other industrialized countries have produced mixed results.⁵ Although studies based on rating scales of depressive symptoms showed an increasing trend over the past 3 decades,^{6–13} a 2006 meta-analysis of 26 epidemiologic studies on rates of current depressive disorder among adolescents found no significant change between the mid-1960s and mid-1990s.¹⁴ A more recent study¹⁵ found a declining prevalence of severe impairment among US adolescents from 1996–1998 to 2010–2012.¹⁵ However, this study did not assess trends in specific disorders and was based on parent reports.

Examining temporal trends in prevalence of depression among young people has implications for evaluating whether they have benefited from increasing use of mental health treatments.¹⁶ Characterization of national trends in depressive disorders and their treatment could also inform community efforts to improve access to mental health services for young people. In the current study, we used data from the 2005 to 2014 National

Surveys on Drug Use and Health (NSDUH) on adolescents and young adults to examine trends in 12-month major depressive episodes (MDEs), controlling for sociodemographic characteristics and substance use disorders. We further examined trends in prevalence of MDEs in different sociodemographic groups and trends in mental health service use among adolescents and young adults with MDEs. The study period covers years following the FDA black-box warning regarding antidepressant use in youth. Stratified regression analyses are examined for trends in prevalence according to sex, race/ethnicity, age, income group, and substance use disorders. Trends in service use also are evaluated by type of provider, type of setting, use of psychiatric medications, continuation of treatment, and perceived helpfulness of treatments.

METHODS

Sample

The NSDUH is a cross-sectional annual survey of the US population in all 50 states and the District of Columbia sponsored by Substance Abuse and Mental Health Services Administration. It provides nationally representative data on MDE and its treatment among the civilian noninstitutionalized population aged 12 or older. Persons without a household address (eg, homeless persons not living in shelters), active-duty military, and institutional residents are excluded. Interviews are conducted by using computer-assisted interviewing. The NSDUH data collection protocol was approved by the institutional review board at RTI International (Research Triangle Park, NC). NSDUH oversamples adolescents and young adults.

Overall, 176 245 adolescents aged 12 to 17 and 180 459 adults aged 18 to 25 were interviewed in the

NSDUH 2005 to 2014 and their data are available in public use files. The annual mean weighted response rate of the 2005 to 2014 NSDUH was 65.2%¹⁷ according to Response Rate 2 of the American Association for Public Opinion Research.¹⁸ Of those interviewed, 172 495 (98.9%) adolescents and 178 755 (99.1%) young adults responded to structured interview questions for 12-month MDE and comprised the study samples.

Assessments

Lifetime and 12-month MDE were assessed using a structured interview based on the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* criteria. Participants were next asked whether they had experienced an episode in the past year. Questions were adapted from the depression section of the NCS-Replication.⁴ Although the validity of the NSDUH major depressive disorder instrument has not been assessed, the validity of the NCS-Replication in adults and adolescents has been assessed.^{1,16} In a test-retest reliability study of NSDUH interviews, the κ values for the of past-year MDE ranged from 0.52 in adults to 0.72 in adolescents,¹⁹ representing “moderate” to “substantial agreement,” respectively.²⁰

Treatments for depression were assessed by asking whether during the past 12 months participants had seen or talked to a medical doctor or other professional about their depressive symptoms. Types of professionals were aggregated into mental health providers (psychologist, psychiatrist, or psychotherapist; social worker; counselor, other mental health professional), general medical providers (general practitioner or family doctor; other medical doctor; a nurse, occupational therapist, or other health professional), and complementary/alternative medicine

(CAM) providers (eg, a religious or spiritual advisor; alternative healers, such as an herbalist). Participants were next asked if they were currently receiving treatment or counseling. In addition, participants were asked if during the past 12 months they had taken medication that was prescribed for their depression and whether they were taking such medication at the time of interview. Two further questions assessed how much treatment or counseling had helped and how much prescription medication had helped, with responses ranging from “not at all” to “extremely.” Questions regarding treatment of depression were asked only among participants with positive responses to the MDE questions.

Treatment setting was assessed only in adolescents by a series of questions concerning where they received “treatment or counseling in the past 12 months for emotional or behavioral problems that were not caused by alcohol or drugs.” Participants were further asked about the reason for their service use. Although these questions were not limited to participants with MDE, in our analyses we examined only settings in which adolescents had sought care because they had “felt depressed.” The settings included “a private therapist, psychologist, psychiatrist, social worker, or counselor,” “a mental health clinic or center,” “a partial day hospital or day treatment program,” and staying overnight in “any type of hospital” or in “a residential treatment center.” Participants were also asked about treatment from “an in-home therapist, counselor, or family preservation worker” and from “a school social worker, a school psychologist, or a school counselor.” The wording of questions regarding school services changed in 2009. Therefore, we examined this question using the 2009 to 2014 NSDUH data.

Treatment seeking for any mental health problems was assessed differently in adolescents and young adults. All adolescent participants were asked if they had received care for “emotional or behavioral problems that were not caused by alcohol or drugs.” Similarly, all adult participants were asked if they had received treatment or counseling for “problems with emotions, nerves or mental health,” excluding treatment of alcohol or drug use. We limited the analyses of these questions to participants with 12-month MDE.

Substance use disorder ratings were based on individual diagnostic criteria from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* on past 12-month abuse and dependence of alcohol, marijuana, and other drugs (including cocaine, hallucinogens, heroin, inhalants, non-medically used prescription pain relievers, sedatives, tranquilizers, or stimulants). Substance use disorders were categorized into alcohol use disorder only, cannabis use disorder (without alcohol use disorder), other drug use disorder (without alcohol use disorder), and any drug use disorder with alcohol use disorder.

Information also was collected on participant age, sex, race/ethnicity, annual family income, student status, parents in the household (for adolescents), employment status (for those aged 14+) and marital status (adults).

Statistical Analyses

Analyses were conducted in 3 stages. First, trends in the prevalence of 12-month MDE across the 10 years of NSDUH were assessed by using adjusted binary logistic regression models. The adjusted model included sociodemographic variables and substance use disorders in addition to the survey year variable. Because the association between survey year and 12-month MDE did not appear to be linear in preliminary analyses, the

mvars routine of Stata 14 (Stata Corp, College Station, TX) for regression spline was used to fit the data (see Supplemental Information).²¹

Second, we conducted stratified analyses and interaction tests to examine whether the observed trends in 12-month MDE were consistent across major sociodemographic groups. The transformed predictor variables obtained in the first stage of the analyses were used as predictors in the stratified analyses.

In the third stage, we examined trends in depression treatment overall and by provider type and setting by using binary logistic models. Trends in perceived helpfulness of treatments were similarly assessed. These analyses were limited to respondents with 12-month MDE. In addition to sociodemographics and substance use disorders, these models adjusted for health insurance coverage and receipt of substance use disorder treatment.

All analyses were conducted by using Stata 14, taking into account the complex survey design and sampling weights of NSDUH; α was set at $P < .01$.

RESULTS

Of the 172 495 adolescents and 178 755 young adults who responded to 12-month MDE questions, 15 529 (8.7%) and 15 603 (8.6%), respectively, met criteria for 12-month MDE. Background characteristics by MDE are presented in Supplemental Table 4. In comparison with adolescents without MDE, those with MDE included a disproportionate number of older adolescents, nonstudents, unemployed individuals, adolescents from households with no parents or with single parents, and adolescents with substance use disorders. Adolescents with MDE also were less

likely to be boys than girls and non-Hispanic black than non-Hispanic white (Supplemental Table 4). The sociodemographic correlates of MDE in young adults were somewhat similar to those in adolescents. Compared with young adults without MDE, those with 12-month MDE were proportionately less likely to be men and non-Hispanic black compared to non-Hispanic white and more likely to have a substance use disorder. Young adults with 12-month MDE were also more likely to be unemployed or employed part-time, compared to employed full-time; widowed, divorced or separated, or never married, compared to married or living as married; and less likely to have an annual family income of \$20 000 to \$75 000, compared to <\$20,000 (Supplemental Table 4).

In adolescents, the prevalence of 12-month MDE was stable over the 2005 to 2011 period; however, it gradually increased in later years (Fig 1), growing from 8.7% (2005) to 11.3% (2014) corresponding to a 37% increase in odds (odds ratio [OR] 1.37, 95% confidence interval [CI] 1.27–1.48, $P < .001$). These proportions translate into an increase of more than a half million adolescents with 12-month MDE between 2005 (approximately 2 200 000) and 2014 (approximately 2 700 000). The change was more modest for the young adult group: from 8.8% to 9.6% (OR 1.13, 95% CI 1.05–1.22, $P = .001$).

A spline regression model with 2 basis functions provided the best-fitting model for both adolescents and young adults (see Supplemental Information). These transformed predictors were used in the regression models, the results of which are presented in Table 1.

For adolescents, a similar increasing trend was observed across age, income, and substance use disorder strata (Table 1); however, the trend was somewhat stronger among girls than boys, with the interaction

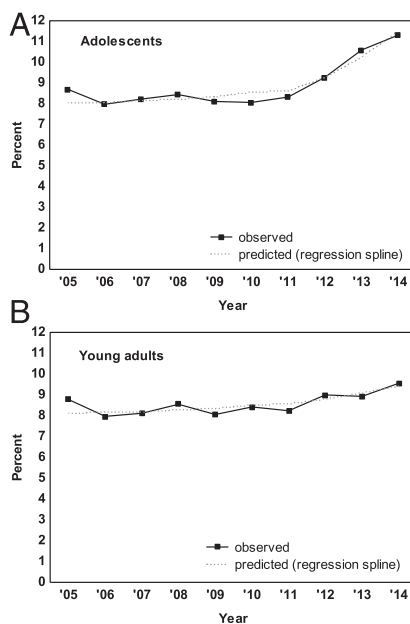


FIGURE 1 Prevalence of 12-month MDEs in adolescents (A) and young adults (B) in the United States based on the 2005 to 2014 NSDUH. The predicted value lines are based on regression spline (see text and Supplemental Information for detail).

test approaching significance ($P = .020$). Among girls, the prevalence of 12-month MDE increased from 13.1% (2004) to 17.3% (2014); whereas, among boys the prevalence increased from 4.5% (2004) to 5.7% (2014) (Table 1). Furthermore, the increasing trend was smaller and statistically nonsignificant in non-Hispanic black adolescents, although the interaction test for race/ethnicity was not statistically significant (Table 1).

Among young adults, the increasing trend in prevalence of 12-month MDE was limited to those in the 18 to 20 age range (Table 1). The prevalence did not appreciably change in the 21 to 25 age range. The interaction test with age group was statistically significant ($P < .01$). Furthermore, the trend was statistically significant only among the non-Hispanic whites. However, the interaction test with race/ethnicity only approached a trend-level statistical significance ($P = .012$).

The proportion of adolescents with 12-month MDE who received mental health counseling or treatment in the past 12 months for their depression from any type of provider did not significantly change over the 2005 to 2014 period (Table 2). However, a larger proportion of adolescents with 12-month MDE reported care from specialty mental health providers, in private mental health care settings, in inpatient or day treatment settings, and in multiple settings. Furthermore, adolescents with 12-month MDE who had received any treatment or counseling in the past year were more likely in recent years to report being currently in treatment. A larger proportion of adolescents with 12-month MDE also reported receiving prescription medication for their depression in recent years. There was no significant trend in the percentage of adolescents who perceived treatment overall or medication treatment as helpful (Table 2).

There were fewer statistically significant changes in treatment seeking over time among young adults (Table 3). Only the proportion of young adults with 12-month MDE who received depression care from specialty mental health care providers increased significantly over the study period.

DISCUSSION

Each year almost 1 in 11 adolescents and young adults have an MDE. The prevalence of these episodes increased between 2005 and 2014. The trend was limited to those in the 12 to 20 age range, and was somewhat more prominent among non-Hispanic whites than minority groups and among adolescent girls than boys.

Adjusting the analyses for sociodemographic and household factors that have been previously found to be associated with adverse mental health outcomes in

TABLE 1 Trends in 12-Month MDEs in Adolescents (n = 172 495) and Young Adults (n = 178 755) in the United States, Stratified According to Major Sociodemographic Groups

	Percent of Participants in Each Survey Year Meeting Criteria for 12-mo MDEs										Main Effect ^{a,b}			Interaction ^c		
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2014	Wald Test	P	Wald Test	P	
All adolescent participants	8.7	8.0	8.2	8.4	8.0	8.0	8.3	9.3	10.6	11.3	99.82	<.001	<.001	— ^d	— ^d	
Age, y																
12–13	5.6	5.3	4.3	5.1	4.5	4.2	4.2	5.6	5.9	7.2	21.15	<.001	<.001			
14–15	9.1	7.8	8.6	8.5	8.6	9.0	8.7	10.1	12.1	11.8	39.24	<.001	<.001			
16–17	11.2	10.6	11.6	11.0	10.5	10.6	11.7	11.9	13.4	14.7	39.60	<.001	<.001	1.90	.115	
Sex																
Girls	13.1	11.9	12.1	12.6	11.3	12.0	12.1	14.2	16.1	17.3	98.75	<.001	<.001			
Boys	4.5	4.2	4.6	4.3	4.9	4.2	4.7	4.6	5.2	5.7	10.09	<.001	<.001	4.06	.020	
Race/ethnicity																
Non-Hispanic white	9.0	8.0	8.9	8.8	8.2	8.6	8.9	9.5	10.9	12.1	60.97	<.001	<.001			
Non-Hispanic black	7.2	6.9	6.9	7.5	7.3	6.4	7.1	7.9	8.3	8.9	3.79	.026	.026			
Hispanic	9.4	8.1	7.5	7.2	8.1	8.0	7.6	10.5	10.5	11.2	15.84	<.001	<.001			
Non-Hispanic other	7.5	9.6	6.9	10.0	7.9	6.7	8.7	7.1	12.5	10.9	7.47	<.001	<.001	0.57	.757	
Family income, \$																
<20 000	9.1	7.5	7.9	8.4	6.8	7.8	8.5	10.9	10.0	11.0	13.75	<.001	<.001			
20 000–49 999	9.1	9.5	9.4	8.8	8.6	8.6	9.4	9.1	10.6	11.5	13.09	<.001	<.001			
50 000–74 999	9.7	7.1	7.4	7.9	8.5	9.3	7.5	9.7	12.6	12.3	30.05	<.001	<.001			
75 000+	7.4	7.2	7.8	8.2	7.9	6.8	7.6	8.5	9.9	10.9	39.56	<.001	<.001	1.38	.228	
12-mo substance use disorder																
Alcohol use disorder	21.1	17.8	19.6	23.6	21.5	22.5	23.1	26.8	31.5	29.0	12.19	<.001	<.001			
Cannabis use disorder	22.9	18.1	17.7	18.7	18.5	13.9	16.5	20.1	23.3	23.5	3.38	.038	.038			
Other drug use disorder	24.0	26.5	35.9	34.0	35.2	38.2	28.9	43.8	35.1	39.0	3.42	.036	.036			
Drug use disorder with alcohol use disorder	27.3	21.2	24.6	30.1	23.7	28.0	28.1	32.4	36.5	35.3	4.18	.018	.018			
No substance use disorder	7.6	7.0	7.1	7.1	7.1	6.9	7.3	8.2	9.6	10.4	83.18	<.001	<.001	1.94	.149	
All young adult participants	8.8	8.0	8.1	8.6	8.1	8.4	8.2	9.0	8.9	9.6	19.97	<.001	<.001	— ^d	— ^d	
Age, y																
18–20	8.9	7.5	7.1	8.8	7.9	8.4	8.8	9.4	9.5	10.1	19.88	<.001	<.001			
21–25	8.7	8.3	8.4	8.2	8.4	7.9	7.9	8.8	8.6	9.3	4.64	.012	.012	6.43	.002	
Sex																
Women	11.9	10.3	10.8	11.6	10.6	11.8	10.9	11.9	11.9	11.8	8.07	<.001	<.001			
Men	5.7	5.7	5.5	5.5	5.5	5.2	5.6	6.1	6.0	7.4	13.03	<.001	<.001	4.01	.021	
Race/ethnicity																
Non-Hispanic white	9.5	8.6	9.0	8.8	9.0	8.8	9.0	10.0	10.2	11.1	29.12	<.001	<.001			
Non-Hispanic black	6.6	7.3	6.5	6.5	6.1	8.1	5.7	5.9	5.8	6.1	0.84	.435	.435			
Hispanic	8.1	6.2	6.5	9.2	6.7	7.6	7.4	8.5	7.4	7.8	0.22	.800	.800			
Non-Hispanic other	8.0	7.9	7.5	8.6	7.4	7.4	9.1	8.8	9.3	9.9	3.59	.031	.031	2.89	.012	
Family income, \$																
<20 000	9.3	8.4	9.2	9.1	8.8	8.9	8.6	9.7	9.6	10.0	4.34	.015	.015			
20 000–49 999	8.8	8.0	7.9	8.5	7.7	8.3	8.4	8.8	8.6	8.9	3.41	.037	.037			
50 000–74 999	8.5	7.0	6.4	7.5	8.1	7.0	8.1	8.0	7.5	9.1	2.90	.059	.059			
75 000+	8.0	7.9	8.2	8.7	7.6	8.9	7.4	8.9	9.5	10.2	10.26	<.001	<.001	0.80	.570	
12-mo substance use disorder																
Alcohol use disorder	14.0	15.4	14.4	14.4	14.3	13.8	13.4	17.9	17.4	17.2	5.37	.006	.006			
Cannabis use disorder	15.0	11.3	12.7	14.9	12.8	16.0	13.2	13.3	15.4	18.3	2.47	.090	.090			

TABLE 1 Continued

	Percent of Participants in Each Survey Year Meeting Criteria for 12-mo MDEs											Main Effect ^{a,b}			Interaction ^c	
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Wald Test	P	Wald Test	P		
Other drug use disorder	24.8	19.4	16.7	24.4	19.9	21.2	23.4	18.9	22.5	28.1	1.45	.239				
Drug use disorder with alcohol use disorder	18.3	21.0	19.0	19.4	20.9	20.3	17.1	22.7	25.3	24.3	3.59	.031				
No substance use disorder	7.1	6.0	6.5	6.8	6.5	6.9	7.0	7.1	7.2	7.9	11.15	<.001	0.64	.527		

Data source: The 2005–2014 NSDUH.

^a Adjusted for age, sex, race/ethnicity, income, student status, presence of parents in household and substance use disorders in analyses for adolescents and for age, sex, race/ethnicity, income, marital status, employment, student status, and substance use disorders in analyses for young adults.

^b Adjusted Wald F test for the predictors from the logistic regression model. In these models, 12-mo MDE was parameterized by a regression spline with 2 basis functions and 1 knot automatically selected at position 8 on the predictor variable (corresponding to year 2012) in adolescents and a regression spline with 2 basis functions and 1 knot automatically selected at position 3 (corresponding to year 2007) in young adults (see Appendix 1 for detail).

^c Based on adjusted Wald F test for the interaction of each variable with the predictors from the spline regression model.

^d Interaction tests examine variations in trend among subgroups and cannot be computed for whole group.

adolescents, such as single parent homes or income, did not account for the increasing trend in depression. Furthermore, the trends could not be explained by any changes in prevalence of substance use disorders as the analyses adjusted for alcohol and nonalcohol drug abuse and dependence. Analyses of NSDUH and other US surveys have not identified any meaningful increase in prevalence of substance use or misuse among adolescents over the period covered by this study.^{17,22}

The trends in adolescents were different among boys and girls. This aligns with past studies that also found a larger increase in depressive symptoms in girls than boys in more recent years,⁵ and recent data on trends in suicide in the United States that identified a greater increase among adolescent girls and young women.²³ Adolescent girls may have been exposed to a greater degree to depression risk factors in recent years. For example, cyberbullying may have increased more dramatically among girls than boys.²⁴ As compared with adolescent boys, adolescent girls also now use mobile phones with texting applications more frequently and intensively²⁵ and problematic mobile phone use among young people has been linked to depressed mood.²⁶ Interestingly, the sex differences in trends were not consistent across age groups, as the prevalence of depression followed similar temporal trends in young men and women.

The differences in trends may also represent an increase in prevalence of stressful reactions and behaviors that have similar features to depression. For example, there is some evidence that the prevalence of nonsuicidal self-injury,^{27–29} which has some similar features to MDEs and may be comorbid with depressive episodes, has increased in recent years, especially in adolescent girls.³⁰ However, the extent to which the observed temporal trends in

MDEs are confounded by such stress reactions is difficult to ascertain in NSDUH, as the survey only assessed MDEs.

The causes of the observed trends remain elusive. These trends coincided with a major economic downturn that affected the mental health of all ages in many communities.^{31–35} However, consistent with a previous report of no change in the prevalence of adult MDE in the United States over a similar time period,³⁶ no change in the prevalence of MDE was noted in the 21 to 25 age range.

We did not observe many significant changes in mental health treatment among adolescents and young adults with 12-month MDE over the 2005 to 2014 period. The use of specialty mental health providers increased in both age groups and the use of inpatient and day treatment settings, as well as medication, increased in adolescents. Most of the increases in the use of these services were limited to the years after 2011. This is broadly consistent with previous evidence indicating that clinician diagnoses of mental disorders, use of psychotherapy, and visits to psychiatrists did not appreciably change between 2003 and 2010.³⁷ In view of the growing prevalence of MDE in these age groups, stable treatment rates translate into a growing number of untreated depressed adolescents. These trends suggest that little progress has been made in narrowing the mental health treatment gap for adolescent depression. This lack of progress may reflect lingering reluctance on the part of providers to diagnose and treat depression in the wake of the FDA’s black-box warning regarding the use of antidepressants.^{2,3}

Most adolescents receive routine primary care in pediatric settings, providing opportunities to detect and treat depression. There also

TABLE 2 Trends in Treatment Seeking in Adolescents With 12-Month MDEs in the United States (n = 15 529)

Participant Groups	Survey Year										Test of Temporal Trend		
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	AOR	99% CI	P
Treatment seeking for any mental health problems	36.4	37.2	37.2	39.2	32.3	36.4	35.4	36.4	36.9	42.0	1.14	0.96–1.36	.043
Type of provider seen for depression care													
Specialty mental health	30.0	29.1	30.6	29.3	27.3	29.5	30.6	30.5	30.2	34.3	1.19	1.00–1.42	.009
General medical	10.2	10.4	12.3	11.3	9.7	10.5	11.5	10.3	9.8	11.7	1.04	0.77–1.40	.740
GAM	5.9	7.4	6.0	6.5	4.1	5.5	6.6	5.3	4.3	5.7	0.80	0.49–1.30	.227
Any type of provider	34.3	36.1	36.1	34.4	32.4	35.8	36.0	35.0	34.2	38.6	1.11	0.93–1.34	.127
Treatment setting for depression care													
Private mental health care provider	21.3	23.7	23.7	22.7	19.0	22.8	21.5	23.2	24.3	29.0	1.33	1.08–1.64	<.001
Mental health clinic	8.1	7.6	7.6	7.4	6.6	7.8	7.7	7.7	8.5	10.8	1.39	1.00–1.93	.010
Day treatment	3.6	4.1	4.4	3.0	3.1	3.6	5.3	5.3	5.3	5.8	1.58	1.03–2.44	.006
Inpatient	3.1	2.8	3.0	3.3	3.6	3.1	3.4	3.2	3.5	5.5	1.78	1.13–2.80	.001
Residential	2.1	2.3	1.5	1.3	1.5	1.7	2.1	2.8	1.9	3.2	1.81	0.92–3.58	.024
In home	5.5	6.7	6.3	7.4	5.4	5.7	6.0	7.5	5.6	7.9	1.25	0.85–1.82	.132
School counseling	— ^a	— ^a	— ^a	— ^a	14.9	14.3	14.8	15.8	15.6	18.6	1.63	0.92–2.89	.028
Multiple settings ^b	11.4	12.9	12.7	12.7	10.6	12.4	12.5	14.2	14.1	17.1	1.52	1.15–2.00	<.001
Use of prescription medication for depression	16.5	14.6	17.8	15.5	14.1	16.2	15.3	15.8	16.9	20.0	1.31	1.02–1.68	.006
Currently receiving treatment or counseling ^c	38.4	39.1	44.3	41.7	39.3	43.8	42.5	48.9	42.9	50.7	1.48	1.14–1.94	<.001
Currently taking prescription medication ^d	67.7	67.4	67.3	63.7	66.7	67.1	72.8	72.7	61.1	68.7	1.18	0.78–1.79	.293
Treatment or counseling helpful ^e	32.9	35.2	33.9	36.7	36.4	36.6	38.1	37.9	36.1	36.1	1.10	0.82–1.47	.367
Prescription medication helpful ^f	47.2	45.9	43.9	44.3	43.4	41.4	44.0	47.1	43.6	37.7	0.84	0.56–1.26	.261

Data source: The 2005–2014 NSDUH.

AOR, adjusted OR. ORs and AORs were estimated in binary logistic regressions with the variable of survey year transformed to a variable ranging from 0 (for 2005) and 1 (for 2014). Thus, AORs represent change in odds over the whole study period. Variables of age, sex, race/ethnicity, student status, family income, parents' presence in the household, substance use disorders, substance use treatment and any health insurance were included in the models.

^a Questions regarding school counseling in NSDUH changed in 2009. As a result, data on school counseling for years 2005–2008 were not included in the analysis of temporal trends for this type of care.

^b Includes any combinations of private mental health provider; mental health clinic, day hospital, inpatient, residential, and in-home settings.

^c Among participants who received any counseling or therapy for depression in the past year.

^d Among participants who took any prescription medication for depression in the past year.

^e Among participants who received any counseling or therapy for depression in the past year. Helpful was defined as reporting that treatment or counseling helped “a lot” or “extremely.”

^f Among participants who took any prescription medication for depression in the past year. Helpful was defined as reporting that prescription medication helped “a lot” or “extremely.”

TABLE 3 Trends in Treatment Seeking in Young Adults With 12-Month MDEs in the United States (n = 15 603)

Participant Groups	Survey Year										Test of Temporal Trend		
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	AOR	99% CI	P
Treatment seeking for any mental health problems	28.2	24.9	25.6	25.2	29.2	27.1	28.9	29.0	28.8	29.7	1.13	0.92–1.39	.131
Type of provider seen for depression care													
Specialty mental health	30.8	29.1	27.2	27.5	29.7	31.7	31.9	32.6	35.4	34.1	1.26	1.03–1.53	.003
General medical	22.6	23.4	22.8	21.1	22.5	22.7	20.7	23.4	19.1	22.4	0.91	0.75–1.10	.206
CAM	10.2	7.8	7.6	8.7	6.9	9.0	8.1	8.8	8.6	9.8	1.06	0.74–1.53	.672
Any type of provider	44.8	43.2	41.2	40.5	43.3	45.8	44.0	46.5	45.6	46.1	1.13	0.94–1.35	.084
Use of prescription medication for depression	30.9	29.7	29.4	27.9	31.5	31.8	30.1	31.2	32.1	31.8	1.09	0.90–1.32	.243
Currently receiving treatment or counseling ^a	39.2	39.5	45.0	43.0	48.1	46.4	48.1	41.8	45.2	52.9	1.25	0.95–1.64	.036
Currently taking prescription medication ^b	55.5	61.9	67.5	68.8	72.1	67.4	69.4	64.1	65.1	73.3	1.34	0.94–1.89	.031
Treatment or counseling helpful ^c	40.4	32.2	34.6	37.1	40.2	39.0	39.6	39.9	40.4	40.3	1.19	0.91–1.54	.091
Prescription medication helpful ^d	45.8	43.4	52.5	48.1	49.3	49.9	49.6	47.2	47.9	51.1	1.15	0.83–1.61	.267

Data source: The 2005–2014 NSDUH.

AOR, adjusted OR. ORs and AORs were estimated in binary logistic regressions with the variable of survey year transformed to a variable ranging from 0 (for 2005) and 1 (for 2014). Thus, AORs represent change in odds over the whole study period. Variables of age, sex, race/ethnicity, student status, family income, marital status, employment, substance use disorders, insurance use treatment and any health insurance were included in the models.

^a Among participants who received any counseling or therapy for depression in the past year.

^b Among participants who took any prescription medication for depression in the past year.

^c Among participants who received any counseling or therapy for depression in the past year. Helpful was defined as reporting that treatment or counseling helped “a lot” or “extremely.”

^d Among participants who took any prescription medication for depression in the past year. Helpful was defined as reporting that prescription medication helped “a lot” or “extremely.”

have been efforts by a number of professional bodies, most notably the American Academy of Pediatrics Task Force on Mental Health, to promote diagnosis and management of depression and other common mental disorders in pediatric settings and to provide resources for practice enhancements, such as diagnostic guidelines.^{38–40} With the wider adoption of the medical home model under the Affordable Care Act, integrative approaches to depression treatment in pediatric primary care will likely increase.⁴¹

The increasing use of inpatient and day treatment settings over the 2005 to 2014 period may reflect greater intensity of treatment of adolescents. These trends may be related to enhanced mental health coverage in recent years after parity legislation, which may also explain greater continuity in treatment in more recent years.⁴² However, these findings need to be corroborated in future studies, especially with regard to increased inpatient treatment that was most prominent in 2014.

The findings should be interpreted in the context of several limitations. Most notably, the study was based on self-reports by adolescents and may not correspond with parent, teacher, or clinical assessments.¹⁵ Variations in sources of information would likely affect estimates of prevalence of disorders, but are unlikely to affect temporal trends. Furthermore, self-reports may be more sensitive than parental reports for capturing internalizing disorders, such as depression.^{43,44} A second limitation is that NSDUH assessed only MDE. Temporal trends in prevalence of other common mental disorders in these age groups may be different.⁵

CONCLUSIONS

In the context of these limitations, this study provides useful

information on temporal trends in 12-month MDE and treatment of depression based on large and nationally representative samples of adolescents and young adults. Prevention, early detection, and treatment of depression and other common mental disorders in these age groups are major goals of public mental health initiatives. Yet adaptation and broad implementation of effective treatment and prevention

programs remains a challenge.^{45,46} The growing number of depressed adolescents and young adults who do not receive any mental health treatment for their MDE calls for renewed outreach efforts, especially in school and college health and counseling services and pediatric practices where many of the untreated adolescents and young adults with depression may be detected and managed.⁴⁷

ABBREVIATIONS

CAM: complementary/alternative medicine
 CI: confidence interval
 FDA: Food and Drug Administration
 MDE: major depressive episodes
 NCS: National Comorbidity Survey
 NSDUH: National Survey on Drug Use and Health
 OR: odds ratio

FUNDING: Dr. Olfson's work on this study was partly supported by National Institute on Drug Abuse R01 DA019606 and Agency for Healthcare Research and Quality U19 HS021112. No other funding was secured for this study. The findings and conclusions of this study are those of the authors and do not necessarily reflect the views of the Substance Abuse and Mental Health Services Administration or the US Department of Health and Human Services. Funded by the National Institutes of Health (NIH).

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

COMPANION PAPER: A companion paper to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2016-2869.

REFERENCES

- Merikangas KR, He JP, Burstein M, et al. Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry*. 2010;49(10):980-989
- Olfson M, Marcus SC, Druss BG. Effects of Food and Drug Administration warnings on antidepressant use in a national sample. *Arch Gen Psychiatry*. 2008;65(1):94-101
- Zito JM, Safer DJ, DosReis S, et al. Psychotropic practice patterns for youth: a 10-year perspective. *Arch Pediatr Adolesc Med*. 2003;157(1):17-25
- Kessler RC, Berglund P, Demler O, et al; National Comorbidity Survey Replication. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *JAMA*. 2003;289(23):3095-3105
- Collishaw S. Annual research review: Secular trends in child and adolescent mental health. *J Child Psychol Psychiatry*. 2015;56(3):370-393
- Collishaw S, Maughan B, Goodman R, Pickles A. Time trends in adolescent mental health. *J Child Psychol Psychiatry*. 2004;45(8):1350-1362
- Fichter MM, Xepapadakis F, Quadflieg N, Georgopoulou E, Fthenakis WE. A comparative study of psychopathology in Greek adolescents in Germany and in Greece in 1980 and 1998-18 years apart. *Eur Arch Psychiatry Clin Neurosci*. 2004;254(1):27-35
- Sigfusdottir ID, Asgeirsdottir BB, Sigurdsson JF, Gudjonsson GH. Trends in depressive symptoms, anxiety symptoms and visits to healthcare specialists: a national study among Icelandic adolescents. *Scand J Public Health*. 2008;36(4):361-368
- Sweeting H, Young R, West P. GHQ increases among Scottish 15 year olds 1987-2006. *Soc Psychiatry Psychiatr Epidemiol*. 2009;44(7):579-586
- Tick NT, van der Ende J, Verhulst FC. Ten-year trends in self-reported emotional and behavioral problems of Dutch adolescents. *Soc Psychiatry Psychiatr Epidemiol*. 2008;43(5):349-355
- Tick NT, van der Ende J, Verhulst FC. Twenty-year trends in emotional and behavioral problems in Dutch children in a changing society. *Acta Psychiatr Scand*. 2007;116(6):473-482
- von Soest T, Wichstrøm L. Secular trends in depressive symptoms among Norwegian adolescents from 1992 to 2010. *J Abnorm Child Psychol*. 2014;42(3):403-415
- Fleming TM, Clark T, Denny S, et al. Stability and change in the mental health of New Zealand secondary school students 2007-2012: results from the national adolescent health surveys. *Aust N Z J Psychiatry*. 2014;48(5):472-480
- Jane Costello E, Erkanli A, Angold A. Is there an epidemic of child or adolescent depression? *J Child Psychol Psychiatry*. 2006;47(12):1263-1271
- Olfson M, Druss BG, Marcus SC. Trends in mental health care among children and adolescents. *N Engl J Med*. 2015;372(21):2029-2038
- Haro JM, Arbabzadeh-Bouche S, Brugha TS, et al. Concordance of the Composite International Diagnostic Interview Version 3.0 (CIDI 3.0) with standardized clinical assessments in the WHO World Mental Health surveys. *Int J Methods Psychiatr Res*. 2006;15(4):167-180
- Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health. Available at: www.samhsa.gov/data/population-data-nsduh/reports. Accessed May 20, 2016

18. American Association for Public Opinion Research. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*. 8th ed. Lenexa, KS: American Association for Public Opinion Research; 2015
19. Substance Abuse and Mental Health Services Administration. *Reliability of Key Measures in the National Survey on Drug Use and Health*. Rockville, MD: Substance Abuse and Mental Health Services Administration, Department of Health and Human Services; 2010. HHS Publication No. SMA 09-4425
20. Viera AJ, Garrett JM. Understanding interobserver agreement: the kappa statistic. *Fam Med*. 2005;37(5):360–363
21. Royston P, Sauerbrei W. *Multivariable Model-Building: A Pragmatic Approach to Regression Analysis Based on Fractional Polynomials for Modelling Continuous Variables*. Chichester, UK: John Wiley & Sons; 2008
22. Johnston LD, O'Malley PM, Miech RA, Bachman JG, Schulenberg JE. *Monitoring the Future National Survey Results on Drug Use, 1975–2015: Overview, Key Findings on Adolescent Drug Use*. Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2016
23. Curtin SC, Warner M, Hedegaard H. *Increase in Suicide in the United States, 1999–2014*. Hyattsville, MD: National Center for Health Statistics; 2016
24. Kessel Schneider S, O'Donnell L, Smith E. Trends in cyberbullying and school bullying victimization in a regional census of high school students, 2006–2012. *J Sch Health*. 2015;85(9):611–620
25. Lenhart A. *Teen, Social Media and Technology Overview*. Washington, DC: Pew Research Center; 2015
26. Augner C, Hacker GW. Associations between problematic mobile phone use and psychological parameters in young adults. *Int J Public Health*. 2012;57(2):437–441
27. Fox KR, Franklin JC, Ribeiro JD, Kleiman EM, Bentley KH, Nock MK. Meta-analysis of risk factors for nonsuicidal self-injury. *Clin Psychol Rev*. 2015;42:156–167
28. Whitlock J, Muehlenkamp J, Purington A, et al. Nonsuicidal self-injury in a college population: general trends and sex differences. *J Am Coll Health*. 2011;59(8):691–698
29. Nock M. *The Oxford Handbook of Suicide and Self-injury*. New York, NY: Oxford University Press; 2014
30. Muehlenkamp JJ, Williams KL, Gutierrez PM, Claes L. Rates of non-suicidal self-injury in high school students across five years. *Arch Suicide Res*. 2009;13(4):317–329
31. Barr B, Kinderman P, Whitehead M. Trends in mental health inequalities in England during a period of recession, austerity and welfare reform 2004 to 2013. *Soc Sci Med*. 2015;147:324–331
32. Katikireddi SV, Niedzwiedz CL, Popham F. Trends in population mental health before and after the 2008 recession: a repeat cross-sectional analysis of the 1991–2010 Health Surveys of England. *BMJ Open*. 2012;2(5):e001790
33. Solantaus T, Leinonen J, Punamaki RL. Children's mental health in times of economic recession: replication and extension of the family economic stress model in Finland. *Dev Psychol*. 2004;40(3):412–429
34. National Academies of Sciences, Engineering, and Medicine. *Mental Disorders and Disabilities Among Low-Income Children*. Washington, DC: The National Academies Press; 2015
35. Bachmann CJ, Aagaard L, Burcu M, et al. Trends and patterns of antidepressant use in children and adolescents from five western countries, 2005–2012. *Eur Neuropsychopharmacol*. 2016;26(3):411–419
36. Mojtabai R, Jorm AF. Trends in psychological distress, depressive episodes and mental health treatment-seeking in the United States: 2001–2012. *J Affect Disord*. 2015;174:556–561
37. Olfson M, Blanco C, Wang S, Laje G, Correll CU. National trends in the mental health care of children, adolescents, and adults by office-based physicians. *JAMA Psychiatry*. 2014;71(1):81–90
38. Foy JM; American Academy of Pediatrics Task Force on Mental Health. Enhancing pediatric mental health care: report from the American Academy of Pediatrics Task Force on Mental Health. Introduction. *Pediatrics*. 2010;125(suppl 3):S69–S74
39. Foy JM; American Academy of Pediatrics Task Force on Mental Health. Enhancing pediatric mental health care: algorithms for primary care. *Pediatrics*. 2010;125(suppl 3):S109–S125
40. Foy JM, Kelleher KJ, Laraque D; American Academy of Pediatrics Task Force on Mental Health. Enhancing pediatric mental health care: strategies for preparing a primary care practice. *Pediatrics*. 2010;125(suppl 3):S87–S108
41. Ader J, Stille CJ, Keller D, Miller BF, Barr MS, Perrin JM. The medical home and integrated behavioral health: advancing the policy agenda. *Pediatrics*. 2015;135(5):909–917
42. Grazier KL, Eisenberg D, Jedele JM, Smiley ML. Effects of mental health parity on high utilizers of services: pre-post evidence from a large, self-insured employer. *Psychiatr Serv*. 2016;67(4):448–451
43. Sourander A, Helstelä L, Helenius H. Parent-adolescent agreement on emotional and behavioral problems. *Soc Psychiatry Psychiatr Epidemiol*. 1999;34(12):657–663
44. Martin JL, Ford CB, Dyer-Friedman J, Tang J, Huffman LC. Patterns of agreement between parent and child ratings of emotional and behavioral problems in an outpatient clinical setting: when children endorse more problems. *J Dev Behav Pediatr*. 2004;25(3):150–155
45. Aarons GA, Palinkas LA. Implementation of evidence-based practice in child welfare: service provider perspectives. *Adm Policy Ment Health*. 2007;34(4):411–419
46. Hoagwood K, Burns BJ, Kiser L, Ringeisen H, Schoenwald SK. Evidence-based practice in child and adolescent mental health services. *Psychiatr Serv*. 2001;52(9):1179–1189
47. McCabe MA. *Health Care Reform as a Vehicle for Promoting Children's Mental and Behavioral Health*. Washington, DC: Institute of Medicine; 2015

National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults

Ramin Mojtabai, Mark Olfson and Beth Han

Pediatrics originally published online November 14, 2016;

Updated Information & Services

including high resolution figures, can be found at:
<http://pediatrics.aappublications.org/content/early/2016/11/10/peds.2016-1878>

References

This article cites 37 articles, 5 of which you can access for free at:
<http://pediatrics.aappublications.org/content/early/2016/11/10/peds.2016-1878#BIBL>

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Psychiatry/Psychology
http://www.aappublications.org/cgi/collection/psychiatry_psychology_sub
Public Health
http://www.aappublications.org/cgi/collection/public_health_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults

Ramin Mojtabai, Mark Olfson and Beth Han

Pediatrics originally published online November 14, 2016;

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/early/2016/11/10/peds.2016-1878>

Data Supplement at:

<http://pediatrics.aappublications.org/content/suppl/2016/11/10/peds.2016-1878.DCSupplemental>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2016 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

