Results from the 2011 National Survey on Drug Use and Health: Mental Health Findings

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Substance Abuse and Mental Health Services Administration
Center for Behavioral Health Statistics and Quality

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Revised Adult Mental Illness Estimates for 2008 to 2011

The Substance Abuse and Mental Health Services Administration (SAMHSA) has been publishing National Survey on Drug Use and Health (NSDUH) estimates of the prevalence of past year serious mental illness (SMI) and any mental illness (AMI) among adults aged 18 or older since the release of the 2008 NSDUH national findings report. Estimates were based on a model developed in 2008. In 2013, SAMHSA developed a more accurate model for the 2012 data. This revised model incorporates the NSDUH respondent's age and indicators of past year suicide thoughts and depression, along with the variables that were specified in the 2008 model (Kessler-6 [K6] questions on psychological distress and an abbreviated set of questions on impairment in carrying out activities from the World Health Organization Disability Assessment Schedule [WHODAS]), leading to more accurate estimates of SMI and AMI. Estimates and estimation procedures described in this report for those measures are based on the 2008 model and not the 2012 revised model. However, the NSDUH detailed tables for 2008 and the mental health detailed tables for 2009 at http://media.samhsa.gov/data/NSDUH.aspx have been updated to include estimates of SMI and AMI for adults based on this revised model. The same updates have been made to the mental health detailed tables for 2010 and 2011 at http://www.samhsa.gov/data/population-data-nsduh. The definitions for these measures in the glossary accompanying the mental health detailed tables for 2010 and 2011 also are based on the 2012 revised model. Other mental health measures in this report, such as major depressive episode (MDE) and serious thoughts of suicide, were not affected. For further information on the revised model, see the NSDUH short report titled Revised Estimates of Mental Illness from the National Survey on Drug Use and Health *at http://www.samhsa.gov/data/population-data-nsduh.*

Highlights

- In 2011, there were an estimated 45.6 million adults aged 18 or older in the United States with any mental illness (AMI) in the past year. This represents 19.6 percent of all adults in this country. These estimates were stable between 2008 (44.0 million, 19.6 percent) and 2011.

- Among adults aged 18 or older in 2011, 11.5 million (5.0 percent) had serious mental illness (SMI) in the past year. These estimates of adults with SMI in 2011 were higher than the estimates in 2008 (9.9 million, 4.4 percent), but were similar to those in 2009 (11.0 million, 4.8 percent) and 2010 (11.5 million, 5.0 percent).

- Women aged 18 or older were more likely than men aged 18 or older to have past year AMI (23.0 vs. 15.9 percent) and SMI (6.4 vs. 3.4 percent) in 2011.

- Among the 45.6 million adults aged 18 or older with AMI in the past year, 17.5 percent (8.0 million adults) met criteria for a substance use disorder (i.e., illicit drug or alcohol dependence or abuse). Among the 11.5 million adults with SMI in the past year, 22.6 percent also had past year substance dependence or abuse. In comparison, 5.8 percent of adults who did not have mental illness in the past year (10.9 million adults) met criteria for a substance use disorder.

- In 2011, an estimated 8.5 million adults (3.7 percent) aged 18 or older had serious thoughts of suicide in the past year. The estimated number and percentage remained stable between 2008 (8.3 million, 3.7 percent) and 2011.

- Among adults aged 18 or older in 2011, 2.4 million (1.0 percent) made suicide plans in the past year, and 1.1 million (0.5 percent) attempted suicide in the past year.

- Adults aged 18 or older with a past year substance use disorder were more likely than those without dependence or abuse to have had serious thoughts of suicide in the past year (11.2 vs. 3.0 percent). Adults with a substance use disorder also were more likely to make suicide plans compared with adults without dependence or abuse (3.6 vs. 0.8 percent) and were more likely to attempt suicide compared with adults without dependence or abuse (1.9 vs. 0.4 percent).

- In 2011, 31.6 million adults (13.6 percent of the population aged 18 or older) received mental health services during the past 12 months. The number and the percentage were similar to those in 2010 (31.5 million, 13.8 percent).

- Between 2002 and 2011, the percentage of adults using outpatient mental health services in the past year declined from 7.4 to 6.7 percent, and the percentage using prescription medication for a mental health problem increased from 10.5 to 11.5 percent.

- Among the 45.6 million adults aged 18 or older with AMI in 2011, 17.4 million (38.2 percent) received mental health services in the past year. Among the 11.5 million adults with SMI in 2011, 6.9 million (59.6 percent) received mental health services in the past year.

- Among the 2.6 million adults aged 18 or older in 2011 with both SMI and a substance use disorder in the past year, 65.6 percent received substance use treatment at a specialty facility or mental health treatment in that period. Included in the 65.6 percent are 12.4 percent who received both mental health treatment and specialty substance use treatment, 49.5 percent who received mental health treatment only, and 3.6 percent who received specialty substance use treatment only.

- In 2011, there were 2.0 million youths aged 12 to 17 (8.2 percent) who had major depressive episode (MDE) during the past year. This was similar to the percentage in 2010 (8.0 percent). Among youths in 2011, females were more likely than males to have past year MDE (12.1 vs. 4.5 percent).

- Among youths aged 12 to 17 in 2011 who had past year MDE, 36.0 percent used illicit drugs in the past year compared with 17.4 percent among youths who did not have past year MDE.

- In 2011, youths aged 12 to 17 with MDE in the past year were more likely than those without MDE to have a substance use disorder in the past year (18.2 vs. 5.8 percent).

- In 2011, 3.1 million youths aged 12 to 17 (12.7 percent) received treatment or counseling for problems with emotions or behavior in a specialty mental health setting (inpatient or outpatient care) in the past 12 months. The 2011 percentage was similar to those in 2002 through 2010 (ranging from 12.0 to 13.5 percent).

- The most common reason for youths receiving specialty mental health services in 2011 was feeling depressed (47.3 percent).

1. Introduction

This report presents results pertaining to mental health from the 2011 National Survey on Drug Use and Health (NSDUH), an annual survey of the civilian, noninstitutionalized population of the United States aged 12 years old or older. This report presents national estimates of the prevalence of past year mental disorders and past year mental health service utilization for youths aged 12 to 17 and adults aged 18 or older. Among adults, estimates presented include rates and numbers of persons with any mental illness (AMI), serious mental illness (SMI), suicidal thoughts and behavior, major depressive episode (MDE), treatment for depression (among adults with MDE), and mental health service utilization. Estimates presented in this report for youths include MDE, treatment for depression (among youths with MDE), and mental health service utilization. Measures related to the co-occurrence of mental disorders with substance use or with substance use disorders also are presented for both adults and youths. The report focuses mainly on trends between 2010 and 2011 and differences across population subgroups in 2011.

Summary of NSDUH

NSDUH is the primary source of statistical information on the use of illegal drugs, alcohol, and tobacco by the civilian, noninstitutionalized population of the United States aged 12 years or older. The survey also includes several modules of questions that focus on mental health issues. Conducted by the Federal Government since 1971, the survey collects data through face-to-face interviews with a representative sample of the population at the respondent's place of residence. The survey is sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services, and is planned and managed by SAMHSA's Center for Behavioral Health Statistics and Quality (CBHSQ). Data collection and analysis are conducted under contract with RTI International.[1] This section briefly describes the survey methodology; a more complete description is provided in Appendix A.

NSDUH collects information from residents of households and noninstitutional group quarters (e.g., shelters, rooming houses, dormitories) and from civilians living on military bases. The survey excludes homeless persons who do not use shelters, military personnel on active duty, and residents of institutional group quarters, such as jails and hospitals. Appendix C describes data sources that provide estimates of mental health indicators for populations outside of the NSDUH target population.

From 1971 through 1998, the survey employed paper and pencil data collection. Since 1999, the NSDUH interview has been carried out using computer-assisted interviewing (CAI). Most of the questions are administered with audio computer-assisted self-interviewing (ACASI). ACASI is designed to provide the respondent with a highly private and confidential mode for responding to questions in order to increase the level of honest reporting of illicit drug use and about other sensitive topics, including mental health issues. Less sensitive items are administered by interviewers using computer-assisted personal interviewing (CAPI).

[1] RTI International is a trade name of Research Triangle Institute.

Consistent with previous years, the 2011 NSDUH employed a State-based design with an independent, multistage area probability sample within each State and the District of Columbia. The eight States with the largest population (which together account for about half of the total U.S. population aged 12 or older) are designated as large sample States (California, Florida, Illinois, Michigan, New York, Ohio, Pennsylvania, and Texas) and have a sample size of about 3,600 each. For the remaining 42 States and the District of Columbia, the sample size is about 900 per State. In 2011, four States in the Gulf Coast (Alabama, Florida, Louisiana, and Mississippi) had a 1-year supplemental sample to facilitate a study of the impact of the April 2010 Deepwater Horizon oil spill on substance use and mental health. In all States and the District of Columbia, the design oversampled youths and young adults; each State's sample was approximately equally distributed among three age groups: 12 to 17 years, 18 to 25 years, and 26 years or older.

Nationally, screening was completed at 156,048 addresses, and 70,109 completed interviews were obtained, which reflect the oversample of about 2,000 cases in the Gulf Coast. The survey was conducted from January through December 2011. Weighted response rates for household screening and for interviewing were 87.0 and 74.4 percent, respectively. See Appendix B for more information on NSDUH response rates.

Limitations on Trend Measurement

Several important changes were made to the adult mental health section in the 2008 NSDUH questionnaire. These changes provide valuable new data on mental health, but they also affect some of the measures that have been collected in NSDUH since 2004. A brief summary of the changes and their impact is provided below.

From 2004 to 2007, NSDUH collected data for adults aged 18 or older on lifetime and past year MDE. The survey also included the Kessler-6 (K6) distress scale that was used to generate estimates of serious psychological distress (SPD) in the past 12 months. However, the K6 scale does not directly measure the presence of a diagnosable mental, behavioral, or emotional disorder, nor does it capture information on functional impairment (i.e., difficulties that substantially interfere with or limit role functioning in one or more major life activities). Both of these measures are needed to determine whether a respondent can be categorized as having SMI or other categories of mental illness defined by levels of functional impairment (i.e., low/mild mental illness or moderate mental illness).

To address SAMHSA's need for estimates of SMI and AMI, as well as data on suicidal ideation and behavior, CBHSQ modified the NSDUH adult mental health items in 2008 to obtain these data. Scales were added that assessed impairment caused by mental health problems. In 2008, CBHSQ also expanded the K6 questions to ask about the past 30 days (the time frame for which the K6 was originally designed). In addition, as part of the Mental Health Surveillance Study (MHSS), a clinical follow-up study was initiated in which a randomly selected subsample of adults (about 1,500 in 2008 and 2011, and 500 in 2009 and 2010) who had completed the NSDUH interview was administered a standard clinical interview by mental health clinicians via paper and pencil over the telephone to determine their mental illness status. Using both the clinical interview and the NSDUH CAI data for the respondents who completed the clinical interview, statistical models were developed that then were applied to data from all adult

respondents who had completed the NSDUH CAI interviews (regardless of whether they had clinical interview data) to produce estimates of mental illness among the adult civilian, noninstitutionalized population. See Section B.4.3 in Appendix B of this report and Section B.4.3 in Appendix B of the 2009 mental health findings report (CBHSQ, 2010) for a more complete discussion of the MHSS procedures and analyses.

Although the same information on MDE has been collected since 2004, the 2008 questionnaire changes for other mental health measures caused discontinuities in trends for MDE among adults; see Sections B.4.2 and B.4.4 in Appendix B for more information. A statistical adjustment to ensure comparability between past year and lifetime MDE estimates from 2005 onward was applied to estimates of lifetime and past year MDE that were affected by the 2008 questionnaire changes. This allowed trends in MDE among adults for 2005 onward to be included in reports since 2010. Because of these adjustments, estimates of past year and lifetime MDE for 2005 to 2008 in this report may differ from estimates published in NSDUH reports prior to 2010. Questionnaire changes in 2008 did not affect comparability of estimates based on adult mental health service utilization questions; therefore, estimates of mental health service utilization presented in this report reflect trends from 2002 to 2011.

The 2008 questionnaire changes did not affect youth MDE or the youth mental health service utilization items. In 2009, changes were made in the youth mental health utilization module; however, analyses determined that the changes did not affect estimates of MDE among youths in 2009 (see Section B.4.2 in Appendix B). The discussion of estimates for these measures in this report includes comparisons with prior years' data for youths.

The calculation of NSDUH person-level weights includes a calibration step that results in weights that are consistent with population control totals obtained from the U.S. Census Bureau (see Section A.3.3 in Appendix A). These control totals are based on the most recently available decennial census; the Census Bureau updates these control totals annually to account for population changes after the census. For the analysis weights in the 2002 through 2010 NSDUHs, the control totals were derived from the 2000 census data; for the 2011 NSDUH weights, the control totals were based on data from the 2010 census. This shift to the 2010 census data could affect comparisons between mental health estimates in 2011 and those from prior years. Analyses of the impact of this change in NSDUH weights show that estimates of the number of substance users for some demographic groups were substantially affected (CBHSQ, 2012b), but percentages of substance users within these groups (i.e., rates) were not. Mental health estimates were affected relatively less, and the effects were restricted to certain estimates and demographic subgroups. Section B.4.5 in Appendix B provides results of investigations of the change to use of 2010 census control totals for the 2011 NSDUH.

Format of Report and Data Presentation

Estimates presented in this report are based on data from a comprehensive set of tables of national mental health estimates that are referred to as "mental health detailed tables." In addition, the tables are accompanied by a glossary that covers key definitions used in this report and the mental health detailed tables.[2] This report has separate chapters that discuss the national

[2] This comprehensive set of tables and the glossary are available at http://www.samhsa.gov/data/.

findings of mental disorders and service utilization for adults aged 18 or older, youths aged 12 to 17, and both adults and youths with mental disorders that co-occurred with substance use or with substance use disorders. Technical appendices in this report describe the survey (Appendix A), provide technical details on the statistical methods and measurement (Appendix B), discuss other sources of related data (Appendix C), and list the references cited in the report (Appendix D). A list of contributors to the production of this report also is provided (Appendix E).

Text, figures, and mental health detailed tables present prevalence measures for the population in terms of both the number of persons and the percentage of the population. Figures on mental disorders show prevalence estimates for the 12-month period prior to the survey (also referred to as the past year). Figures in which estimates are presented by year have footnotes indicating whether the 2011 estimates are significantly different from 2010 or earlier estimates.

During regular data collection and processing checks for the 2011 NSDUH, data errors were identified. These errors affected the data for Pennsylvania (2006 to 2010) and Maryland (2008 and 2009). Data and estimates for 2011 were not affected. The errors had minimal impact on the national estimates. The only estimates appreciably affected in the report and mental health detailed tables are estimates for the Northeast region. Cases with erroneous data were removed from data files, and the remaining cases were reweighted to provide representative estimates. Therefore, some estimates for 2010 and other prior years in the 2011 mental health findings report and the 2011 mental health detailed tables will differ from corresponding estimates found in some previous reports and tables. Further information is available in Section B.3.4 in Appendix B of this report.

Statistical tests have been conducted for all statements appearing in the text of the report that compare estimates between years or subgroups of the population. Unless explicitly stated that a difference is not statistically significant, all statements that describe differences are significant at the .05 level. Statistically significant differences are described using terms such as "higher," "lower," "increased," and "decreased." Statements that use terms such as "similar," "no difference," "same," or "remained steady" to describe the relationship between estimates denote that a difference is not statistically significant. When a set of estimates for survey years or population subgroups is presented without a statement of comparison, statistically significant differences among these estimates are not implied and testing may not have been conducted.

All estimates presented in the report have met the criteria for statistical reliability (see Section B.2.2 in Appendix B). Estimates that do not meet these criteria are suppressed and do not appear in tables, figures, or text. Suppressed estimates are not included in statistical tests of comparisons. For example, a statement that "whites had the highest prevalence" means that the rate among whites was higher than the rate among all nonsuppressed racial/ethnic subgroups, but not necessarily higher than the rate among a subgroup for which the estimate was suppressed.

Data are presented for racial/ethnic groups based on guidelines for collecting and reporting race and ethnicity data (Office of Management and Budget, 1997). Because respondents could choose more than one racial group, a "two or more races" category is included for persons who reported more than one category (i.e., white, black or African American, American Indian or Alaska Native, Native Hawaiian, Other Pacific Islander, Asian, Other). Respondents choosing both Native Hawaiian and Other Pacific Islander but no other categories are classified as being in the "Native Hawaiian or Other Pacific Islander" category instead of the

"two or more races" category. Except for the "Hispanic or Latino" group, the racial/ethnic groups include only non-Hispanics. The category "Hispanic or Latino" includes Hispanics of any race.

Other NSDUH Reports and Data

Other reports focusing on specific topics of interest will be produced using the 2011 NSDUH data and made available on SAMHSA's Web site. The mental health detailed tables described previously are also available through the Internet at http://samhsa.gov/data/. The tables are organized into sections on mental health topics among adults and youths. Most tables are provided in several parts, showing population estimates (e.g., numbers of persons with mental disorders), prevalence estimates (e.g., percentages of persons with mental disorders), and standard errors of all nonsuppressed estimates. Additional methodological information on NSDUH, including the questionnaire, is available electronically at the same Web address.

Descriptive reports and in-depth analytic reports focusing on specific issues or populations and methodological information on NSDUH, including the questionnaire, are available at http://samhsa.gov/data/. In addition, CBHSQ makes public use data files available through the Substance Abuse and Mental Health Data Archive at http://www.datafiles.samhsa.gov. Currently, files are available from the 1979 to 2010 surveys.[3] The 2011 NSDUH public use file will be available by the end of 2012.

[3] See http://www.icpsr.umich.edu/icpsrweb/SAMHDA/series/64.

2. Mental Illness and Mental Health Service Utilization among Adults

This chapter presents findings from the National Survey on Drug Use and Health (NSDUH) on past year mental illness and mental health problems in the United States, including the percentage of adults aged 18 or older with any mental illness (AMI), serious mental illness (SMI), suicidal thoughts and behavior, and major depressive episode (MDE). In addition, this chapter includes estimates of the percentages of adults who received treatment for mental health problems in the past year overall and among those with AMI, SMI, and MDE. The chapter also presents data on the percentage of adults who had a perceived unmet need for mental health services in the past year.

Any Mental Illness

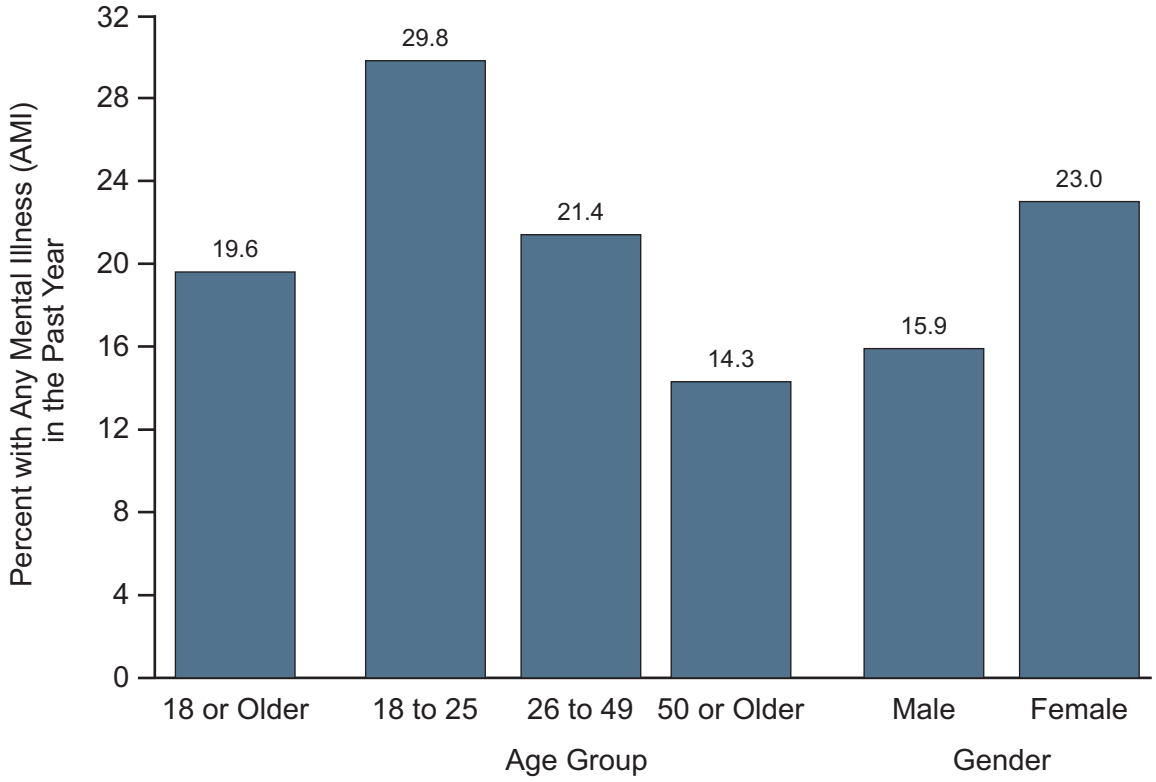
AMI among adults aged 18 or older is defined as currently or at any time in the past year having had a diagnosable mental, behavioral, or emotional disorder (excluding developmental and substance use disorders) of sufficient duration to meet diagnostic criteria specified within the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association [APA], 1994).

In order to generate estimates of mental illness in the United States, the Substance Abuse and Mental Health Services Administration (SAMHSA) designed and implemented the Mental Health Surveillance Study (MHSS). Each year since 2008, a subsample of adults has been selected from the main study to participate in a follow-up telephone interview that obtains a detailed mental health assessment administered by a trained mental health clinician. The MHSS interview uses the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Non-patient Edition (SCID-I/NP) (First, Spitzer, Gibbon, & Williams, 2002). A prediction model using the clinical interview data collected in 2008 was developed to produce estimates of AMI for the entire NSDUH adult sample. For consistency and trend measurement, the model developed from the 2008 data was used to generate estimates of mental illness for each year from 2008 to 2011. For details on the modeling and estimation of AMI, see Section B.4.3 in this report's Appendix B and Section B.4.3 in Appendix B of the 2009 mental health findings report (Center for Behavioral Health Statistics and Quality [CBHSQ], 2010).

- In 2011, an estimated 45.6 million adults aged 18 or older in the United States had AMI in the past year. This represents 19.6 percent of all adults in this country (Figure 2.1). These estimates were stable between 2008 (44.0 million, 19.6 percent) and 2011.

- The percentage of adults with AMI in the past year was highest for adults aged 18 to 25 (29.8 percent), followed by those aged 26 to 49 (21.4 percent), then by those aged 50 or older (14.3 percent) (Figure 2.1).

Figure 2.1 Any Mental Illness in the Past Year among Adults Aged 18 or Older, by Age and Gender: 2011



- Adult women in 2011 were more likely than adult men to have AMI in the past year (23.0 vs. 15.9 percent) (Figure 2.1).

- In 2011, the percentage of persons aged 18 or older with past year AMI was 15.9 percent among Hispanics, 16.1 percent among Asians, 18.8 percent among blacks, 20.5 percent among whites, 28.3 percent among persons reporting two or more races, and 28.9 percent among American Indians or Alaska Natives. The estimate of past year AMI among Native Hawaiians or Other Pacific Islanders aged 18 or older could not be reported because of low precision (see Section B.2.2 in Appendix B).

- In 2011, the percentage of adults with past year AMI was higher among unemployed persons (28.0 percent) than among either full-time (16.1 percent) or part-time (23.2 percent) employed persons. Adults employed part time also were more likely than those employed full time to have past year AMI.

- The percentage of adults with AMI was highest among those with a past year family income that was less than 100 percent of the Federal poverty level (29.6 percent), followed by those with a family income at 100 to 199 percent of the Federal poverty level (23.1 percent), then by adults with a family income at 200 percent or more of the Federal poverty level (16.2 percent).

- In 2011, the percentage of adults with Medicaid or Children's Health Insurance Program (CHIP) who had AMI in the past year (32.4 percent) was higher than the percentages among adults with private health insurance (16.3 percent), those with no health insurance (24.3 percent), and those with other forms of health insurance (17.3 percent). Having other forms of health insurance is defined as having Medicare, CHAMPUS, TRICARE, CHAMPVA, the VA, military health care, or any other type of health insurance.

- The percentage of adults in 2011 with past year AMI was 39.0 percent among those on probation in the past year, which was higher than that among adults who were not on probation in the past year (19.2 percent). Similarly, among adults on parole or supervised release in the past year, the percentage having AMI was 29.5 percent, which was higher than the percentage having AMI among adults who were not on parole or supervised release in the past year (19.5 percent).

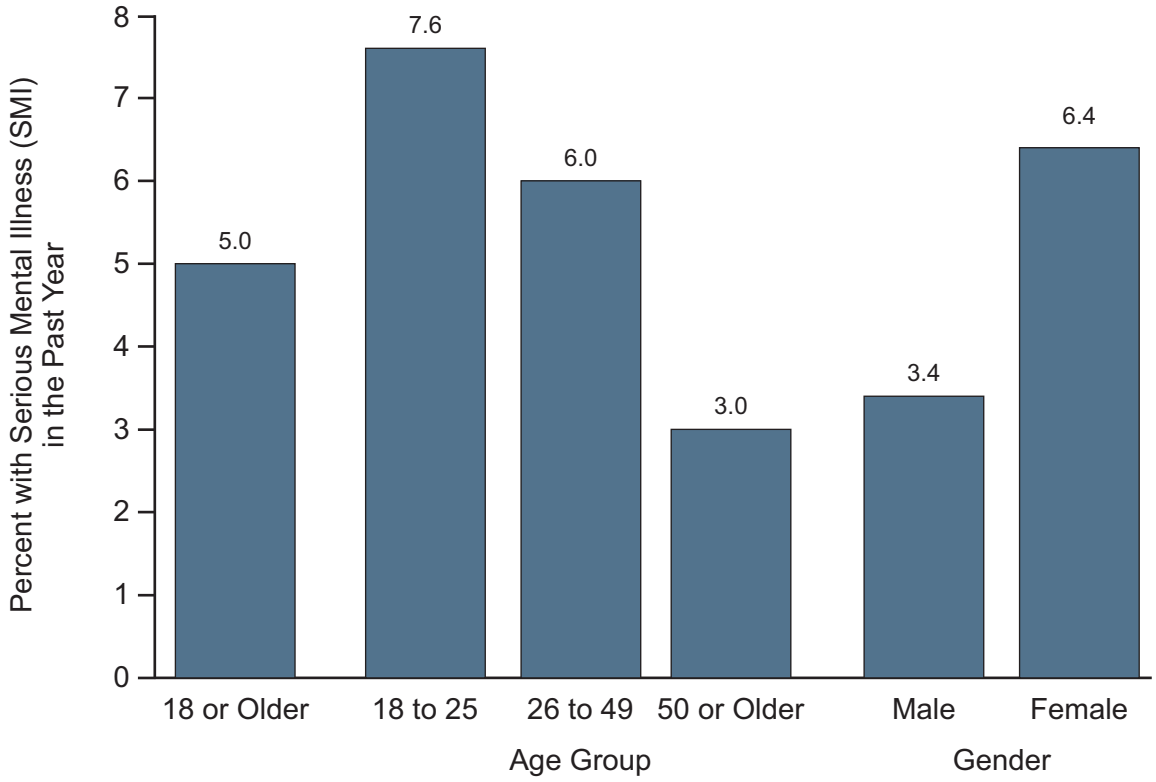
Serious Mental Illness

Public Law No. 102-321, the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) Reorganization Act of 1992, established a block grant for States within the United States to fund community mental health services for adults with SMI. The law required States to include prevalence estimates in their annual applications for block grant funds. This legislation also required SAMHSA to develop an operational definition of SMI. SAMHSA defined SMI as persons aged 18 or older who currently or at any time in the past year have had a diagnosable mental, behavioral, or emotional disorder (excluding developmental and substance use disorders) of sufficient duration to meet diagnostic criteria specified within DSM-IV (APA, 1994) that has resulted in serious functional impairment, which substantially interferes with or limits one or more major life activities.

Similar to AMI estimates in the United States, SMI estimates were generated via the MHSS. To produce estimates of SMI for the entire NSDUH adult sample, a prediction model was developed using short-scale indicators of distress and impairment in combination with the SMI status determined by the clinical interview. For consistency and trend measurement, the model developed from the 2008 data was used to generate estimates for each year in 2008 to 2011. For more details, see Section B.4.3 in Appendix B of this report and Section B.4.3 in Appendix B of the 2009 mental health findings report (CBHSQ, 2010).

- In 2011, there were an estimated 11.5 million adults aged 18 or older in the United States with SMI in the past year. This represented 5.0 percent of all adults in this country in 2011 (Figure 2.2). These estimates of adults with SMI in 2011 were higher than the estimates in 2008 (9.9 million, 4.4 percent), but were similar to those in 2009 (11.0 million, 4.8 percent) and 2010 (11.5 million, 5.0 percent).

Figure 2.2 Serious Mental Illness in the Past Year among Adults Aged 18 or Older, by Age and Gender: 2011



- The percentage of adults with past year SMI in 2011 was highest among adults aged 18 to 25 (7.6 percent), followed by those aged 26 to 49 (6.0 percent), then by those aged 50 or older (3.0 percent) (Figure 2.2).
- Women aged 18 or older in 2011 were more likely than men to have SMI in the past year (6.4 vs. 3.4 percent) (Figure 2.2).
- In 2011, the percentage of persons aged 18 or older with past year SMI was 3.4 percent among Asians, 3.5 percent among blacks, 3.7 percent among Hispanics, 5.3 percent among Native Hawaiians or Other Pacific Islanders, 5.5 percent among whites, 8.1 percent among adults reporting two or more races, and 12.4 percent among American Indians or Alaska Natives.
- The percentage of adults with past year SMI in 2011 was higher among unemployed persons (7.6 percent) than among either full-time (3.7 percent) or part-time (5.8 percent) employed persons. Adults employed part time also were more likely than those employed full time to have past year SMI.

- In 2011, the percentage of adults with SMI was highest among those with a past year family income that was less than 100 percent of the Federal poverty level (9.6 percent), followed by adults with a family income at 100 to 199 percent of the Federal poverty level (6.0 percent), then by adults with a family income at 200 percent or more of the Federal poverty level (3.6 percent).

- The percentage of adults in 2011 with SMI in the past year was higher among those with Medicaid or CHIP (10.3 percent) than that among adults with private health insurance (3.6 percent), adults with no health insurance (6.6 percent), and those with other forms of health insurance (4.3 percent).

- In 2011, the percentage of adults having past year SMI was higher among adults on probation in the past year (13.4 percent) than that among adults who were not on probation in the past year (4.8 percent). Similarly, among adults on parole or supervised release in the past year, 10.7 percent had past year SMI, which was higher than the percentage among adults who were not on parole or supervised release (4.9 percent).

Suicidal Thoughts and Behavior

Responding to a need for national data on the prevalence of suicidal thoughts and behavior, a set of questions has been included in the NSDUH questionnaire since 2008. These questions ask all adult respondents if at any time during the past 12 months they had serious thoughts of suicide, and among those with suicidal ideation, whether they made suicide plans or attempts in the past year. If an attempt was made, additional items asked whether the respondent received medical attention or hospitalization as a result of attempted suicide.

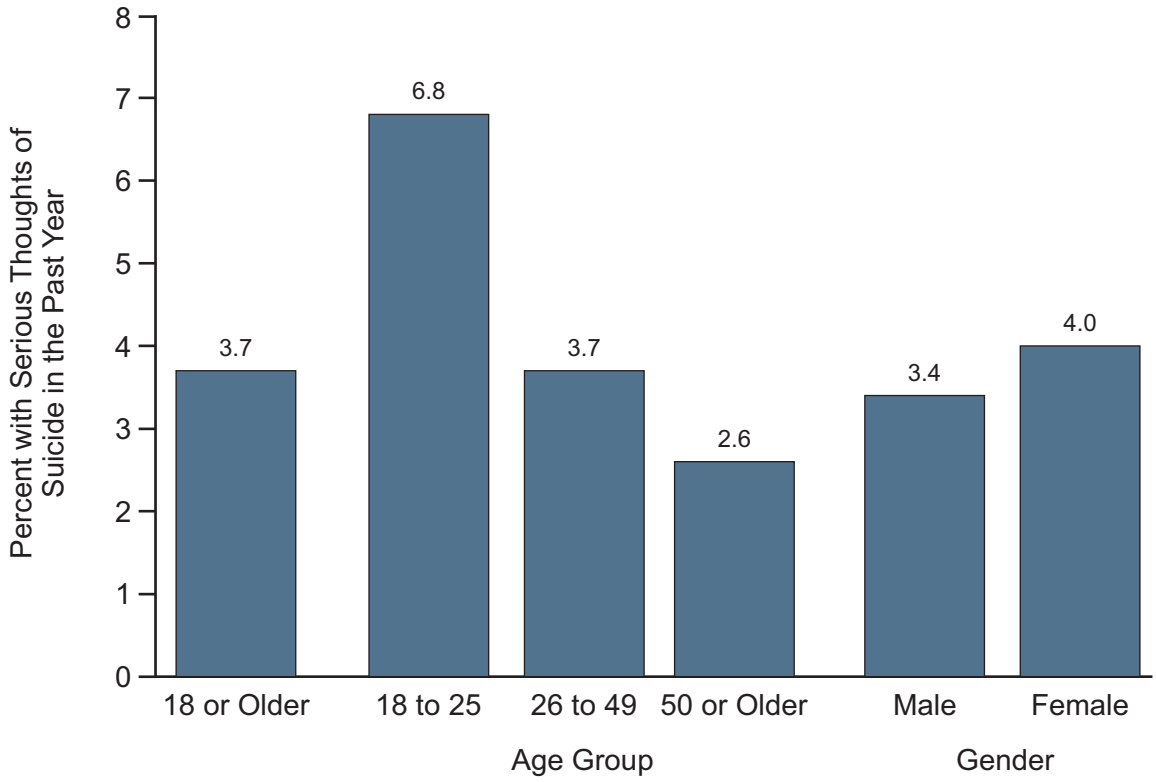
- In 2011, an estimated 8.5 million adults (3.7 percent) aged 18 or older had serious thoughts of suicide in the past year (Figures 2.3 and 2.4). The estimated number and percentage remained stable between 2008 (8.3 million, 3.7 percent) and 2011.

- The percentage of adults having serious thoughts of suicide was highest among persons aged 18 to 25 (6.8 percent), followed by persons aged 26 to 49 (3.7 percent), then by persons aged 50 or older (2.6 percent) (Figure 2.3).

- The percentage of adults in 2011 with serious thoughts of suicide in the past year was higher among women (4.0 percent) than among men (3.4 percent).

- Among adults aged 18 or older, 2.4 million (1.0 percent) made suicide plans in the past year (Figure 2.4). The percentage of adults who made suicide plans in the past year was higher among persons aged 18 to 25 (1.9 percent) than among persons aged 26 to 49 (1.1 percent) and those aged 50 or older (0.7 percent).

Figure 2.3 Suicidal Thoughts in the Past Year among Adults Aged 18 or Older, by Age and Gender: 2011

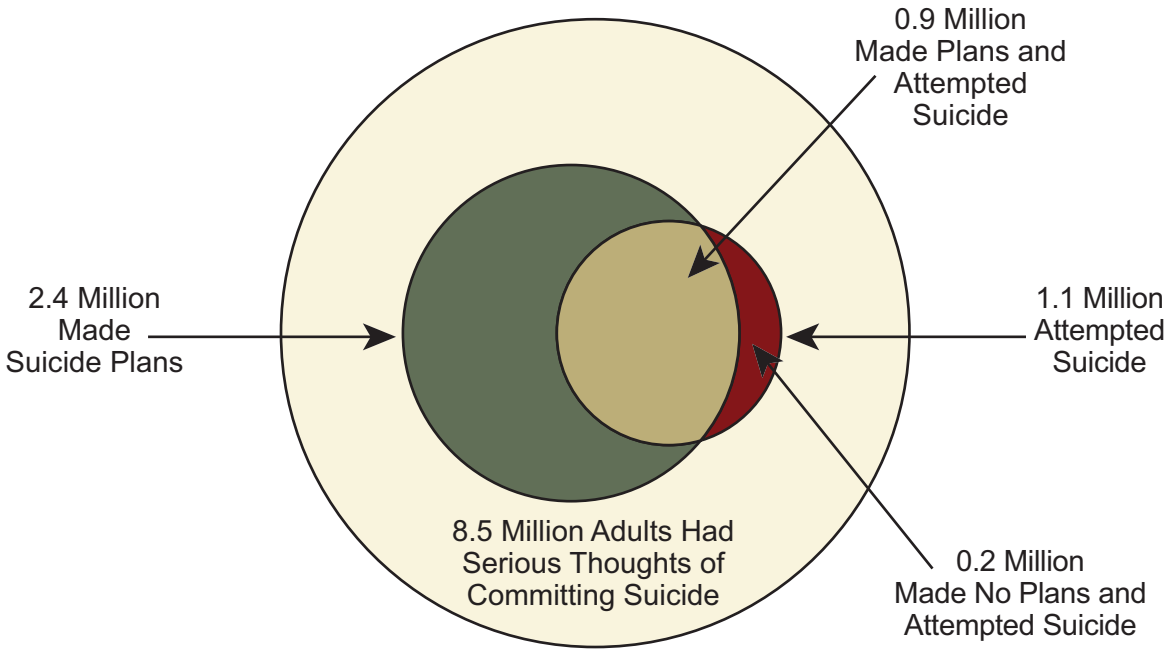


- In 2011, 1.1 million adults (0.5 percent) aged 18 or older attempted suicide in the past year (Figure 2.4). Among these persons who attempted suicide, 0.9 million also reported making suicide plans, and 0.2 million did not make suicide plans.

- Among the 1.1 million adults who attempted suicide in the past year, 633,000 (55.7 percent) received medical attention for their suicide attempt in the past year, and 442,000 (38.9 percent) stayed overnight or longer in a hospital as a result of their suicide attempt in the past year.

- In 2011, the percentage of adults aged 18 or older having serious thoughts of suicide in the past year was 2.5 percent among Hispanics, 2.9 percent among Asians, 3.3 percent among blacks, 4.0 percent among whites, 4.4 percent among persons reporting two or more races, and 13.1 percent among American Indians or Alaska Natives. The estimate of serious thoughts of suicide in the past year among Native Hawaiians or Other Pacific Islanders aged 18 or older could not be reported because of low precision.

Figure 2.4 Suicidal Thoughts and Behavior in the Past Year among Adults Aged 18 or Older: 2011



- Adults in 2011 who were unemployed in the past year were more likely than those who were employed full time to have serious thoughts of suicide (6.7 vs. 2.6 percent), make suicide plans (2.5 vs. 0.6 percent), and attempt suicide (1.3 vs. 0.2 percent).
- Adults in 2011 with Medicaid or CHIP were more likely than those with private health insurance to have serious thoughts of suicide (6.6 vs. 2.8 percent), make suicide plans (2.6 vs. 0.6 percent), and attempt suicide (1.8 vs. 0.2 percent).
- In 2011, full-time college students aged 18 to 22 were less likely than other adults aged 18 to 22 to have serious thoughts of suicide (6.5 vs. 8.4 percent), make suicide plans (1.5 vs. 2.4 percent), or attempt suicide (0.8 vs. 1.8 percent) in the past year.

Major Depressive Episode

A NSDUH module designed to obtain measures of lifetime and past year prevalence of MDE and treatment for depression has been administered to adults aged 18 or older since 2004. Some questions in the adult depression module differ slightly from questions in the adolescent depression module. Therefore, the MDE data for adults aged 18 or older should not be compared or combined with MDE data for youths aged 12 to 17.

MDE, as defined in NSDUH, is based on the definition of MDE in the DSM-IV (APA, 1994) and is measured for the lifetime and past year periods. Lifetime MDE is defined as having at least five or more of nine symptoms of depression in the same 2-week period in a person's lifetime, in which at least one of the symptoms was a depressed mood or loss of interest or pleasure in daily activities. Respondents who had MDE in their lifetime were defined as having past year MDE if they had a period of depression lasting 2 weeks or longer in the past 12 months while also having some of the other symptoms of MDE. It should be noted that, unlike the DSM-IV criteria for MDE, no exclusions were made in NSDUH for depressive symptoms caused by medical illness, bereavement, or substance use disorders. Treatment for MDE in adults is defined as seeing or talking to a health professional or other professional or using prescription medication for depression in the past year. The specific questions used to measure MDE and a discussion of measurement issues are included in Section B.4.4 in Appendix B of this report and in Section B.4.4 in Appendix B of the 2009 mental health findings report (CBHSQ, 2010).

Adding new adult mental health questions in 2008 (i.e., the past 30-day Kessler-6 or K6 scale, the functional impairment scale[s], and the suicidal thoughts and behavior items) may have affected how respondents reported their symptoms in the adult MDE module; for further discussion, see Sections B.4.2 and B.4.4 in Appendix B of this report and Sections B.4.4 and B.4.7 in Appendix B of the 2008 NSDUH national findings report (Office of Applied Studies, 2009). These changes in 2008 caused discontinuities in trends for MDE among adults. However, an adjustment was applied to estimates of MDE that were affected by these questionnaire changes to allow trends in MDE among adults for 2005 to 2011 to be included in this report.

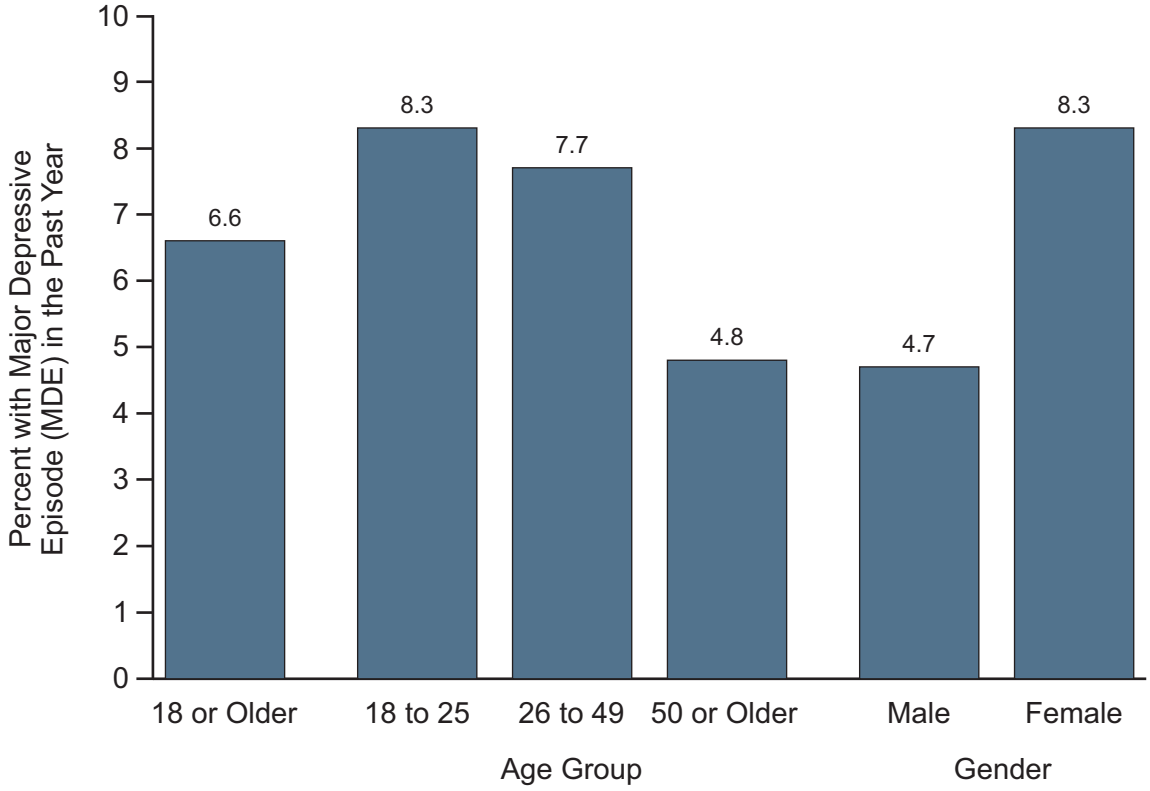
- In 2011, 6.6 percent of adults aged 18 or older (15.2 million people) had at least one MDE in the past year (Figure 2.5). The percentage and number of adults who had past year MDE remained stable between 2005 (6.6 percent, 14.2 million) and 2011.

- Among adults aged 18 or older, the percentage having past year MDE in 2011 was lower for those aged 50 or older (4.8 percent) compared with those aged 18 to 25 (8.3 percent) and those aged 26 to 49 (7.7 percent) (Figure 2.5).

- In 2011, the percentage of adults with past year MDE was higher among women than among men (8.3 vs. 4.7 percent) (Figure 2.5). Among women, the percentage having MDE was lower among women aged 50 or older (5.8 percent) than among women aged 18 to 25 (11.0 percent) or those aged 26 to 49 (10.0 percent).

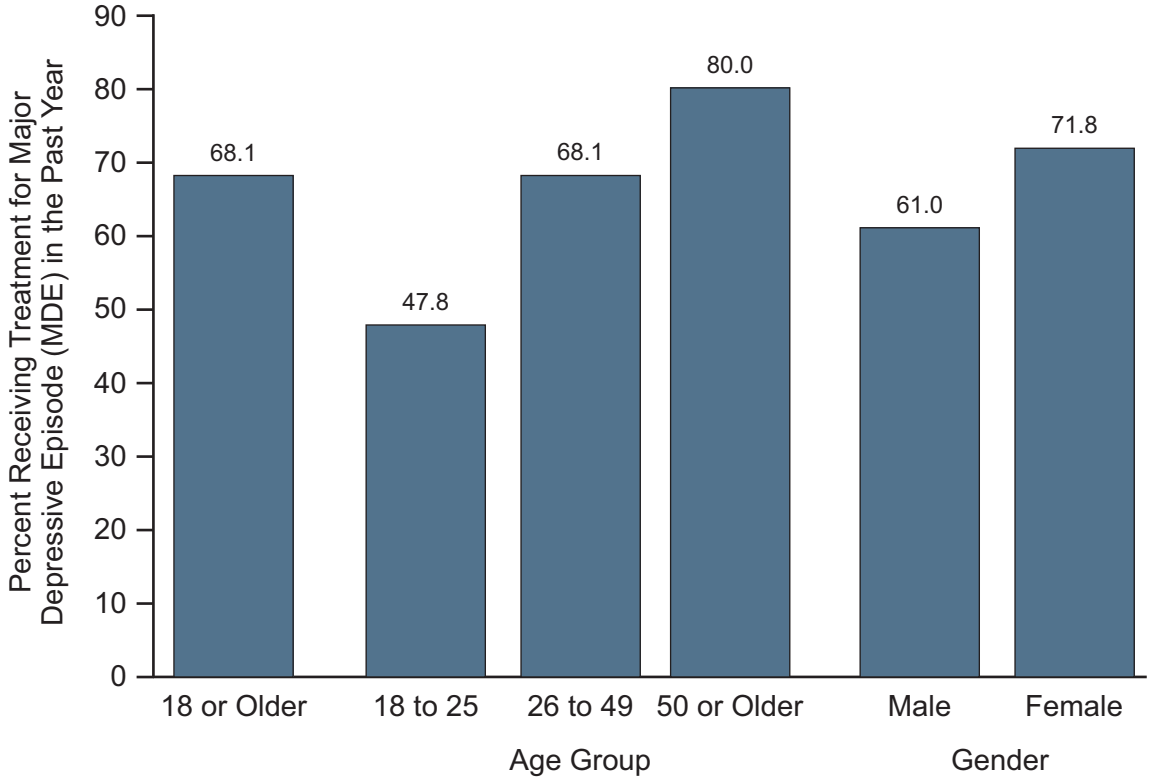
- Past year MDE among adults varied by race/ethnicity in 2011. The percentage of adults with past year MDE was 3.2 percent among Native Hawaiians or Other Pacific Islanders, 4.0 percent among Asians, 4.6 percent among Hispanics, 5.6 percent among blacks, 7.3 percent among whites, 7.4 percent among American Indians or Alaska Natives, and 8.3 percent among persons reporting two or more races.

Figure 2.5 Major Depressive Episode in the Past Year among Adults Aged 18 or Older, by Age and Gender: 2011



- Among adults in 2011, the percentage having past year MDE was higher among unemployed persons (8.5 percent) and persons employed part time (8.1 percent) than among those employed full time (5.0 percent).
- Among the 15.2 million adults aged 18 or older who had MDE in the past year, 10.3 million (68.1 percent) received treatment (i.e., saw or talked to a medical doctor or other professional or used prescription medication) for depression in the same time period (Figure 2.6).
- Adults aged 50 years or older in 2011 with past year MDE were most likely to receive treatment for depression in the past year (80.0 percent), followed by those aged 26 to 49 with past year MDE (68.1 percent), then by those aged 18 to 25 with past year MDE (47.8 percent) (Figure 2.6).
- In 2011, women aged 18 or older who had MDE in the past year were more likely than their male counterparts to have received treatment for depression in the past year (71.8 vs. 61.0 percent) (Figure 2.6).

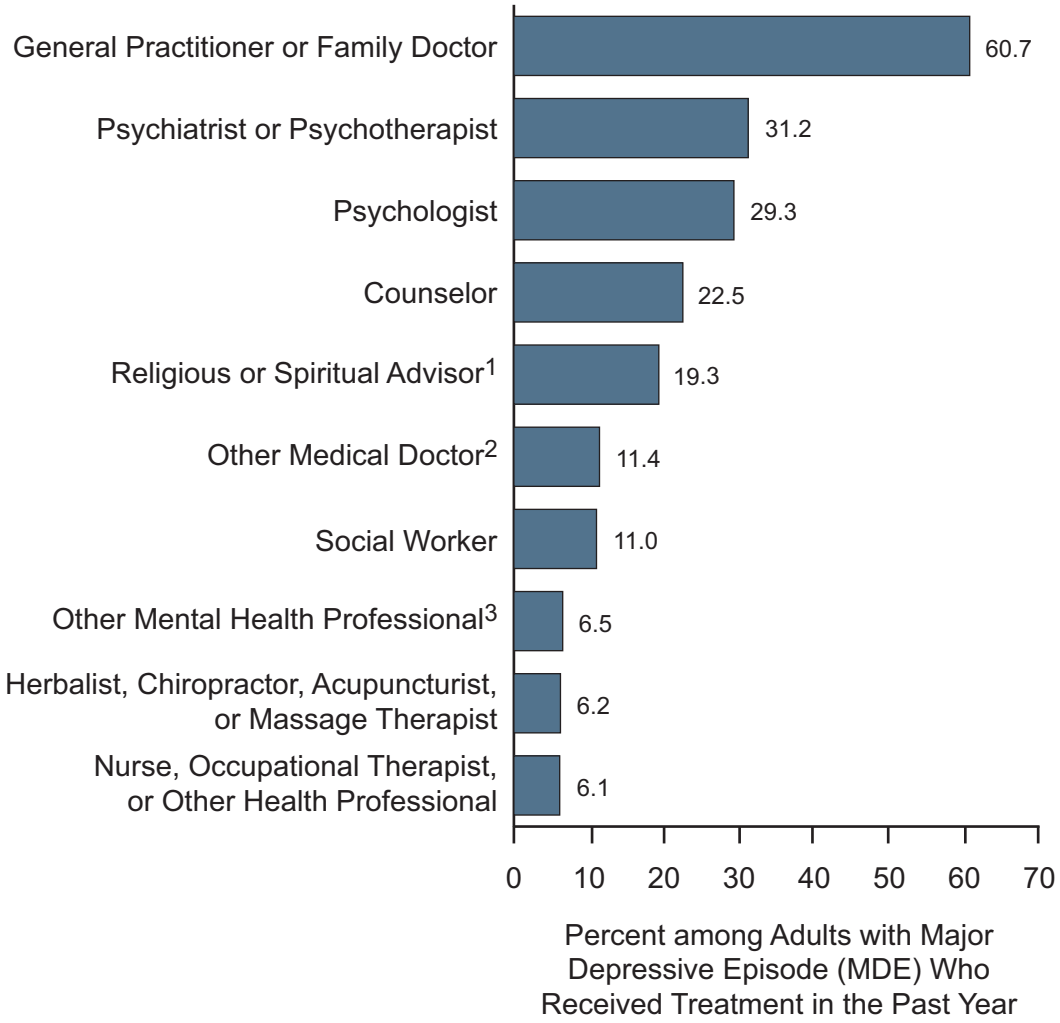
Figure 2.6 Receipt of Treatment for Major Depressive Episode in the Past Year among Adults Aged 18 or Older Who Had a Major Depressive Episode in the Past Year, by Age and Gender: 2011



- Among adults aged 18 or older in 2011 with past year MDE, about two thirds of those with private insurance (68.7 percent) received treatment for depression in the past year. This percentage was higher than that among adults with no insurance (49.8 percent) and was lower than the percentages among adults with Medicaid or CHIP (81.1 percent) or those with other forms of health insurance (83.5 percent).

- Adults aged 18 or older in 2011 with past year MDE who saw or talked to a health professional or other professional about depression in the past year were seen most commonly by general practitioners or family doctors (60.7 percent), followed by psychiatrists or psychotherapists (31.2 percent) or psychologists (29.3 percent), then by counselors (22.5 percent) (Figure 2.7).

Figure 2.7 Type of Professional Seen among Adults Aged 18 or Older with a Major Depressive Episode Who Received Treatment in the Past Year: 2011



[1] Religious or Spiritual Advisor includes ministers, priests, or rabbis.

[2] Other Medical Doctor includes cardiologists, gynecologists, urologists, and other medical doctors who are not general practitioners or family doctors.

[3] Other Mental Health Professional includes mental health nurses and other therapists where type is not specified.

- In 2011, 44.7 percent of adults with past year MDE received treatment for depression through a combination of seeing or talking to a health professional or other professional and using prescription medication. In contrast, 13.9 percent saw or talked to a health professional or other professional only, and 7.0 percent used prescription medication only.

Mental Health Service Utilization among Adults

This section presents data on the receipt of mental health services among adults aged 18 or older, the perceived unmet need for mental health services among adults, and reasons for not receiving mental health services among adults with an unmet need. Adults are asked whether they received treatment or counseling for any problem with emotions, "nerves," or mental health in the past year in any inpatient or outpatient setting or used prescription medication in the past year for a mental or emotional condition, not including treatment for use of alcohol or illicit drugs. The treatment questions in this module do not ask specifically about treatment for a particular disorder. Consequently, references to treatment or counseling for any problem with emotions, nerves, or mental health are described broadly as "mental health service use" or receiving/needing "mental health care."

Questions in NSDUH on mental health service utilization are asked of all adults and are not limited to those with a mental health disorder. Questions for adults about treatment for MDE also are asked in a section of the interview that is separate from these other questions about mental health service utilization. Thus, respondents could indicate receipt of treatment for depression in the adult MDE section without having indicated in the mental health service utilization section that they received services for any problems with emotions, nerves, or mental health.

Estimates of the receipt of mental health services are presented by level of mental illness for adults. These include AMI and three levels of mental illness among those with AMI: low (mild) mental illness, moderate mental illness, and SMI. Definitions for AMI and SMI among persons aged 18 or older were described previously. Low (mild) mental illness was defined as mental illness with mild impairment in carrying out major life activities; moderate mental illness was defined as mental illness with moderate impairment in carrying out major life activities (see Section B.4.3 in Appendix B for additional details on the procedures for constructing these measures).[4]

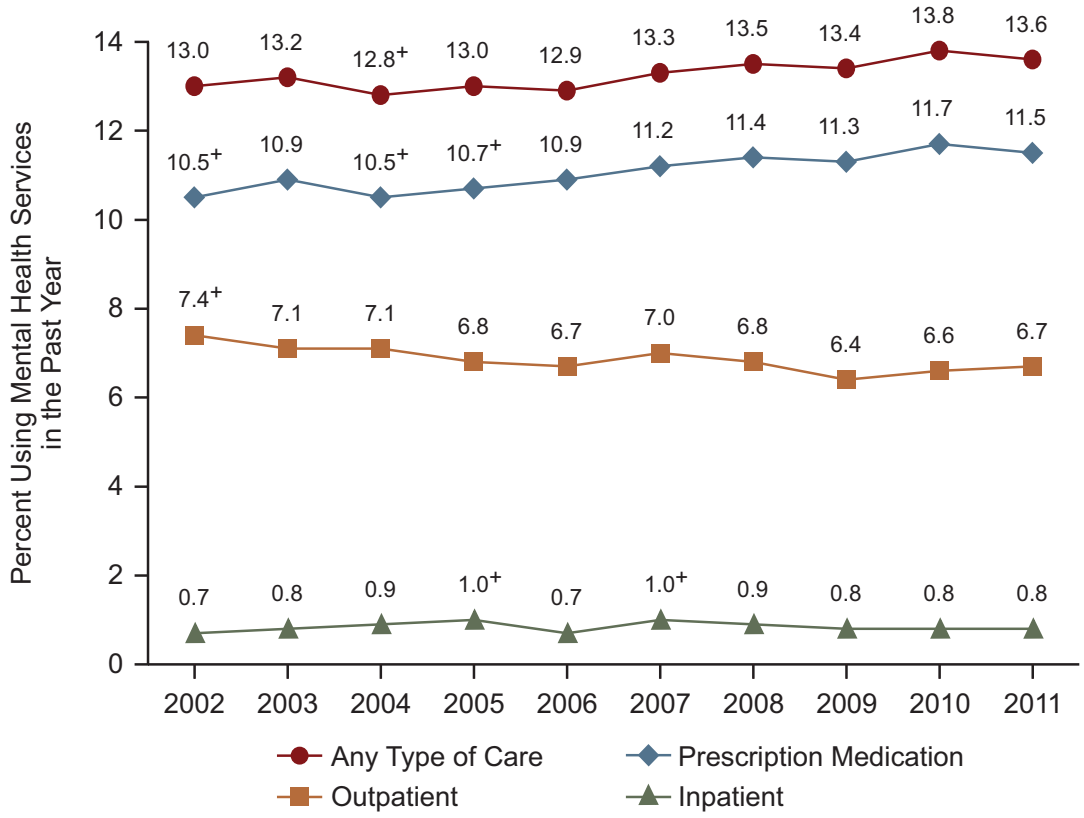
Also described in this section are estimates of the perceived unmet need for mental health services and reasons for not receiving mental health services among adults aged 18 or older with an unmet need. Unmet need is established using a question that asks whether a respondent perceived a need for, but did not receive mental health treatment or counseling at any time in the 12 months prior to the NSDUH interview. This measure also includes persons who received some type of mental health service in the past 12 months but reported a perceived need for additional services they did not receive.

It is important to note that because the survey covers the U.S. civilian, noninstitutionalized population, persons residing in long-term psychiatric or other institutions continuously throughout the year were not included in the NSDUH sampling frame (see Section A.1 in Appendix A and Section B.1 in Appendix B). However, persons who were hospitalized or institutionalized for a period of time during the survey period, but who resided in households for most of the survey period were included in the sample.

[4] Also see the entry for mental illness in the glossary included as part of the 2011 mental health detailed tables (for access information, see Chapter 1).

- In 2011, 31.6 million persons aged 18 or older (13.6 percent of the population aged 18 or older) used mental health services during the past 12 months (Figure 2.8). The number and the percentage were similar to those in 2010 (31.5 million, 13.8 percent).

Figure 2.8 Past Year Mental Health Service Use among Adults Aged 18 or Older, by Type of Care: 2002-2011



+Difference between this estimate and the 2011 estimate is statistically significant at the .05 level.

- The use of mental health services in the past year varied by age for adults. Mental health service use was higher among adults aged 26 to 49 (14.9 percent) and those aged 50 or older (13.2 percent) than among those aged 18 to 25 (11.4 percent).

- Among adults aged 18 or older in 2011, women were more likely than men to use mental health services in the past year (17.1 vs. 9.9 percent).

- Among racial/ethnic groups, the rate of past year mental health service use among adults aged 18 or older in 2011 was 2.5 percent for Native Hawaiians or Other Pacific Islanders, 6.5 percent for Asians, 7.3 percent for Hispanics, 7.6 percent for blacks, 16.2 percent for persons reporting two or more races, 16.3 percent for American Indians or Alaska Natives, and 16.6 percent for whites.

- In 2011, the percentage of adults using mental health services in the past year was higher among adults aged 18 or older with Medicaid or CHIP (22.2 percent) compared with percentages of adults with other forms of health insurance coverage (14.6 percent), adults with private health insurance (13.1 percent), and adults without health insurance coverage (8.8 percent).

- In 2011, the type of mental health service most commonly used by adults in the past year was prescription medication (11.5 percent or 26.8 million adults), followed by outpatient services (6.7 percent or 15.5 million adults), then by inpatient services (0.8 percent or 1.8 million adults) (Figure 2.8). Percentages of adults who used prescription medication, outpatient services, or inpatient services in 2011 were similar to those in 2010 (11.7, 6.6, and 0.8 percent, respectively). Note that respondents could report using more than one type of mental health care.

- Between 2002 and 2011, the percentage of adults using outpatient services in the past year declined from 7.4 to 6.7 percent, and the percentage using prescription medication increased from 10.5 to 11.5 percent (Figure 2.8).

- In 2011, adult women aged 18 or older were more likely than adult men to use outpatient mental health services (8.4 vs. 4.8 percent) and prescription medication (14.6 vs. 8.2 percent) for mental health problems in the past year.

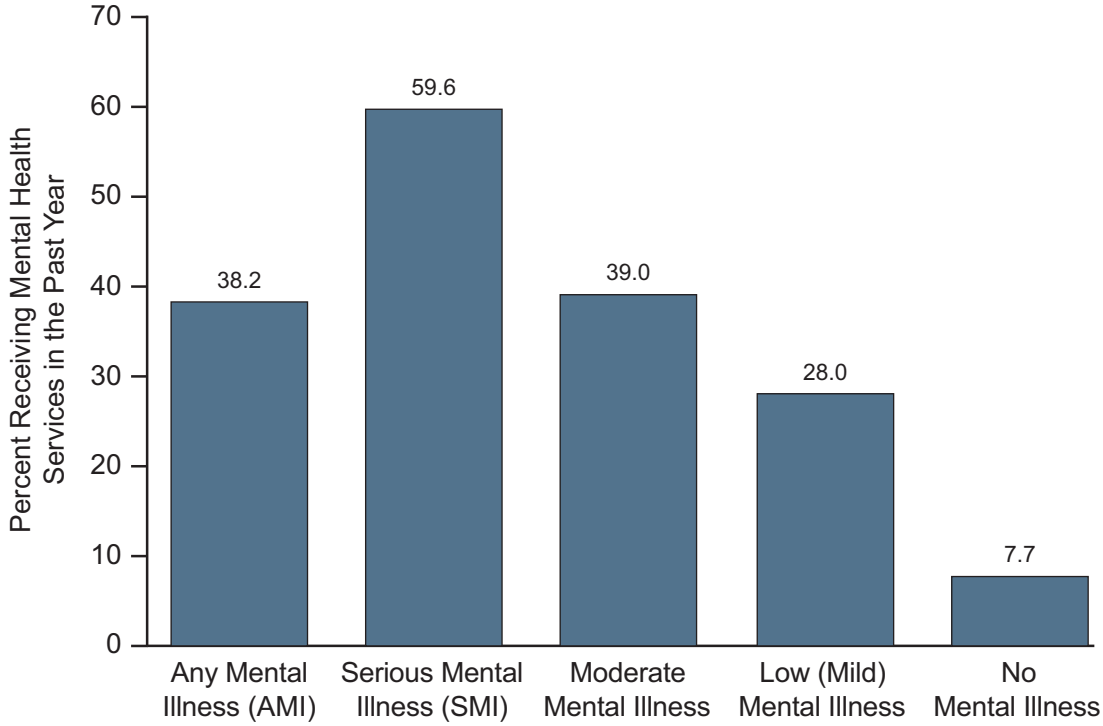
- Among adults aged 18 or older in 2011 who reported using mental health services in the past year, 63.7 percent used one type of care (inpatient, outpatient, or prescription medication), 33.2 percent used two types of care, and 3.1 percent used all three types of care.

- Among adults aged 18 or older in 2011 who used outpatient mental health services in the past year, several types of locations were reported where services were received. These included an office of a private therapist, psychologist, psychiatrist, social worker, or counselor that was not part of a clinic (55.7 percent); an outpatient mental health clinic or center (23.7 percent); a doctor's office that was not part of a clinic (19.6 percent); or an outpatient medical clinic (7.6 percent).

- In 2011, the most likely source of payment for outpatient mental health services among adults aged 18 or older who used mental health services in the past year was private health insurance (37.9 percent), followed by self-payment or payment by a family member living in the household (33.7 percent), then by Medicare (15.2 percent), then by Medicaid (11.9 percent) or an employer (7.1 percent).

- Among the 45.6 million adults aged 18 or older with AMI in 2011, 17.4 million (38.2 percent) received mental health services in the past year (Figure 2.9). Also, among the 11.5 million adults aged 18 or older with SMI in 2011, 6.9 million (59.6 percent) received mental health services in the past year. Mental health services were received by 39.0 and 28.0 percent of adults with moderate mental illness and low (mild) mental illness, respectively.

Figure 2.9 Receipt of Mental Health Services among Adults Aged 18 or Older, by Level of Mental Illness: 2011



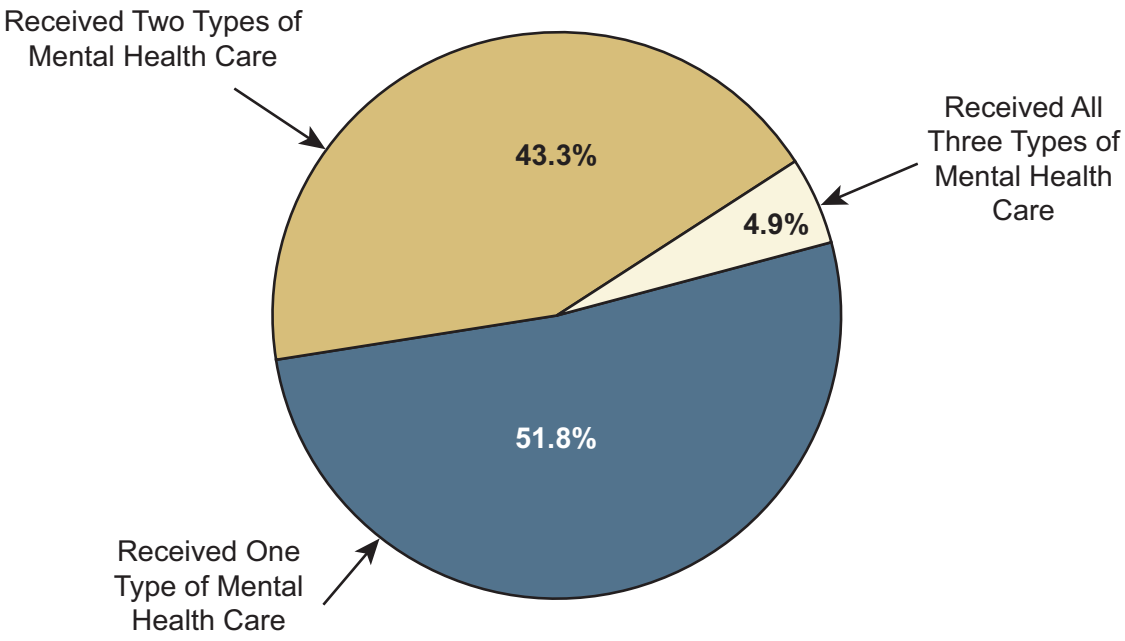
- Percentages of adults aged 18 or older in 2011 who received past year mental health services were similar to those in 2010 for adults with SMI (60.8 percent in 2010) and for adults with past year AMI (39.3 percent in 2010).

- Among adults with SMI in 2011, the rate of mental health service use was lower among adults aged 18 to 25 (45.0 percent) than that among those aged 26 to 49 (60.8 percent) or those aged 50 or older (69.8 percent). A similar pattern of mental health service use by age group was evident among adults with moderate mental illness and low (mild) mental illness. Specifically, rates of service use among adults aged 18 to 25 with moderate mental illness and low (mild) mental illness (26.8 and 17.3 percent, respectively) were lower than corresponding rates among their counterparts aged 26 to 49 (40.8 and 27.1 percent, respectively) and those aged 50 or older (45.8 and 35.9 percent, respectively).

- In 2011, among all adults aged 18 or older with past year AMI, 32.9 percent used prescription medication, 22.4 percent used outpatient services, and 3.1 percent used inpatient services for a mental health problem in the past year. The percentages of adults with past year SMI who used prescription medication, outpatient services, and inpatient services were 52.6, 40.1, and 7.2 percent, respectively. Respondents could report that they used more than one type of service.

- Among the 17.4 million adults aged 18 or older with past year AMI who reported receiving mental health services in the past year, 51.8 percent received one type of care (inpatient, outpatient, or prescription medication), 43.3 percent received two types of care, and 4.9 percent received all three types of care (Figure 2.10).

Figure 2.10 Number of Types of Mental Health Services Received among Adults Aged 18 or Older with Past Year Any Mental Illness Who Received Mental Health Services in the Past Year: 2011

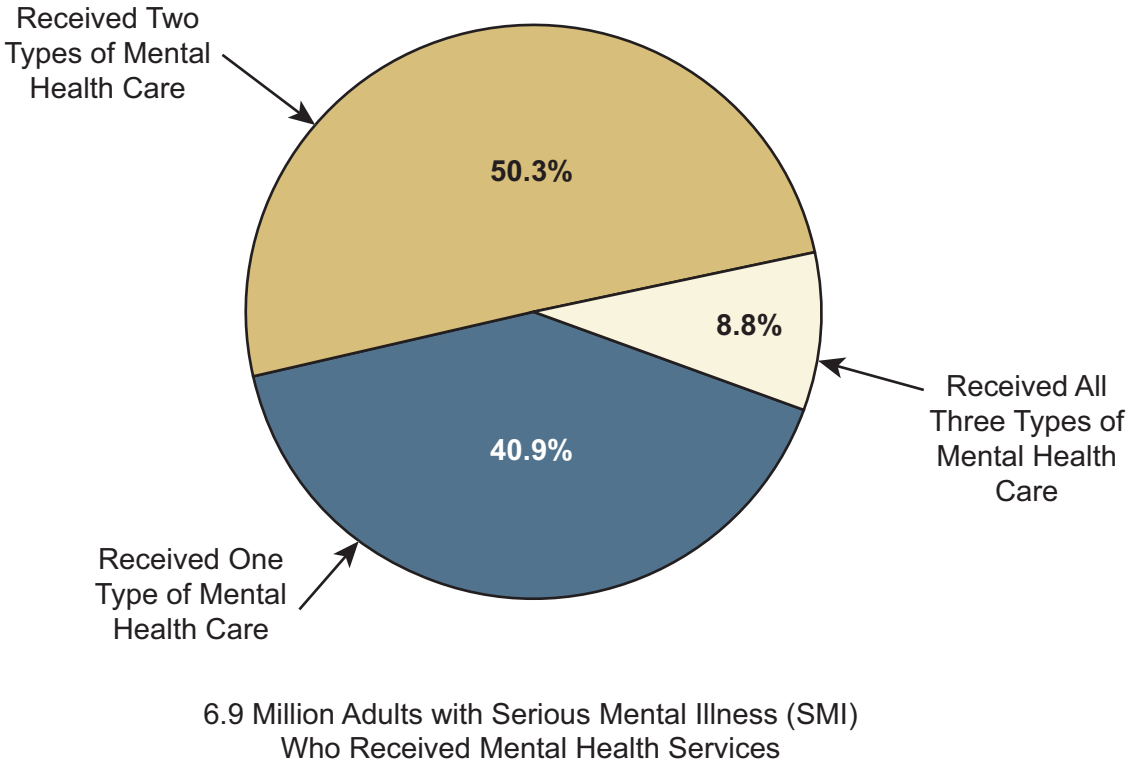


Note: The three types of mental health care are receiving inpatient care, outpatient care, or prescription medication.

- Among the 6.9 million adults aged 18 or older with past year SMI who reported receiving mental health services in the past year, 40.9 percent received one type of care (inpatient, outpatient, or prescription medication), 50.3 percent received two types of care, and 8.8 percent received all three types of care (Figure 2.11).

- Among adults aged 18 or older who reported receiving mental health services in the past year, the percentage receiving one type of mental health service (inpatient, outpatient, or prescription medication) was 40.9 percent among adults with past year SMI, 55.8 percent among adults with past year moderate mental illness, and 60.5 percent among adults with past year low (mild) mental illness.

Figure 2.11 Number of Types of Mental Health Services Received among Adults Aged 18 or Older with Past Year Serious Mental Illness Who Received Mental Health Services in the Past Year: 2011



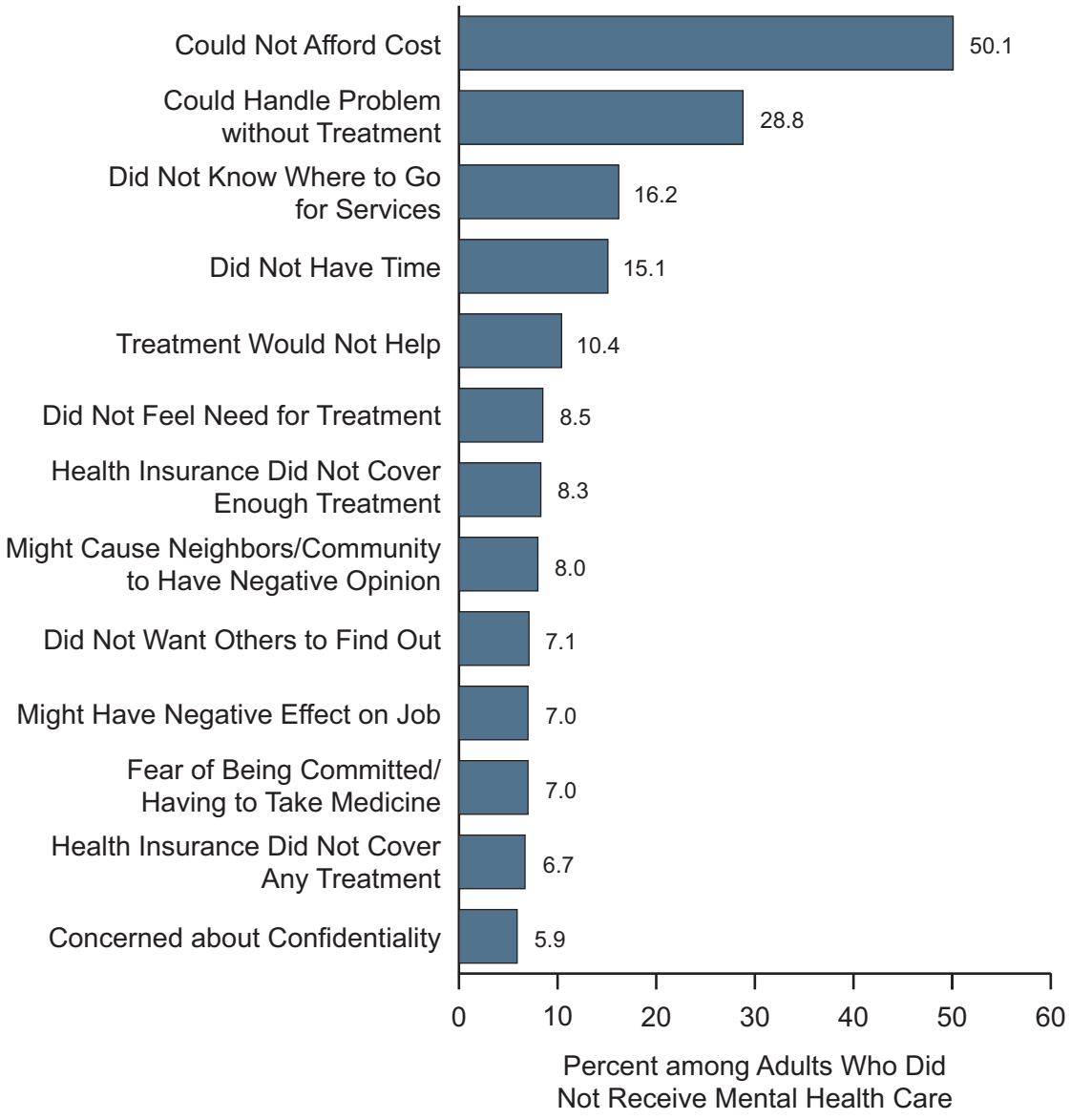
Note: The three types of mental health care are receiving inpatient care, outpatient care, or prescription medication.

- Among adults aged 18 or older, receipt of prescription medication for mental health problems varied by level of mental illness in the past year. In 2011, 52.6 percent of adults with SMI, 32.9 percent of adults with moderate mental illness, and 23.8 percent of adults with low (mild) mental illness received prescription medication for their mental health problems in the past year.

- In 2011, there were 10.8 million adults aged 18 or older (4.6 percent of all adults) who reported an unmet need for mental health care in the past year. These included 4.9 million adults who did not receive any mental health services in the past year. Among adults who did receive some type of mental health service in the past year, 18.6 percent (5.9 million) reported an unmet need for mental health care. (Unmet need among adults who received mental health services may reflect a delay in care or a perception of insufficient care.)

- Among the 4.9 million adults aged 18 or older who reported an unmet need for mental health care and did not receive mental health services in the past year, several reasons were reported for not receiving mental health care. These included an inability to afford care (50.1 percent), believing at the time that the problem could be handled without care (28.8 percent), not knowing where to go for care (16.2 percent), and not having the time to go for care (15.1 percent) (Figure 2.12).

Figure 2.12 Reasons for Not Receiving Mental Health Services in the Past Year among Adults Aged 18 or Older with an Unmet Need for Mental Health Care Who Did Not Receive Mental Health Services: 2011



3. Major Depressive Episode and Mental Health Service Utilization among Youths

This chapter presents findings from the National Survey on Drug Use and Health (NSDUH) on past year major depressive episode (MDE), MDE accompanied by severe impairment in one or more role domains, and the percentage receiving treatment for depression among youths aged 12 to 17 in the United States. This chapter also presents findings on mental health service utilization by youths for any emotional and behavioral problems (excluding those caused by alcohol or illicit drug use).

Major Depressive Episode (MDE), MDE with Severe Impairment, and Treatment

A module of questions designed to obtain measures of lifetime and past year prevalence of MDE, severe impairment caused by MDE in the past year, and treatment for MDE in the past year has been administered to youths aged 12 to 17 since 2004. As described in the next paragraph, some questions in the adolescent depression module differ slightly from questions in the adult depression module to make them more appropriate for youths. Therefore, these data should not be compared or combined with MDE data for adults aged 18 or older.

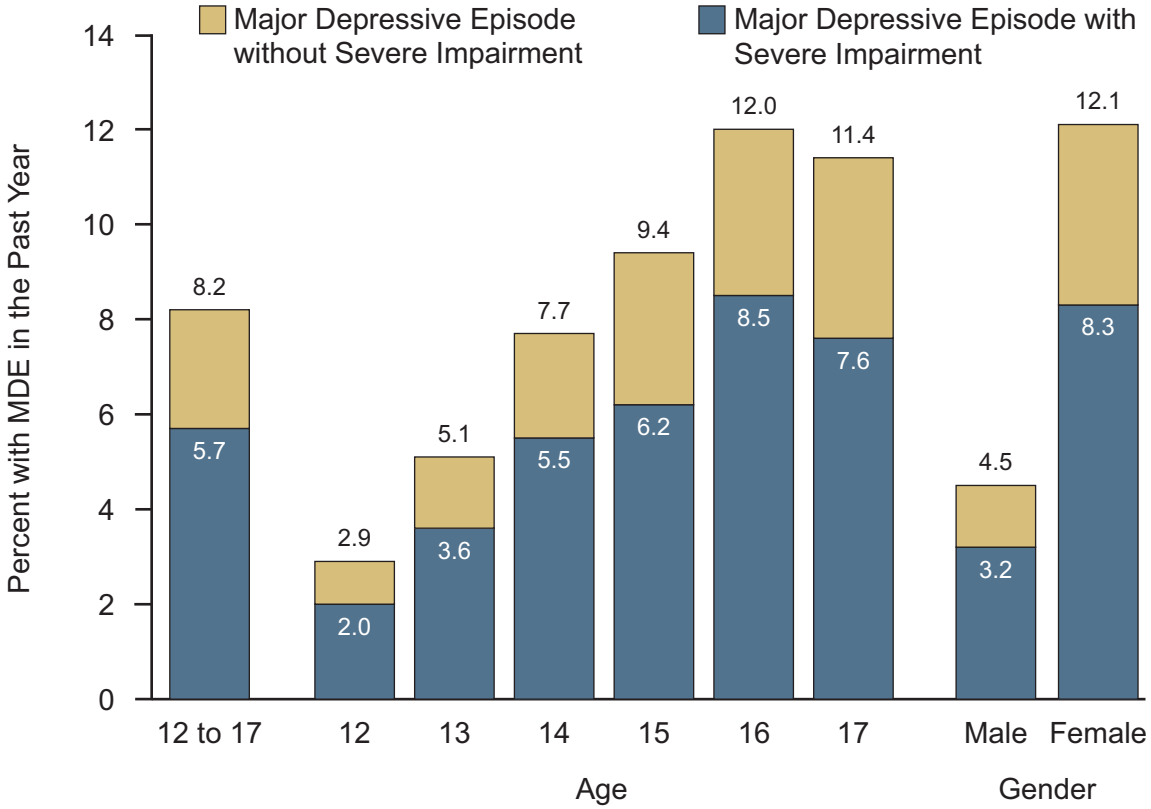
MDE is defined as a period of at least 2 weeks when a person experienced a depressed mood or loss of interest or pleasure in daily activities and had at least four of seven additional symptoms reflecting the criteria as described in the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association [APA], 1994). It should be noted that unlike the DSM-IV criteria for MDE, no exclusions were made in NSDUH for depressive symptoms caused by medical illness, bereavement, or substance use disorders. Severe impairment is defined by the level of role interference reported to be caused by MDE. The role domains (i.e., chores at home, school or work, close relationships with family, or social life) for youths aged 12 to 17 are slightly modified to be made age appropriate. Treatment for MDE among youths is defined as seeing or talking to a medical doctor or other professional or using prescription medication for depression in the past year. The specific questions used to measure MDE and a discussion of measurement issues are included in Section B.4.4 of Appendix B.

- In 2011, there were 2.0 million youths (8.2 percent of the population aged 12 to 17) who had MDE during the past year (Figure 3.1). This was similar to the percentages in 2005 to 2010 (8.8, 7.9, 8.2, 8.3, 8.1, and 8.0 percent, respectively) and was lower than the percentage in 2004 (9.0 percent).

- In 2011, 1.4 million youths (5.7 percent) had past year MDE with severe impairment in one or more role domains. This was similar to the percentage in 2010 (5.7 percent).

- In 2011, past year MDE among youths generally increased with age. Among 12 year olds, 2.9 percent had past year MDE. Corresponding rates were 12.0 percent among 16 year olds and 11.4 percent among 17 year olds (Figure 3.1). Past year MDE with severe impairment among youths also generally increased with age. Among 12 year olds, 2.0 percent had past year MDE with severe impairment. Corresponding rates among older adolescents were 8.5 percent for 16 year olds and 7.6 percent for 17 year olds.

Figure 3.1 Major Depressive Episode in the Past Year among Youths Aged 12 to 17, by Severe Impairment, Age, and Gender: 2011



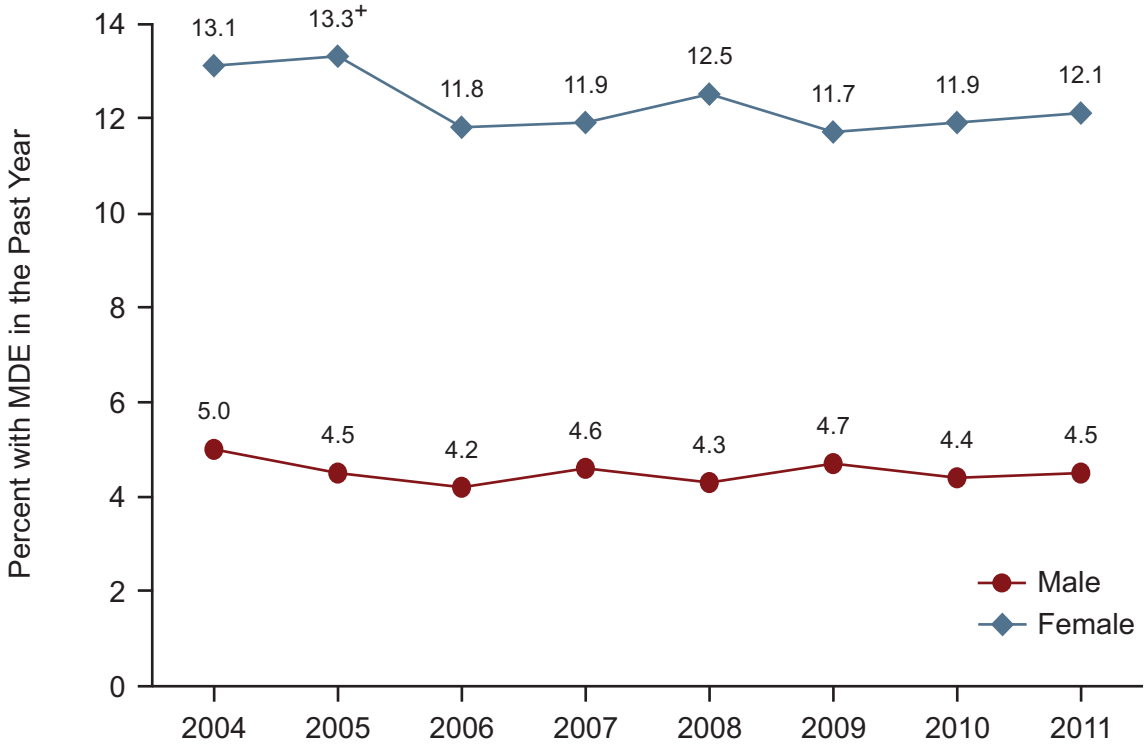
Note: Respondents with an unknown level of impairment were included in the estimates for Major Depressive Episode without Severe Impairment.

- Among youths aged 12 to 17 in 2011, females were more likely than males to have past year MDE (12.1 vs. 4.5 percent) (Figure 3.1). Similarly, females were more likely than males to have past year MDE with severe impairment (8.3 vs. 3.2 percent).

- Among both female and male youths, the prevalence of past year MDE was similar in 2010 and 2011 (Figure 3.2). The percentages of female and male youths in 2010 who had MDE with severe impairment (8.2 and 3.2 percent, respectively) also were similar to the percentages in 2011.

- Past year MDE among female youths was stable from 2006 through 2011 (ranging from 11.7 to 12.5 percent) (Figure 3.2). However, the 2011 percentage was lower than in 2005 (13.3 percent).

Figure 3.2 Major Depressive Episode in the Past Year among Youths Aged 12 to 17, by Gender: 2004-2011



+ Difference between this estimate and the 2011 estimate is statistically significant at the .05 level.

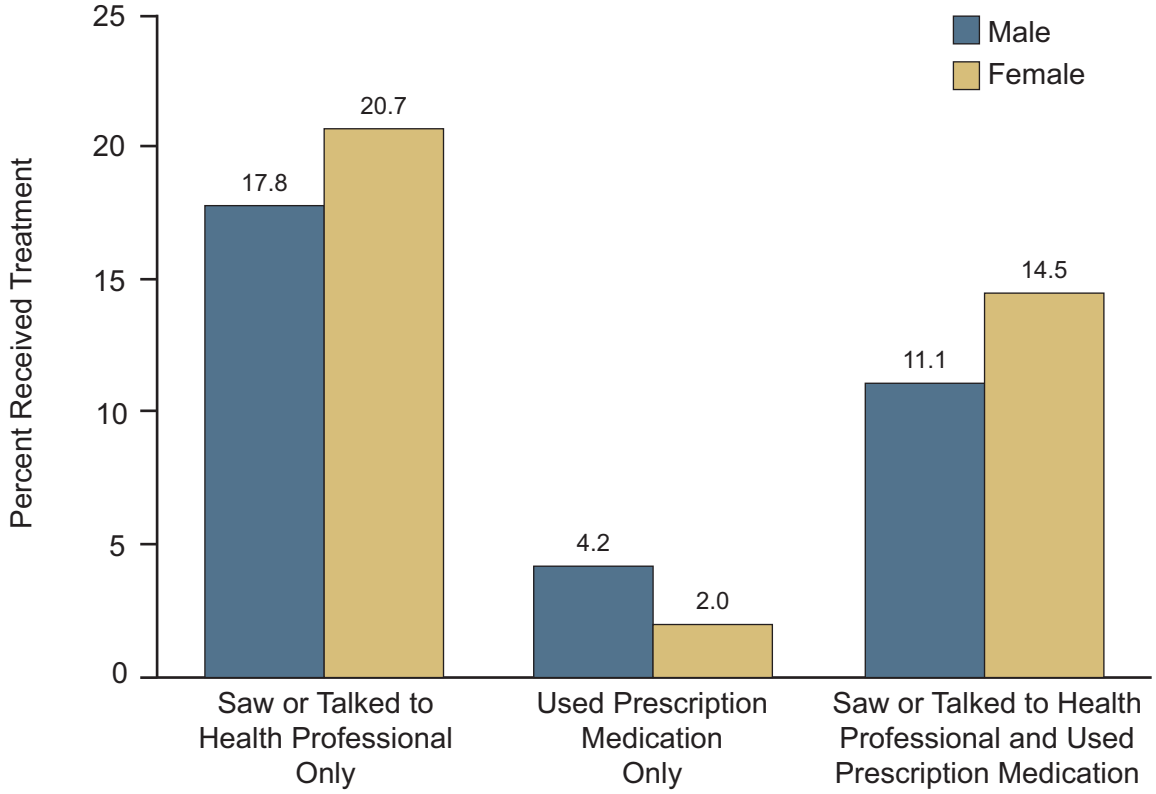
- In 2011, 38.4 percent of youths aged 12 to 17 with past year MDE and 43.5 percent with past year MDE with severe impairment received treatment for depression (i.e., saw or talked to a medical doctor or other professional or used prescription medication). These percentages were similar to those in 2010 (37.8 and 41.1 percent, respectively).

- Among youths in 2011 with past year MDE, 19.9 percent saw or talked to a health professional only, 2.6 percent used prescription medication only, and 13.6 percent received treatment from both sources for depression in the past year. These percentages were similar to those in 2010 (19.4, 3.0, and 13.2 percent, respectively).

- Among female youths in 2011 with past year MDE, 20.7 percent saw or talked to a health professional only, 2.0 percent used prescription medication only, and 14.5 percent received treatment from both sources for depression in the past year (Figure 3.3). These percentages for female youths were similar to those in 2010 (21.6, 2.7, and 13.7 percent, respectively).

- Among male youths in 2011 with past year MDE, 17.8 percent saw or talked to a health professional only, 4.2 percent used prescription medication only, and 11.1 percent received treatment from both sources for depression in the past year (Figure 3.3). These percentages for male youths were similar to those in 2010 (14.0, 3.7, and 11.9 percent, respectively).

Figure 3.3 Type of Treatment Received for Major Depressive Episode in the Past Year among Youths Aged 12 to 17, by Gender: 2011



Note: Health Professionals include general practitioner or family doctor; other medical doctor (e.g., cardiologist, gynecologist, urologist); psychologist; psychiatrist or psychotherapist; social worker; counselor; other mental health professional (e.g., mental health nurse or other therapist where type is not specified); and nurse, occupational therapist, or other health professional.

Mental Health Service Utilization

In 2000, NSDUH initiated mental health service utilization modules for respondents aged 12 to 17 and those aged 18 or older. These modules ask about services for emotional and behavioral problems that were not caused by substance use. The mental health service utilization questions for youths aged 12 to 17 are different from those asked of adults aged 18 or older. The youth module was revised in 2009 to include updates to the sources of youth mental health services in an education setting (i.e., school system) and a new question on mental health service utilization in a juvenile justice setting.

The youth mental health service utilization module asks respondents aged 12 to 17 whether they received any treatment or counseling within the 12 months prior to the interview for problems with emotions or behavior in several settings: (a) the *specialty mental health setting* (inpatient or outpatient care); (b) the *education setting* (talked with a school social worker, psychologist, or counselor about an emotional or behavioral problem; participated in a program for students with emotional or behavioral problems while in a regular school; or attended a school for students with emotional or behavioral problems); (c) the *general medical setting* (pediatrician or family physician care for emotional or behavioral problems); or (d) the *juvenile justice setting* (received services for an emotional or behavioral problem in a detention center, prison, or jail). Youths also are asked about the number of nights spent in overnight facilities, the number of visits they had to outpatient mental health or general medical providers for mental health treatment or counseling, and the reason(s) for the most recent stay or visit.

- In 2011, 3.1 million youths aged 12 to 17 (12.7 percent) received treatment or counseling for problems with emotions or behavior in a specialty mental health setting (inpatient or outpatient care) in the past 12 months. The 2011 percentage was similar to those in 2002 through 2010 (ranging from 12.0 to 13.5 percent).

- In 2011, 2.9 million youths (11.9 percent) received mental health services in an education setting, which was similar to the estimates in 2009 (2.9 million youths or 12.1 percent) and 2010 (3.0 million youths or 12.4 percent).

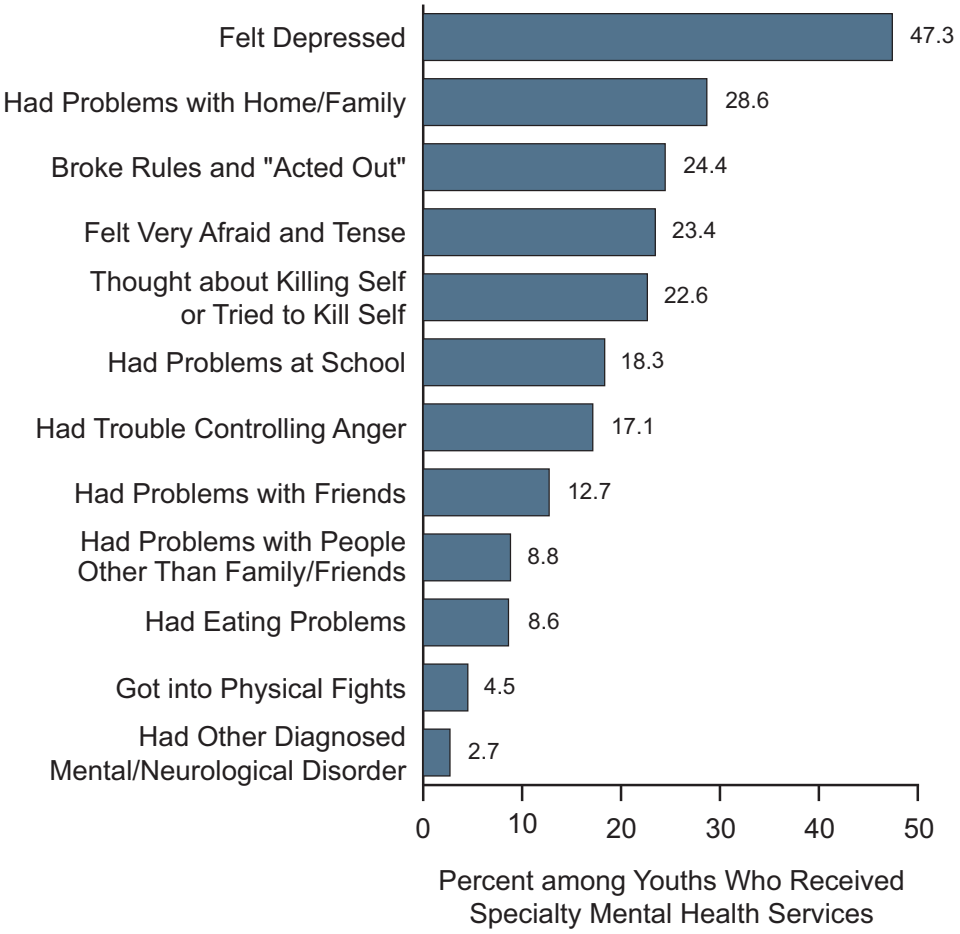
- In 2011, 619,000 youths (2.5 percent) received mental health services in a general medical setting. Additionally in 2011, 1.3 million youths (5.2 percent) received mental health services in both a specialty setting and a nonspecialty setting (i.e., either an education or a general medical setting).

- In 2011, 103,000 youths (0.4 percent) received mental health services in a juvenile justice setting in the past 12 months. Estimates were similar for male and female youths, with 49,000 males (0.4 percent) and 54,000 females (0.4 percent) having received mental health services in a juvenile justice setting.

- Of the 3.1 million youths aged 12 to 17 in 2011 who received specialty mental health services, the most likely reason for receiving services was feeling depressed (47.3 percent), followed by having problems with home or family (28.6 percent), breaking rules and "acting out" (24.4 percent), feeling very afraid and tense (23.4 percent), and thinking about or attempting suicide (22.6 percent), which was followed by having problems at school (18.3 percent) and having trouble controlling anger (17.1 percent) (Figure 3.4).

- Youths in 2011 who received inpatient specialty mental health services in the past year were more likely than those who received outpatient specialty mental health services to report that they received services because they thought about or attempted suicide (43.2 vs. 20.9 percent).

Figure 3.4 Reasons for Receiving Specialty Mental Health Services among Youths Aged 12 to 17 Who Received Mental Health Services in the Past Year: 2011

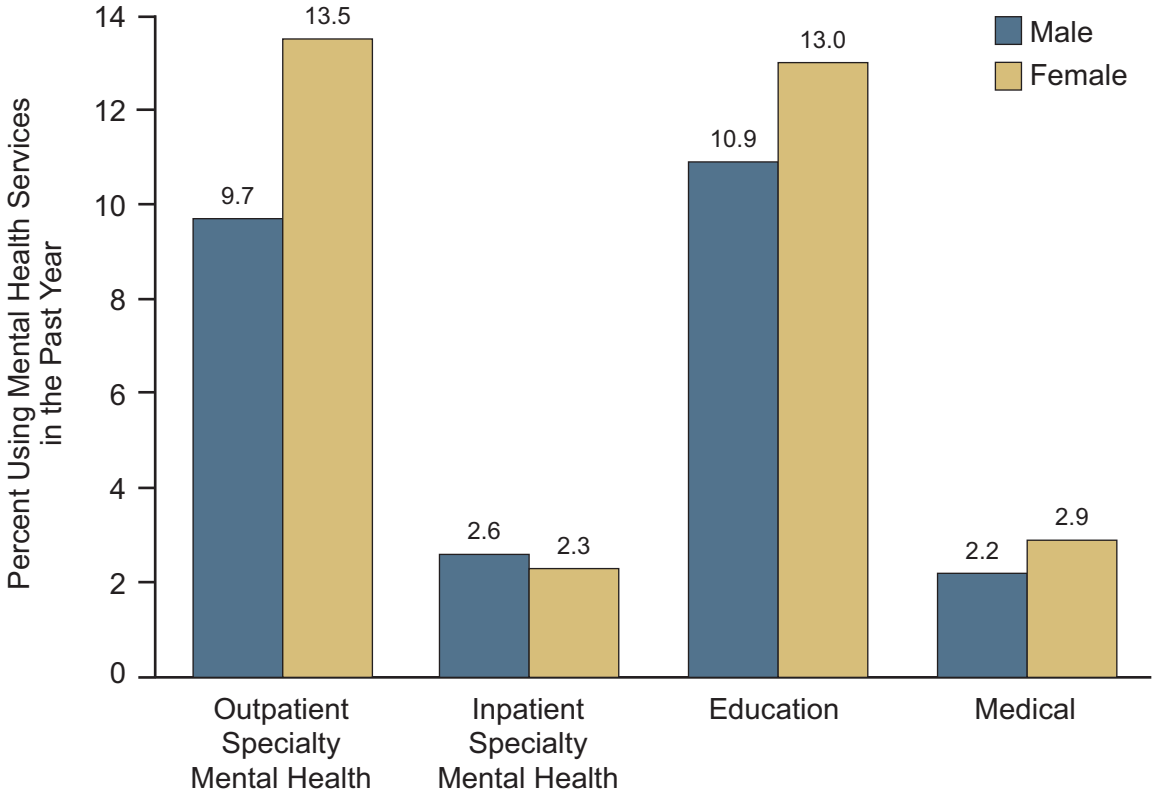


- Of the 2.9 million youths aged 12 to 17 in 2011 who received mental health services in the education setting, the most likely reason for receiving services was feeling depressed (38.6 percent), followed by having problems at school (24.0 percent), then having problems with friends (20.1 percent), breaking rules and "acting out" (20.0 percent), having problems with home or family (18.0 percent), and feeling very afraid and tense (17.8 percent).

- Of the 619,000 youths aged 12 to 17 in 2011 who received mental health services in a general medical setting, the most likely reason for receiving services was feeling depressed (44.2 percent), followed by feeling very afraid and tense (18.4 percent), breaking rules and "acting out" (18.3 percent), having thoughts of or attempting suicide (17.7 percent), some other reason (12.7 percent), having eating problems (12.4 percent), and having problems at school (9.9 percent).

- Female youths aged 12 to 17 were more likely than male youths in 2011 to use outpatient specialty mental health services (13.5 vs. 9.7 percent), education services (13.0 vs. 10.9 percent), and general medical-based services (2.9 vs. 2.2 percent) (Figure 3.5). Similar percentages of female and male youths received inpatient specialty mental health services (2.3 and 2.6 percent, respectively).

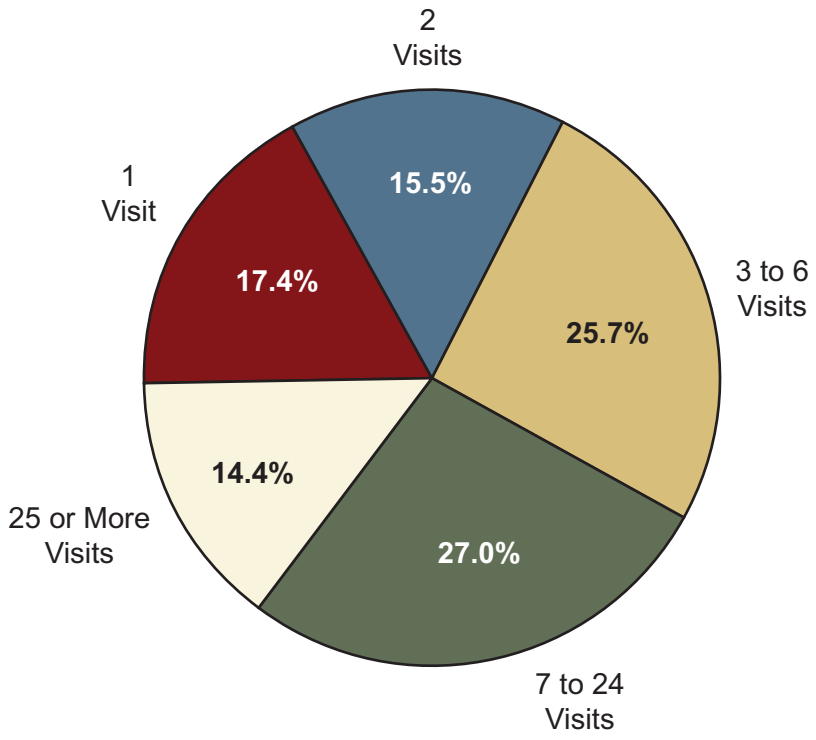
Figure 3.5 Past Year Mental Health Service Use among Youths Aged 12 to 17, by Gender: 2011



- In 2011, of the 2.8 million youths aged 12 to 17 who received outpatient specialty mental health services in the past 12 months, 17.4 percent reported having 1 visit, 15.5 percent reported having 2 visits, 25.7 percent reported having 3 to 6 visits, 27.0 percent reported having 7 to 24 visits, and 14.4 reported having 25 or more visits (Figure 3.6).

- Of the 602,000 youths aged 12 to 17 in 2011 who received inpatient or residential specialty mental health services in the past 12 months, about one third (33.5 percent) reported staying overnight 1 night, 12.2 percent reported staying overnight 2 nights, 17.0 percent reported staying overnight 3 to 6 nights, 23.2 percent reported staying overnight 7 to 24 nights, and 14.0 percent reported staying overnight 25 or more nights.

Figure 3.6 Number of Outpatient Visits in the Past Year among Youths Aged 12 to 17 Who Received Outpatient Specialty Mental Health Services: 2011



2.8 Million Youths Who Received Outpatient Specialty Mental Health Services

4. Co-Occurrence of Mental Illness and Substance Use

This chapter presents findings from the 2011 National Survey on Drug Use and Health (NSDUH) on the co-occurrence of mental illness and mental health problems with substance use and substance use disorders (illicit drug or alcohol dependence or abuse) in the United States. Findings presented for adults aged 18 or older include the co-occurrence of substance use and substance use disorders with past year mental illness; suicidal thoughts, plans, or attempts; and major depressive episode (MDE). Also, the utilization of substance use and mental health services among adults with co-occurring mental illness and substance use is discussed. Findings for youths aged 12 to 17 are presented on the co-occurrence of MDE with substance use and substance use disorders.

Mental illness, as discussed in Chapter 2, is defined as the presence of a diagnosable mental, behavioral, or emotional disorder (excluding developmental and substance use disorders) of sufficient duration to meet diagnostic criteria specified within the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994). Levels of any mental illness (AMI) considered in this report include serious mental illness (SMI), moderate mental illness, and low (mild) mental illness, which are differentiated by their level of functional impairment. Functional impairment is the interference with or limitation of one or more major life activities. Definitions for these mental health measures and other measures used in this chapter are included in a glossary as part of the 2011 mental health detailed tables.[5]

Mental Illness and Substance Use among Adults

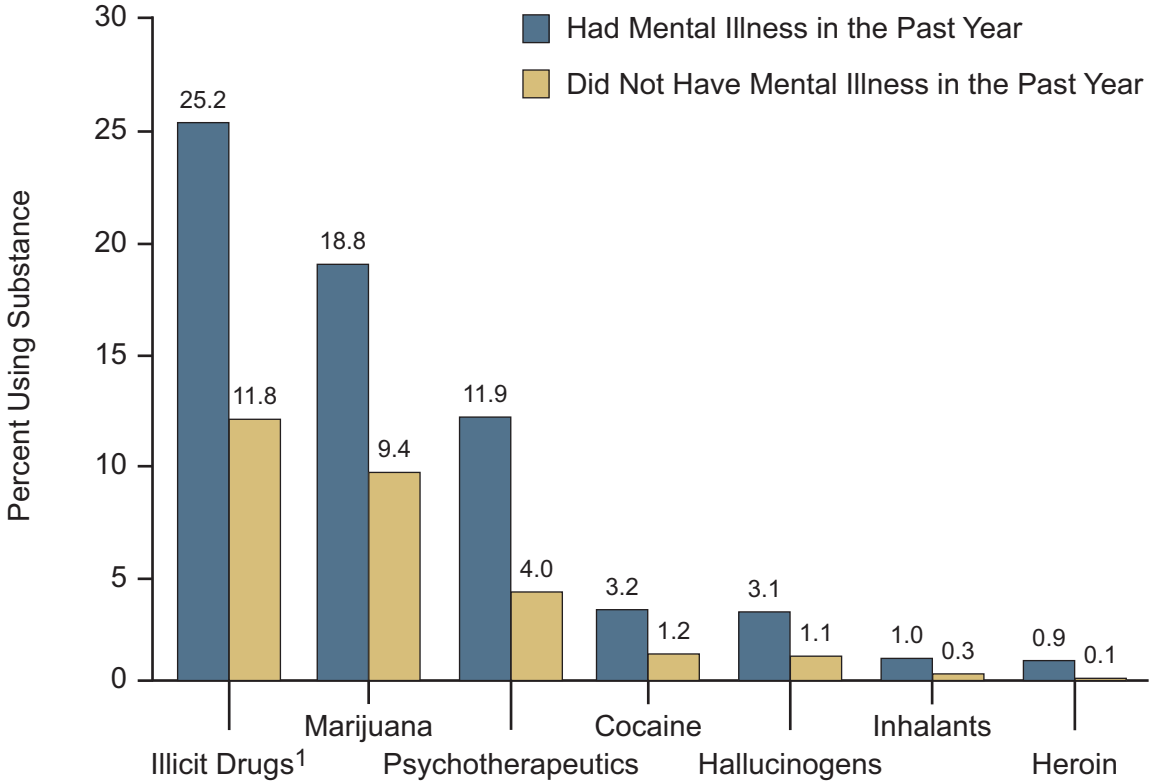
- In 2011, the use of illicit drugs in the past year was more likely among adults aged 18 or older with past year AMI (25.2 percent) than it was among adults who did not have mental illness in the past year (11.8 percent) (Figure 4.1). This pattern was similar for most specific types of illicit drug use, including the use of marijuana, cocaine, hallucinogens, inhalants, or heroin and the nonmedical use of prescription-type psychotherapeutics.

- The use of cigarettes in the past month was more likely among adults aged 18 or older with AMI compared with adults who did not have mental illness (34.7 vs. 20.9 percent).

- Among adults aged 18 or older with AMI in the past year, 27.6 percent were binge alcohol users in the past month, which was higher than the percentage of past month binge alcohol users among adults who did not have mental illness in the past year (23.5 percent). Binge alcohol use is defined as drinking five or more drinks on the same occasion (i.e., at the same time or within a couple of hours of each other) on at least 1 day in the past 30 days.

[5] See Chapter 1 for more information on this report's mental health glossary and the mental health detailed tables.

Figure 4.1 Past Year Substance Use among Adults Aged 18 or Older, by Any Mental Illness: 2011



[1] Illicit Drugs include marijuana/hashish, cocaine (including crack), heroin, hallucinogens, inhalants, or prescription-type psychotherapeutics used nonmedically.

- Adults aged 18 or older with AMI in the past year were more likely than adults who did not have mental illness to be heavy alcohol users in the past month (8.7 vs. 6.2 percent). Heavy alcohol use is defined as drinking five or more drinks on the same occasion on 5 or more days in the past 30 days.

- Illicit drug use in the past year was associated with the level of mental illness. Illicit drug use in the past year among adults aged 18 or older was highest among adults with past year SMI (31.3 percent), followed by adults with moderate mental illness (27.3 percent), then by those with low (mild) mental illness (21.7 percent), then by those who did not have past year mental illness (11.8 percent).

- Adults aged 18 or older with SMI were more likely than those who did not have mental illness in the past year to be past month cigarette users (44.4 vs. 20.9 percent).

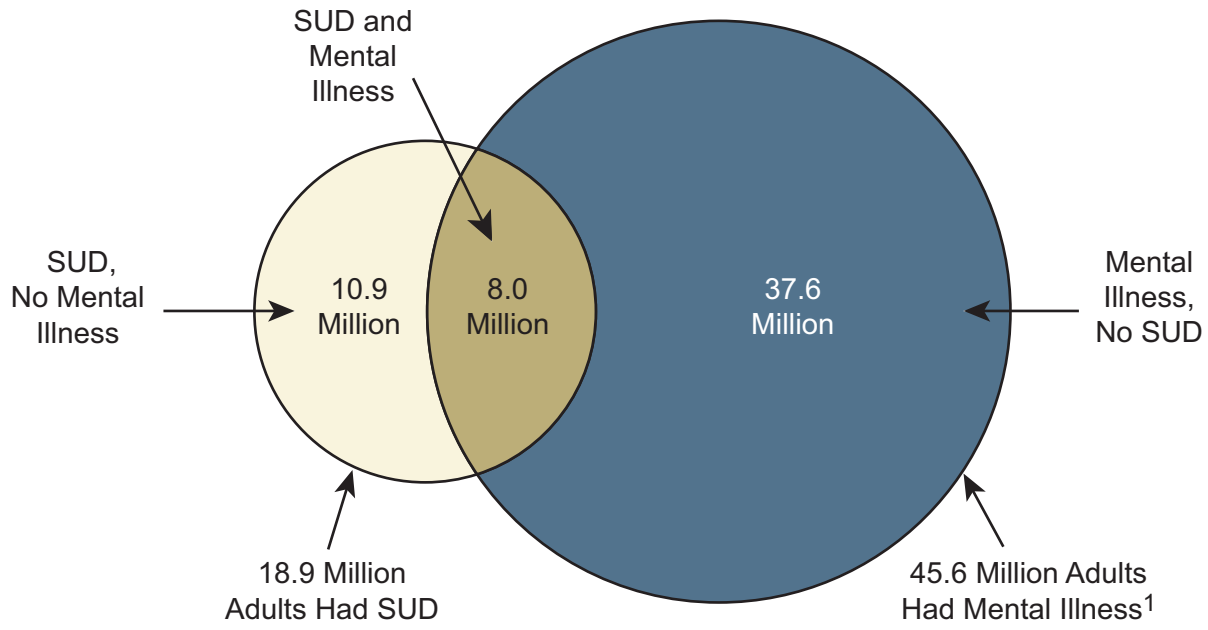
- Adults aged 18 or older in 2011 with SMI in the past year were more likely than those without mental illness to be past month binge alcohol users (28.4 vs. 23.5 percent) or heavy alcohol users (9.9 vs. 6.2 percent).

Mental Illness and Substance Use Disorder among Adults

- Among the 18.9 million adults with a past year substance use disorder, 42.3 percent (8.0 million adults) had a co-occurring mental illness in 2011 (Figure 4.2). In comparison, among adults without a substance use disorder, 17.6 percent had mental illness.

- Among the 45.6 million adults aged 18 or older with AMI in the past year, 17.5 percent (8.0 million adults) met criteria for substance dependence or abuse. In comparison, 5.8 percent of adults who did not have mental illness in the past year (10.9 million adults) met criteria for a substance use disorder.

Figure 4.2 Past Year Substance Dependence or Abuse and Mental Illness among Adults Aged 18 or Older: 2011



SUD = substance use disorder.

[1] Statistics on mental illness are provided in Chapter 2 of this report.

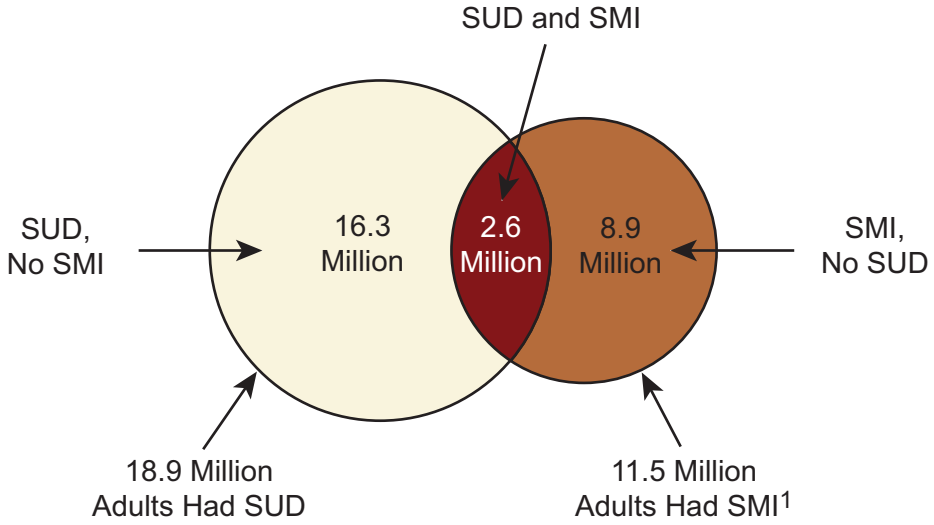
- Among adults aged 18 or older with AMI in the past year, the percentage meeting criteria for substance dependence or abuse was highest among those who were aged 18 to 25 (30.0 percent), followed by those aged 26 to 49 (18.3 percent), then by those aged 50 or older (7.6 percent). Similarly, the prevalence of substance dependence or abuse in the past year among adults with SMI was highest among those aged 18 to 25 (36.8 percent), followed by those aged 26 to 49 (21.1 percent), then by those aged 50 or older (13.1 percent).

- Among the 18.9 million adults aged 18 or older with a past year substance use disorder, 13.8 percent (2.6 million adults) also had SMI (Figure 4.3).

- Among the 11.5 million adults aged 18 or older with SMI in the past year, 22.6 percent also had past year substance dependence or abuse, followed by 16.1 percent of adults with moderate mental illness and 15.7 percent of adults with low (mild) mental illness, then by 5.8 percent of adults who did not have mental illness (Figure 4.4).

- In 2011, 9.9 percent of adults aged 18 or older with SMI in the past year also met criteria for illicit drug dependence or abuse in the past year, as did 6.5 percent of adults with moderate mental illness, 5.1 percent of adults with low (mild) mental illness, and 1.3 percent of adults who did not have mental illness (Figure 4.5).

Figure 4.3 Past Year Substance Dependence or Abuse and Serious Mental Illness among Adults Aged 18 or Older: 2011



SMI = serious mental illness; SUD = substance use disorder.

[1] Statistics on mental illness are provided in Chapter 2 of this report.

Figure 4.4 Past Year Substance Dependence or Abuse among Adults Aged 18 or Older, by Level of Mental Illness: 2011

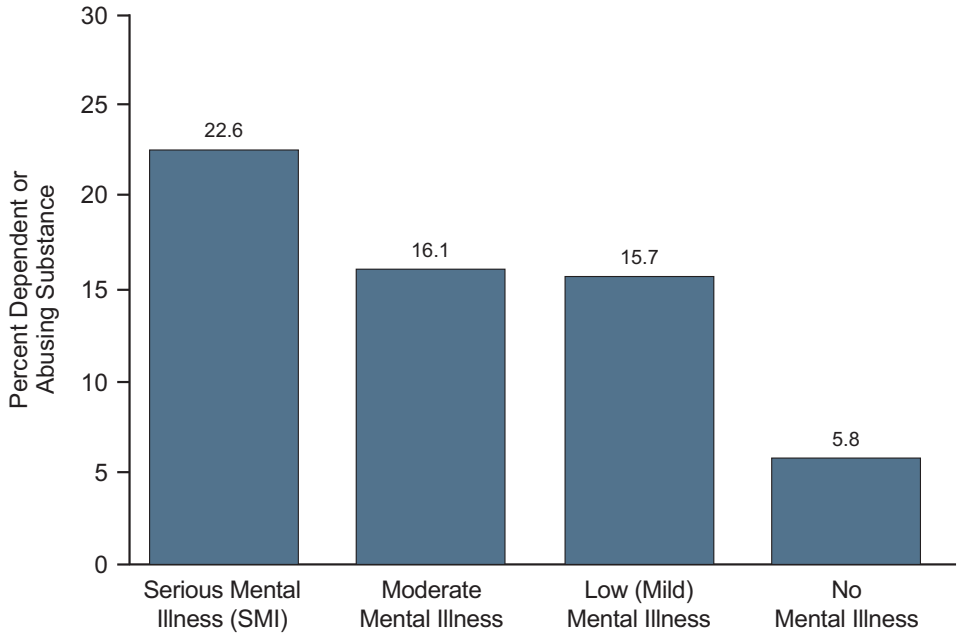
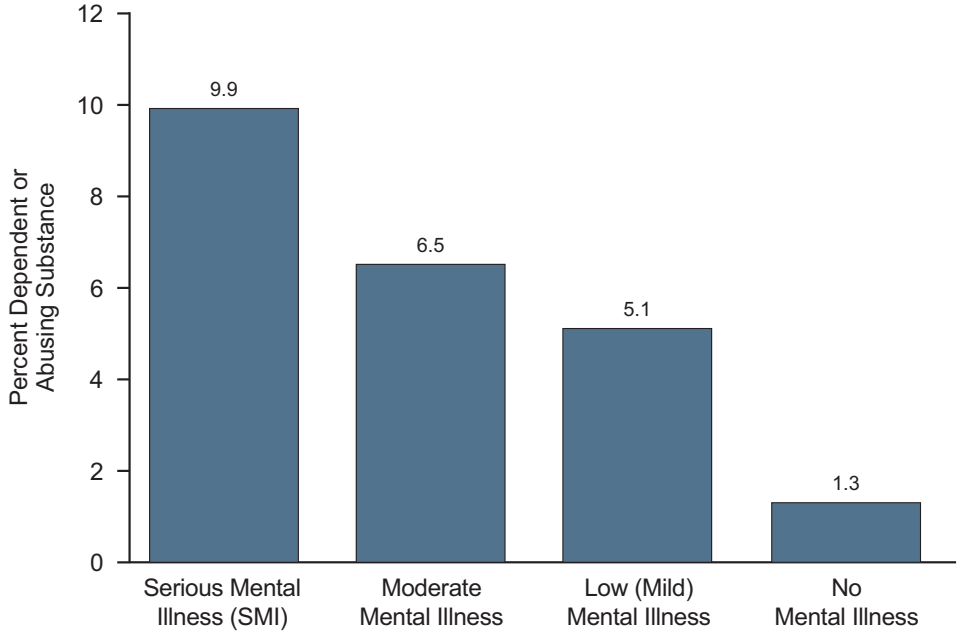
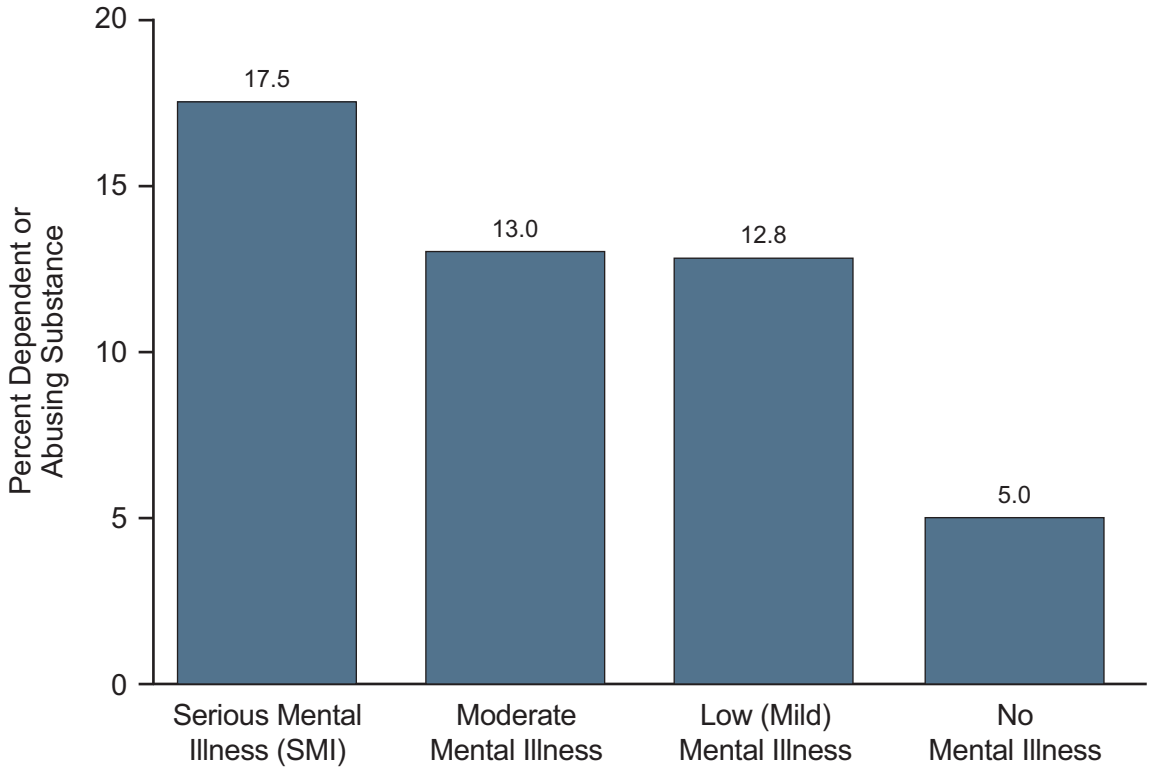


Figure 4.5 Past Year Illicit Drug Dependence or Abuse among Adults Aged 18 or Older, by Level of Mental Illness: 2011



- Among adults aged 18 or older with SMI in the past year, 17.5 percent also had past year alcohol dependence or abuse (Figure 4.6), followed by 13.0 percent of adults with moderate mental illness and 12.8 percent of adults with low (mild) mental illness, then by 5.0 percent of adults who did not have mental illness.

Figure 4.6 Past Year Alcohol Dependence or Abuse among Adults Aged 18 or Older, by Level of Mental Illness: 2011

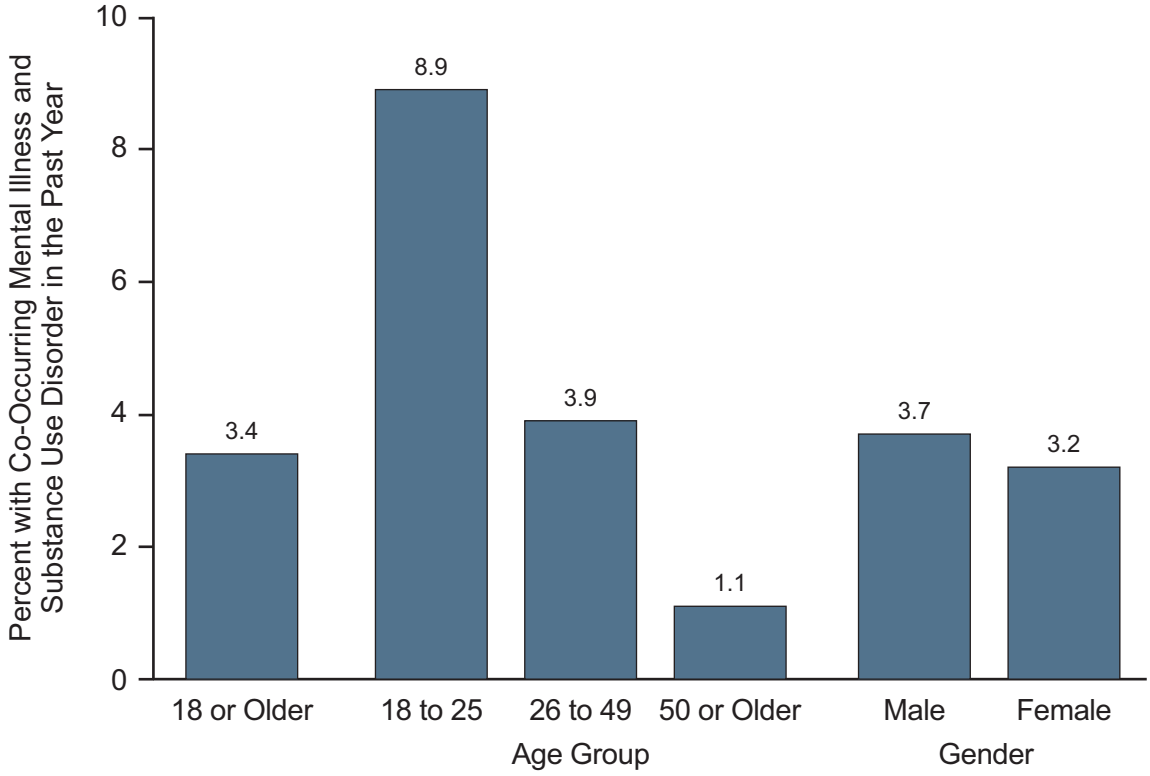


Co-Occurring Mental Illness and Substance Use Disorder among Adults, by Demographic and Socioeconomic Characteristics

- The percentage of adults with co-occurring mental illness and substance use disorder in 2011 was highest among adults aged 18 to 25 (8.9 percent), followed by those aged 26 to 49 (3.9 percent), then by those aged 50 or older (1.1 percent) (Figure 4.7).

- The percentage of past year co-occurring mental illness and substance use disorder among adult males was higher than that among adult females (3.7 vs. 3.2 percent) (Figure 4.7).

Figure 4.7 Co-Occurring Mental Illness and Substance Use Disorder in the Past Year among Adults Aged 18 or Older, by Age and Gender: 2011

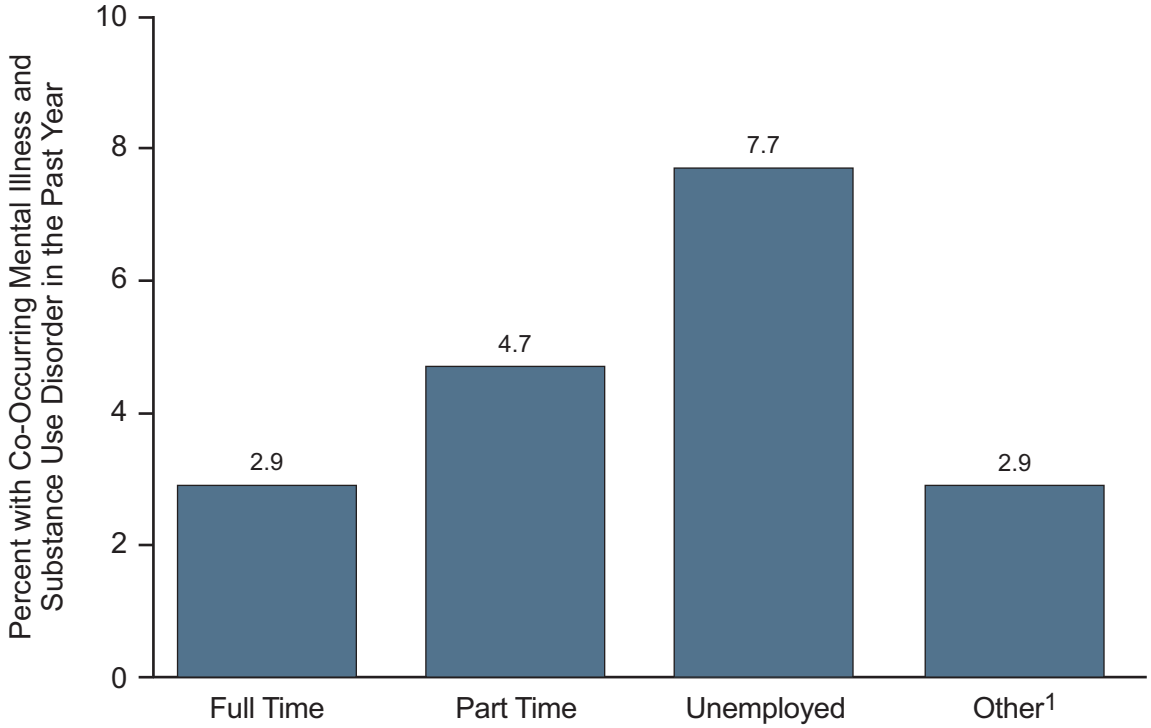


- In 2011, the percentage of adults aged 18 or older with past year mental illness and substance use disorder was 1.7 percent among Asians, 3.0 percent among Hispanics, 3.2 percent among blacks, 3.6 percent among whites, 4.4 percent among persons reporting two or more races, and 10.4 percent among American Indians or Alaska Natives.

- The percentage of adults aged 18 or older with co-occurring mental illness and substance use disorder in 2011 was higher among adults who were unemployed (7.7 percent) than among adults who were employed full time (2.9 percent) or part time (4.7 percent) (Figure 4.8).

- Among adults aged 18 or older whose family income was below 100 percent of the Federal poverty level in the past year, 5.9 percent (1.9 million adults) had past year mental illness and substance use disorder. In contrast, 3.8 percent of adults whose family income was between 100 and 199 percent of the Federal poverty level and 2.7 percent of adults whose family income was at or above 200 percent of the Federal poverty level had past year mental illness and substance use disorder.

Figure 4.8 Co-Occurring Mental Illness and Substance Use Disorder in the Past Year among Adults Aged 18 or Older, by Employment Status: 2011



[1] The Other Employment category includes students, persons keeping house or caring for children full time, retired or disabled persons, or other persons not in the labor force.

- In 2011, the percentage of adults with co-occurring mental illness and substance use disorder was highest among persons with Medicaid or Children's Health Insurance Program (CHIP) (5.7 percent) and among persons without health insurance (5.5 percent), followed by persons with private health insurance (2.7 percent), then by persons with other forms of health insurance (1.8 percent).
- In 2011, the percentage of adults with both SMI and substance use disorder was highest among adults aged 18 to 25 (2.8 percent), followed by those aged 26 to 49 (1.3 percent), then by those aged 50 or older (0.4 percent).
- The percentages of adults with co-occurring SMI and substance use disorder in the past year were similar for males and females (1.0 and 1.2 percent, respectively).

- The percentage of adults with past year SMI and substance use disorder was 0.5 percent among Asians, 0.7 percent among blacks, 0.8 percent among Hispanics, 1.3 percent among whites, 1.5 percent among persons reporting two or more races, 1.6 percent among Native Hawaiians or Other Pacific Islanders, and 4.4 percent among American Indians or Alaska Natives.

- In 2011, the percentage of adults with SMI and substance use disorder in the past year was higher among adults who were unemployed (3.0 percent) than among adults who were employed full time (0.7 percent) and among adults who were employed part time (1.6 percent).

- The percentage of adults with SMI and substance use disorder in the past year was higher among adults whose family income was below 100 percent of the Federal poverty level (2.4 percent, or 792,000 adults) than it was among adults whose family income was between 100 and 199 percent of the Federal poverty level or those whose family income was at or above 200 percent of the Federal poverty level (1.2 and 0.8 percent, respectively).

- In 2011, the percentage of adults with co-occurring SMI and substance use disorder was highest among adults with Medicaid or CHIP (2.4 percent) and adults without health insurance (1.7 percent), followed by adults with private health insurance (0.8 percent) and adults with other forms of health insurance (0.7 percent).

Serious Thoughts, Plans, and Attempts of Suicide and Substance Use Disorder among Adults

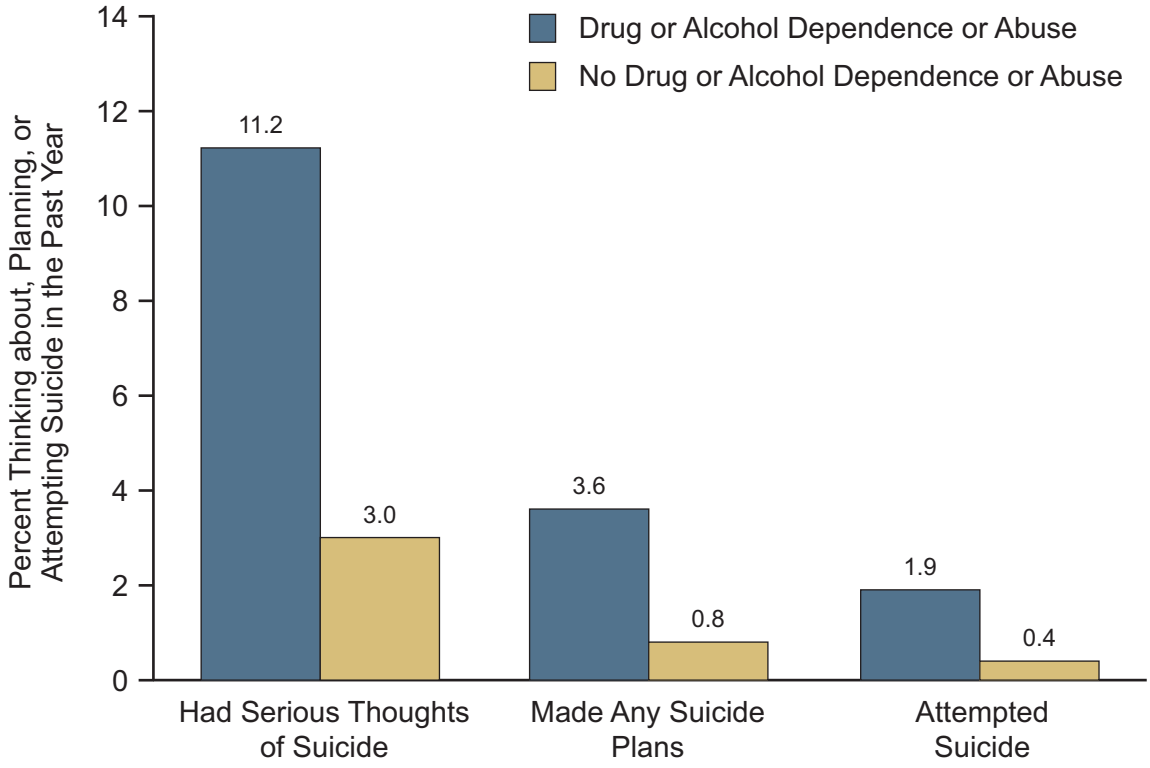
- In 2011, 2.1 million adults aged 18 or older with past year illicit drug or alcohol dependence or abuse had serious thoughts of suicide in the past year (11.2 percent of adults with a substance use disorder) (Figure 4.9).

- Adults aged 18 or older with past year illicit drug or alcohol dependence or abuse were more likely than those without dependence or abuse to have had serious thoughts about suicide in the past year (11.2 vs. 3.0 percent) (Figure 4.9). Adults with substance dependence or abuse also were more likely to make suicide plans compared with adults without dependence or abuse (3.6 vs. 0.8 percent) and were more likely to attempt suicide compared with adults without dependence or abuse (1.9 vs. 0.4 percent).

- In 2011, the percentage of adults aged 18 or older who made suicide plans among those who had co-occurring SMI and substance dependence or abuse in the past year (16.4 percent) was higher than that among those with SMI alone (10.7 percent). Adults with co-occurring SMI and substance dependence or abuse were more likely than those with SMI but no substance use disorders to have attempted suicide in the past year (8.1 vs. 4.0 percent).

- Among adults aged 18 or older with substance dependence or abuse, the percentages who attempted suicide differed by level of mental illness. The percentage who attempted suicide among adults with substance dependence or abuse was highest among those with SMI (8.1 percent) and those with moderate mental illness (4.7 percent), followed by 1.0 percent of those with low (mild) mental illness and 0.4 percent of those with no mental illness.

Figure 4.9 Suicide Thoughts, Plans, and Attempts in the Past Year among Adults Aged 18 or Older, by Substance Dependence or Abuse: 2011



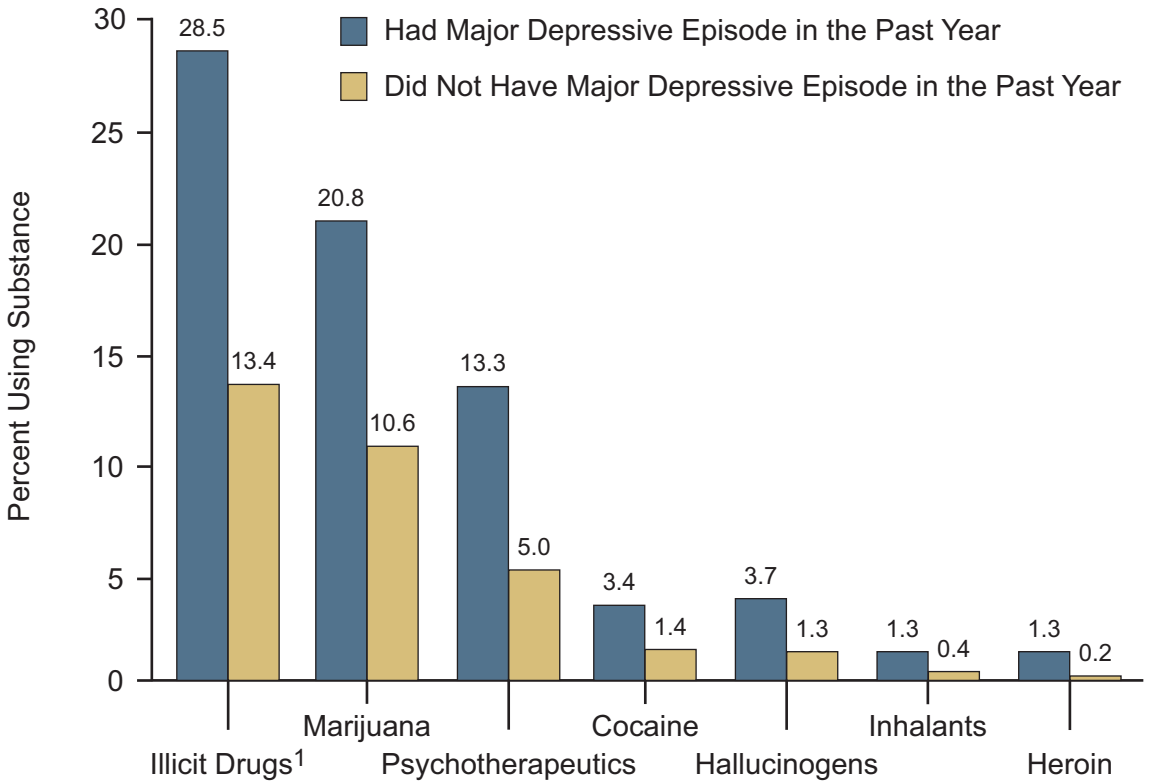
Major Depressive Episode and Substance Use among Adults

- In 2011, adults aged 18 or older who had past year MDE were more likely than those without past year MDE to have used illicit drugs in the past year (28.5 vs. 13.4 percent) (Figure 4.10). A similar pattern was observed for specific types of past year illicit drug use, such as the use of marijuana, cocaine, hallucinogens, inhalants, or heroin and the nonmedical use of prescription-type psychotherapeutics.

- In 2011, the percentage of adults aged 18 older who were heavy alcohol users was higher among adults who had MDE in the past year (8.2 percent) than among those without MDE in the past year (6.6 percent).

- The percentage of adults who were daily cigarette users in the past month was higher among those with past year MDE than among adults without past year MDE (24.6 vs. 13.9 percent).

Figure 4.10 Past Year Substance Use among Adults Aged 18 or Older, by Major Depressive Episode in the Past Year: 2011

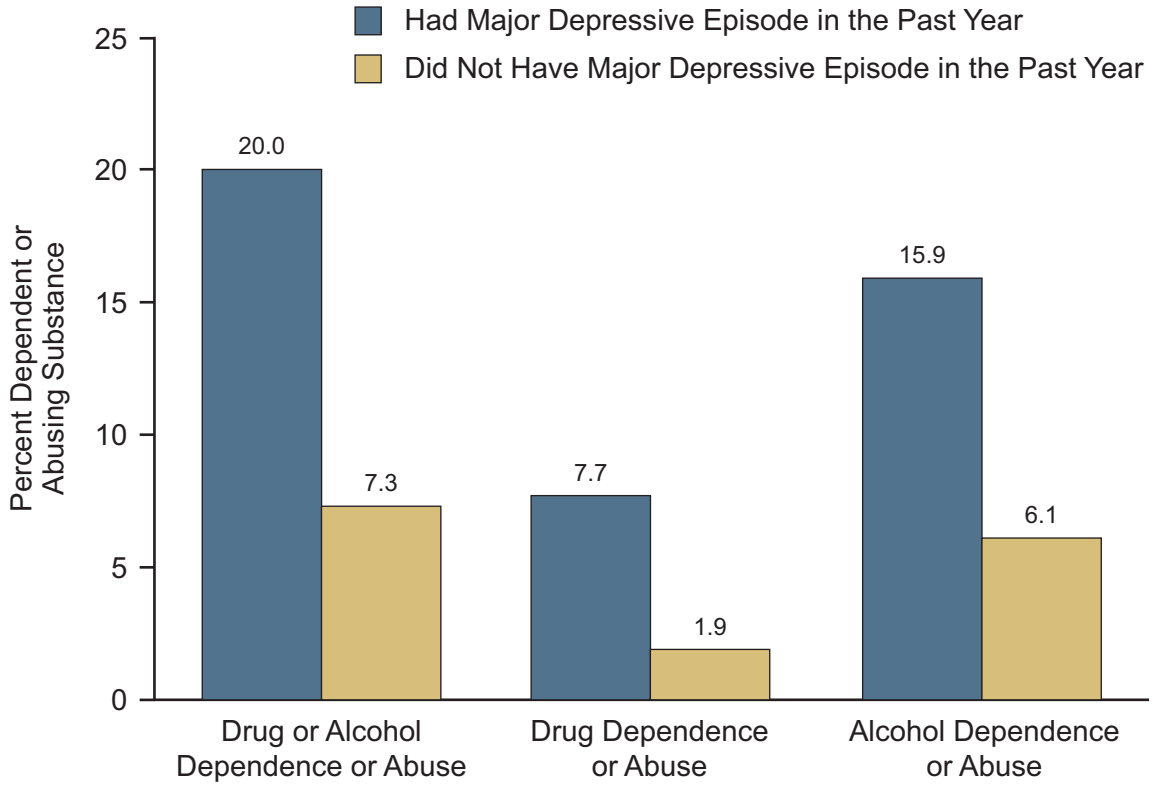


[1] Illicit Drugs include marijuana/hashish, cocaine (including crack), heroin, hallucinogens, inhalants, or prescription-type psychotherapeutics used nonmedically.

Major Depressive Episode and Substance Use Disorder among Adults

- In 2011, 3.0 million adults aged 18 or older (16.2 percent) with past year substance dependence or abuse had MDE in the same time period.
- Adults aged 18 or older who had MDE in the past year were more likely to have substance dependence or abuse than adults who did not have past year MDE (20.0 vs. 7.3 percent) (Figure 4.11).
- The percentage meeting criteria for illicit drug dependence or abuse was greater among adults aged 18 or older who had MDE in the past year than for adults without MDE in the past year (7.7 vs. 1.9 percent) (Figure 4.11). Also, the percentage meeting criteria for alcohol dependence or abuse in the past year was greater among adults with MDE in the past year than for adults without MDE in the past year (15.9 vs. 6.1 percent).

Figure 4.11 Past Year Substance Dependence or Abuse among Adults Aged 18 or Older, by Major Depressive Episode in the Past Year: 2011

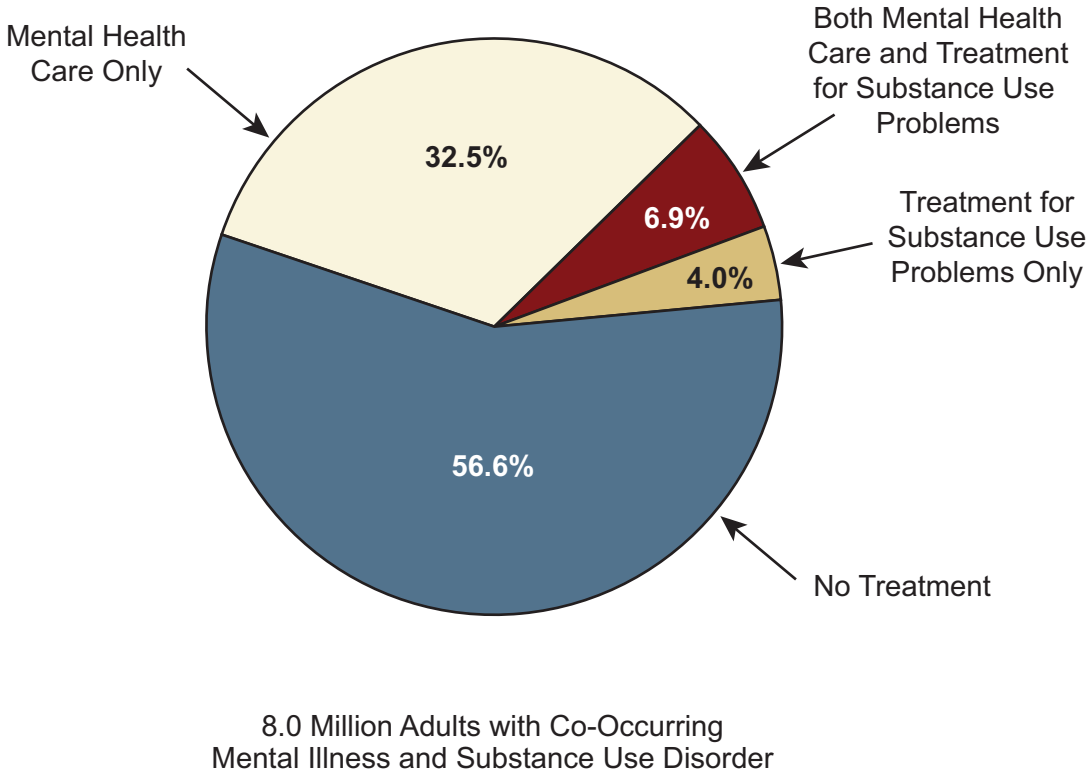


- In 2011, adults aged 18 or older with past year MDE were more likely than adults without past year MDE to meet criteria for illicit drug dependence (6.4 vs. 1.3 percent), alcohol dependence (10.4 vs. 2.7 percent), and both illicit drug and alcohol dependence (2.4 vs. 0.3 percent).

Mental Health Service Utilization among Adults with Co-Occurring Mental Illness and Substance Use Disorders

- Among the 8.0 million adults aged 18 or older who had AMI in the past year and a past year substance use disorder, 43.4 percent received substance use treatment at a specialty facility or mental health care in the past year: 6.9 percent received both mental health care and specialty substance use treatment, 32.5 percent received mental health care only, and 4.0 percent received specialty substance use treatment only (Figure 4.12). A specialty substance use treatment facility is defined as a drug or alcohol rehabilitation facility (inpatient or outpatient), a hospital (inpatient services only), or a mental health center.

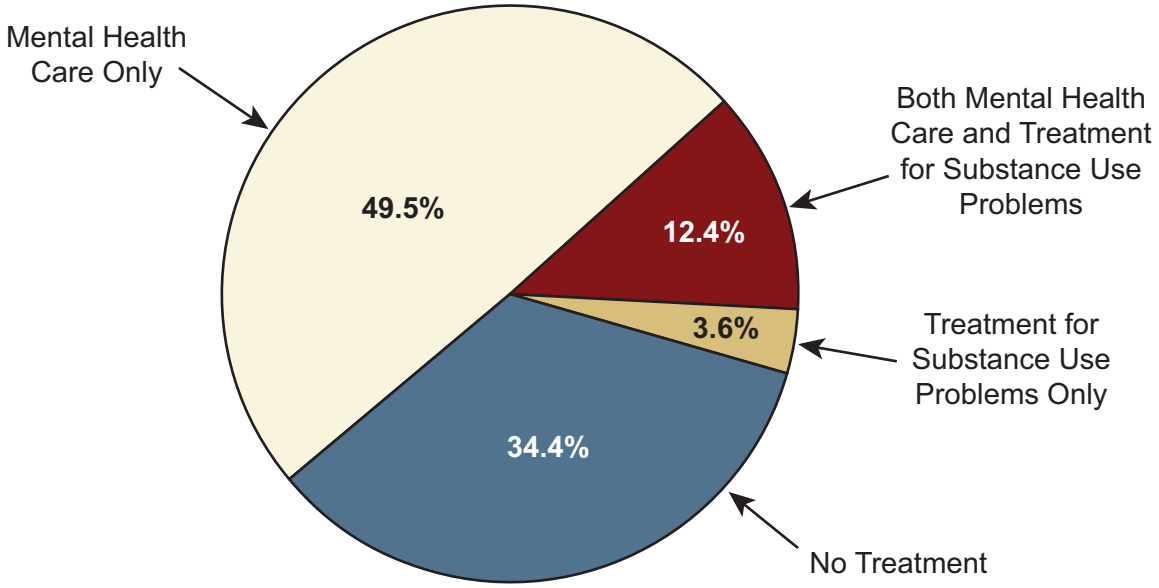
Figure 4.12 Past Year Mental Health Care and Treatment for Substance Use Problems among Adults Aged 18 or Older with Both Mental Illness and a Substance Use Disorder: 2011



Note: Mental health care is defined as having received inpatient care or outpatient care or having used prescription medication for problems with emotions, nerves, or mental health. Treatment for substance use problems refers to treatment at a hospital (inpatient only), rehabilitation facility (inpatient or outpatient), or mental health center in order to reduce or stop drug or alcohol use, or for medical problems associated with drug or alcohol use.

- Among the 2.6 million adults aged 18 or older in 2011 with both SMI and substance dependence or abuse in the past year, 65.6 percent received substance use treatment at a specialty facility or mental health care in that time period (Figure 4.13). Included in the 65.6 percent are 12.4 percent who received both mental health care and specialty substance use treatment, 49.5 percent who received mental health care only, and 3.6 percent who received specialty substance use treatment only.

Figure 4.13 Past Year Mental Health Care and Treatment for Substance Use Problems among Adults Aged 18 or Older with Both Serious Mental Illness and a Substance Use Disorder: 2011



2.6 Million Adults with Co-Occurring Serious Mental Illness (SMI) and Substance Use Disorder

Note: Mental health care is defined as having received inpatient care or outpatient care or having used prescription medication for problems with emotions, nerves, or mental health. Treatment for substance use problems refers to treatment at a hospital (inpatient only), rehabilitation facility (inpatient or outpatient), or mental health center in order to reduce or stop drug or alcohol use, or for medical problems associated with drug or alcohol use.

Note: The percentages do not add to 100 percent due to rounding.

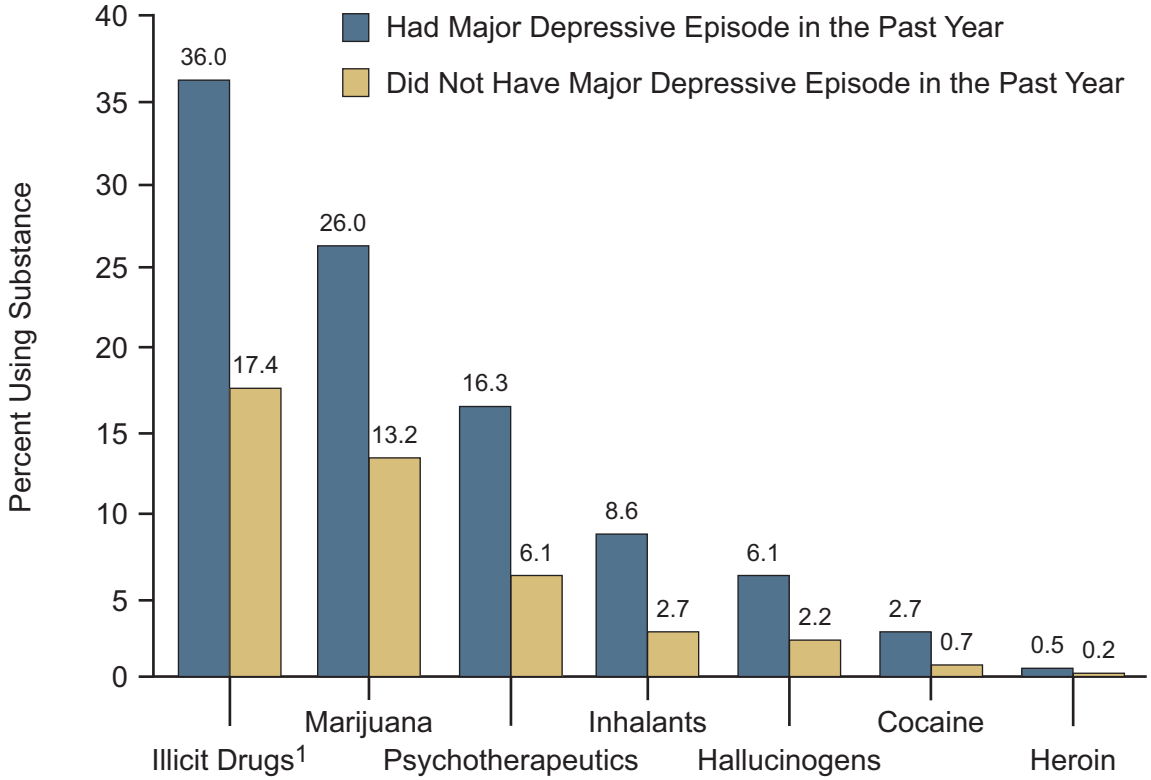
- Among adults who had a past year substance use disorder, those who also had past year SMI were more likely to have received mental health care or specialty substance use treatment (65.6 percent), followed by those who had moderate mental illness (41.0 percent), then by those with low (mild) mental illness (29.7 percent), then by those who had no mental illness in the past year (15.1 percent).

Major Depressive Episode and Substance Use among Youths

- In 2011, youths aged 12 to 17 who had past year MDE were more likely than those without past year MDE to have used illicit drugs in the past year (36.0 vs. 17.4 percent) (Figure 4.14). This pattern was similar for most specific types of illicit drug use, including the use of marijuana, inhalants, hallucinogens, or cocaine and the nonmedical use of prescription-type psychotherapeutics.

- In 2011, youths aged 12 to 17 who had MDE in the past year were more likely to be daily cigarette users in the past month compared with those who did not have MDE in the past year (4.0 vs. 1.6 percent). Similarly, youths who had past year MDE were more likely to be heavy alcohol users in the past month compared with those who did not have past year MDE (2.5 vs. 1.4 percent).

Figure 4.14 Past Year Substance Use among Youths Aged 12 to 17, by Major Depressive Episode in the Past Year: 2011

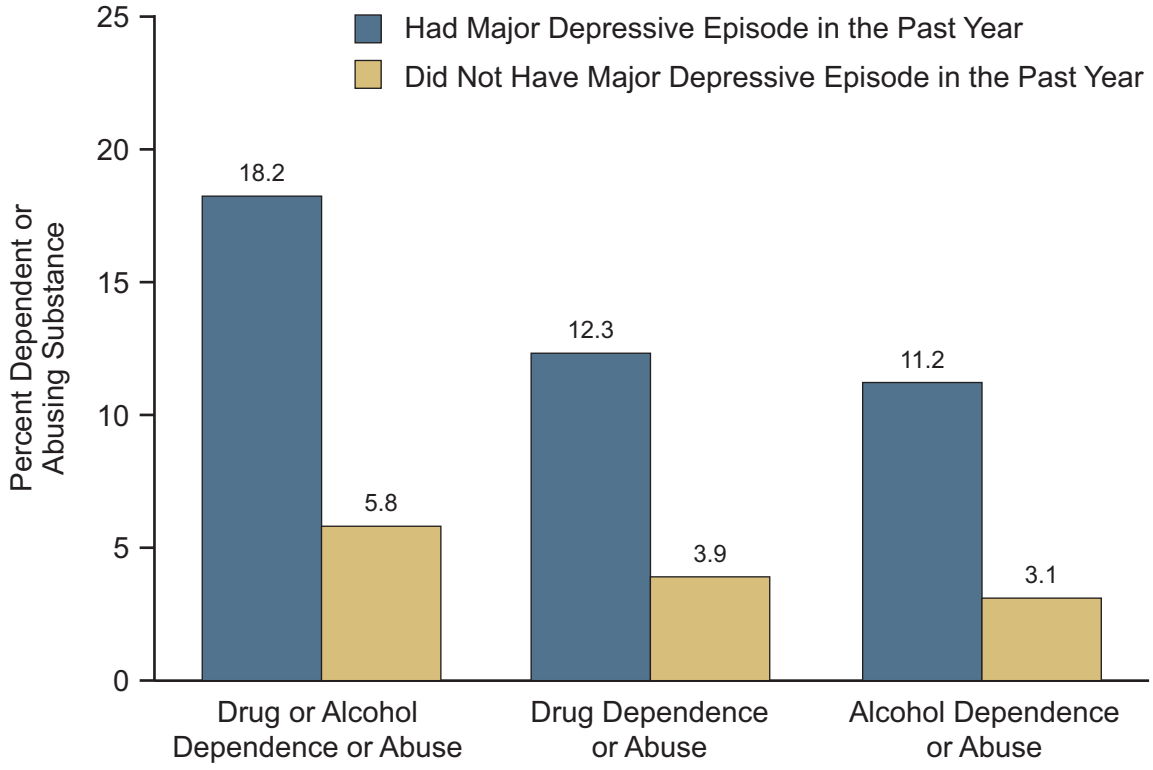


[1] Illicit Drugs include marijuana/hashish, cocaine (including crack), heroin, hallucinogens, inhalants, or prescription-type psychotherapeutics used nonmedically.

Major Depressive Episode and Substance Use Disorder among Youths

- In 2011, 21.4 percent of youths aged 12 to 17 (367,000 youths) with substance dependence or abuse in the past year also had past year MDE. The prevalence of past year MDE among youths with past year substance dependence was 22.8 percent (199,000 youths).
- Youths aged 12 to 17 with MDE in the past year were more likely than those without MDE to have a substance use disorder in the past year (18.2 vs. 5.8 percent) (Figure 4.15).

Figure 4.15 Past Year Substance Dependence or Abuse among Youths Aged 12 to 17, by Major Depressive Episode in the Past Year: 2011



Appendix A: Description of the Survey

A.1 Sample Design

The sample design for the 2011 National Survey on Drug Use and Health (NSDUH)[6] was part of a coordinated 5-year sample design providing estimates for all 50 States plus the District of Columbia initially for the years 2005 through 2009, then continuing through 2011. The respondent universe for NSDUH is the civilian, noninstitutionalized population aged 12 years old or older residing within the United States. The survey covers residents of households (persons living in houses/townhouses, apartments, condominiums; civilians living in housing on military bases, etc.) and persons in noninstitutional group quarters (e.g., shelters, rooming/boarding houses, college dormitories, migratory workers' camps, halfway houses). Excluded from the survey are persons with no fixed household address (e.g., homeless and/or transient persons not in shelters), active-duty military personnel, and residents of institutional group quarters, such as correctional facilities, nursing homes, mental institutions, and long-term hospitals.

The coordinated design for 2005 through 2009 facilitated a 50 percent overlap in second-stage units (area segments) within each successive 2-year period from 2005 through 2009. The 2010 and 2011 NSDUHs continued the 50 percent overlap by retaining half of the second-stage units from the previous survey. Those segments not retained are considered "retired" from use. Because the coordinated design enabled estimates to be developed by State in all 50 States plus the District of Columbia, States may be viewed as the first level of stratification and as a reporting variable.

In 2011, an oversample was included to help in measuring and reporting on the impact that the April 2010 Deepwater Horizon oil spill had on substance use and mental health along the gulf coast. To that end, the target sample was expanded by 2,000 cases in four Gulf Coast States (Alabama, Florida, Louisiana, and Mississippi), resulting in a total targeted national sample size of 69,500. The 2011 Gulf Coast Oversample (GCO) was attained by supplementing the NSDUH sample with 89 segments in GCO-designated counties and parishes in these four States. These 89 segments were retired from use in the 2009 and 2010 surveys. For more details on the GCO and information about the general 2011 NSDUH sample design, see the 2011 NSDUH sample design report by Morton, Martin, Shook-Sa, Chromy, and Hirsch (2012).

For the 50-State design, 8 States were designated as large sample States (California, Florida, Illinois, Michigan, New York, Ohio, Pennsylvania, and Texas) with pre-oversample target sample sizes of 3,600. In 2011, the actual sample sizes in these States ranged from 3,074 to 4,029.[7] For the remaining 42 States and the District of Columbia, the pre-oversample target

[6] Prior to 2002, the survey was known as the National Household Survey on Drug Abuse (NHSDA).

[7] One large sample State, Pennsylvania, had a lower final sample size (3,074) because of interviews that were dropped due to data quality issues. Florida received a portion of the GCO supplement and therefore had a higher sample size (4,029).

sample size was 900. Sample sizes in these States ranged from 865 to 1,746 in 2011.[8] This approach ensured there was sufficient sample in every State to support State estimation by either direct methods or small area estimation (SAE)[9] while at the same time maintaining efficiency for national estimates.

States were first stratified into a total of 900 State sampling regions (SSRs) (48 regions in each large sample State and 12 regions in each small sample State). These regions were contiguous geographic areas designed to yield approximately the same number of interviews.[10] Unlike the 1999 through 2001 NHSDAs and the 2002 through 2004 NSDUHs in which the first-stage sampling units were clusters of census blocks called area segments, the first stage of selection for the 2005 through 2011 NSDUHs was census tracts.[11] This stage was included to contain sample segments within a single census tract to the extent possible.[12]

Within each SSR, 48 census tracts were selected with probability proportional to population size. Within sampled census tracts, adjacent census blocks were combined to form the second-stage sampling units or area segments. One area segment was selected within each sampled census tract with probability proportional to population size. Although only 24 segments were needed to support the coordinated 5-year sample, an additional 24 segments were selected to support any supplemental studies that the Substance Abuse and Mental Health Services Administration (SAMHSA) may choose to field. These 24 segments constituted the reserve sample and were available for use in 2010 and 2011. Eight reserve sample segments per SSR were fielded during the 2011 survey year. Four of these segments were retained from the 2010 survey, and four were selected for use in the 2011 survey.

These sampled segments were allocated equally into four separate samples, one for each 3-month period (calendar quarter) during the year. That is, a sample of addresses was selected from two segments[13] in each calendar quarter so that the survey was relatively continuous in the field. In each of the area segments, a listing of all addresses was made from which a national sample of 216,521 addresses was selected. Of the selected addresses, 179,293 were determined to be eligible sample units. In these sample units (which can be either households or units within group quarters), sample persons were randomly selected using an automated screening procedure programmed in a handheld computer carried by the interviewers. The number of sample units completing the screening was 156,048. Youths aged 12 to 17 years and young adults aged 18 to

[8] The State at the top end of the range (Louisiana, with a sample size of 1,746) included a portion of the GCO supplement.

[9] SAE is a hierarchical Bayes modeling technique used to make State-level estimates for 25 measures related to substance use and mental health. For more details, see the *State Estimates of Substance Use and Mental Disorders from the 2009-2010 National Surveys on Drug Use and Health* (Hughes, Muhuri, Sathe, & Spagnola, 2012).

[10] Sampling areas were defined using 2000 census geography. Counts of dwelling units (DUs) and population totals were obtained from the 2000 decennial census data supplemented with revised population counts from Nielsen Claritas.

[11] Census tracts are relatively permanent statistical subdivisions of counties and parishes and provide a stable set of geographic units across decennial census periods.

[12] Some census tracts had to be aggregated in order to meet the minimum DU requirement of 150 DUs in urban areas and 100 DUs in rural areas.

[13] The sample was selected from up to four segments per calendar quarter in SSRs receiving the GCO supplement.

25 years were oversampled at this stage, with 12 to 17 year olds sampled at an actual rate of 87.2 percent and 18 to 25 year olds at a rate of 69.5 percent on average, when they were present in the sampled households or group quarters. Similarly, persons in age groups 26 or older were sampled at rates of 38.2 percent or less, with persons in the eldest age group (50 years or older) sampled at a rate of 8.9 percent on average. The overall population sampling rates were 0.09 percent for 12 to 17 year olds, 0.07 percent for 18 to 25 year olds, 0.02 percent for 26 to 34 year olds, 0.01 percent for 35 to 49 year olds, and 0.01 percent for those 50 or older. Nationwide, 88,536 persons were selected. Consistent with previous surveys in this series, the final respondent sample of 70,109 persons was representative of the U.S. general population (since 1991, the civilian, noninstitutionalized population) aged 12 or older. In addition, State samples were representative of their respective State populations. More detailed information on the disposition of the national screening and interview sample can be found in Appendix B.

A.2 Data Collection Methodology

The data collection method used in NSDUH involves in-person interviews with sample persons, incorporating procedures to increase respondents' cooperation and willingness to report honestly about sensitive topics, such as illicit drug use behavior and mental health issues. Confidentiality is stressed in all written and oral communications with potential respondents. Respondents' names are not collected with the data, and computer-assisted interviewing (CAI) methods are used to provide a private and confidential setting to complete the interview.

Introductory letters are sent to sampled addresses, followed by an interviewer visit. When contacting a dwelling unit (DU), the field interviewer (FI) asks to speak with an adult resident (aged 18 or older) of the household who can serve as the screening respondent. Using a handheld computer, the FI completes a 5-minute procedure with the screening respondent that involves listing all household members along with their basic demographic data. The computer uses the demographic data in a preprogrammed selection algorithm to select zero to two sample persons, depending on the composition of the household. This selection process is designed to provide the necessary sample sizes for the specified population age groupings. In areas where a third or more of the households contain Spanish-speaking residents, the initial introductory letters written in English are mailed with a Spanish version on the back. All interviewers carry copies of this letter in Spanish. If the interviewer is not certified bilingual, he or she will use preprinted Spanish cards to attempt to find someone in the household who speaks English and who can serve as the screening respondent or who can translate for the screening respondent. If no one is available, the interviewer will schedule a time when a Spanish-speaking interviewer can come to the address. In households where a language other than Spanish is encountered, another language card is used to attempt to find someone who speaks English to complete the screening.

The NSDUH interview can be completed in English or Spanish, and both versions have the same content. If the sample person prefers to complete the interview in Spanish, a certified bilingual interviewer is sent to the address to conduct the interview. Because the interview is not translated into any other language, if a sample person does not speak English or Spanish, the interview is not conducted.

Immediately after completion of the screener, interviewers attempt to conduct the NSDUH interview with each sample person in the household. The interviewer requests the

selected respondent to identify a private area in the home to conduct the interview away from other household members. The interview averages about an hour and includes a combination of CAPI (computer-assisted personal interviewing, in which the interviewer reads the questions) and ACASI (audio computer-assisted self-interviewing).

The NSDUH interview consists of core and noncore (i.e., supplemental) sections. A core set of questions critical for basic trend measurement of prevalence estimates remains in the survey every year and comprises the first part of the interview. Noncore questions, or modules, that can be revised, dropped, or added from year to year make up the remainder of the interview. The core consists of initial demographic items (which are interviewer-administered) and self-administered questions pertaining to the use of tobacco, alcohol, marijuana, cocaine, crack cocaine, heroin, hallucinogens, inhalants, pain relievers, tranquilizers, stimulants, and sedatives.

Questions about mental illness and the utilization of mental health services are included in noncore self-administered sections of the interview. Although many of the questions are asked both of youths aged 12 to 17 and adults, some are asked only of adults and others are asked only of youths. Both adults and youths are asked questions about major depressive episode (MDE) and mental health service utilization. Mental health service utilization questions for both youths and adults cover receipt of mental health treatment in inpatient settings in the past 12 months, the number of nights that respondents received inpatient treatment, receipt of mental health treatment in outpatient settings in the past 12 months, and the number of visits to outpatient mental health treatment providers in that period. Questions that are asked only of adults include symptoms of psychological distress in the past 30 days or past 12 months, impairment with daily activities because of psychological distress, use of prescribed medication to treat a mental or emotional condition in the past 12 months, and unmet need for mental health treatment in that period. All adults also are asked questions about suicidal thoughts and behavior; youths are asked these questions only if they are asked the more detailed questions about MDE. Questions that are asked of youths but not adults pertain to the past 12 months and include reasons for receiving mental health treatment from specific sources, receipt of school-based mental health treatment services, and receipt of mental health treatment in juvenile detention, prison, or jail. Definitions for many of these terms also are included as part of the mental health detailed tables.[14]

Additional topics in noncore self-administered sections include (but are not limited to) injection drug use, perceived risks of substance use, substance dependence or abuse, arrests, treatment for substance use problems, pregnancy, and other health care issues. Noncore demographic questions (which are interviewer-administered and follow the ACASI questions) address such topics as immigration, current school enrollment, employment and workplace issues, health insurance coverage, and income. In practice, some of the noncore portions of the interview have remained in the survey, relatively unchanged, from year to year (e.g., current health insurance coverage, employment).

Thus, the interview begins in CAPI mode with the FI reading the questions from the computer screen and entering the respondent's replies into the computer. The interview then transitions to the ACASI mode for the sensitive questions. In this mode, the respondent can read

[14] This comprehensive set of mental health detailed tables is available at http://www.samhsa.gov/data/.

the questions silently on the computer screen and/or listen to the questions read through headphones and enter his or her responses directly into the computer. At the conclusion of the ACASI section, the interview returns to the CAPI mode with the FI completing the questionnaire. Each respondent who completes a full interview is given a $30 cash payment as a token of appreciation for his or her time.

No personal identifying information about the respondent is captured in the CAI record. FIs transmit the completed interview data to RTI in Research Triangle Park, North Carolina, via home telephone analog lines.

After the data are transmitted to RTI, certain cases are selected for verification. The respondents are contacted by RTI to verify the quality of an FI's work based on information that respondents provide at the end of screening (if no one is selected for an interview at the DU or the entire DU is ineligible for the study) or at the end of the interview. For the screening interview, the adult DU member who served as the screening respondent provides his or her first name and telephone number to the FI, who enters the information into a handheld computer and transmits the data to RTI. For completed interviews, respondents write their home telephone number and mailing address on a quality control form and seal the form in a preaddressed envelope that FIs mail back to RTI. All contact information is kept completely separate from the answers provided during the screening or interview.

Samples of respondents who completed screenings or interviews are randomly selected for verification. These cases are called by telephone interviewers who ask scripted questions designed to determine the accuracy and quality of the data collected. Any cases discovered to have a problem or discrepancy are flagged and routed to a small specialized team of telephone interviewers who recontact respondents for further investigation of the issue(s). Depending on the amount of an FI's work that cannot be verified through telephone verification, including bad telephone numbers (e.g., incorrect number, disconnected, not in service), a field verification may be conducted. Field verifications involve another FI returning to the sampled DU to verify the accuracy and quality of the data in person. If the verification procedures identify situations in which an FI has falsified data, the FI no longer works on NSDUH. All cases completed that quarter by the FI who falsified data are reworked by the FI conducting the field verification.

A subsample of adult respondents from the 2011 NSDUH also was administered a clinical follow-up interview as part of the Mental Health Surveillance Study (MHSS) that has been conducted in conjunction with the main survey since 2008. The MHSS sample respondents were administered a clinical interview within 4 weeks of the NSDUH main interview to assess the presence of mental disorders and functional impairment. Specifically, each participant was assessed by a trained clinical interviewer (master's or doctoral-level clinician, counselor, or social worker) via paper-and-pencil interviewing over the telephone. An estimated 84 percent of selected persons agreed to participate in the MHSS, and 80 percent of those persons completed the clinical interview. The content and function of the clinical interview data are discussed further in Section B.4.3 in Appendix B.

A.3 Data Processing

Data that FIs transmit to RTI are processed to create a raw data file in which no logical editing of the data has been done. The raw data file consists of one record for each transmitted interview. Cases are eligible to be retained as final respondents only if they provided data on lifetime use of cigarettes and at least 9 out of 13 other substances in the core section of the questionnaire. Written responses to questions (e.g., names of other drugs that were used) are assigned numeric codes as part of the data processing procedures. Even though editing and consistency checks are done by the CAI program during the interview, additional, more complex edits and consistency checks are completed at RTI. Additionally, statistical imputation is used to replace missing or ambiguous values after editing for some key variables. Analysis weights are created so that estimates will be representative of the target population. Details of the editing, imputation, and weighting procedures for 2011 will appear in the *2011 NSDUH Methodological Resource Book*, which is in process. Until that volume becomes available, refer to the *2010 NSDUH Methodological Resource Book* (RTI International, 2012).

A.3.1 Data Coding and Editing

With the exception of industry and occupation data, coding of written answers that respondents or interviewers typed was performed at RTI for the 2011 NSDUH. These written answers include mentions of drugs that respondents had used or other responses that did not fit a previous response option (subsequently referred to as "OTHER, Specify" data). For example, the "OTHER, Specify" data for mental health issues in 2010 included (but were not limited to) such topics as outpatient settings in which adults aged 18 or older received mental health treatment in the past 12 months and reasons for the most recent visit or stay in outpatient or inpatient mental health treatment settings in the past 12 months for adolescents aged 12 to 17.

Coding of the "OTHER, Specify" variables at RTI was accomplished through computer-assisted survey procedures and the use of a secure Web site that allowed for coding and review of the data. The computer-assisted procedures entailed a database check for a given "OTHER, Specify" variable that contained typed entries and the associated numeric codes. If an exact match was found between the typed response and an entry in the system, the computer-assisted procedures assigned the appropriate numeric code. Typed responses that did not match an existing entry were coded through the Web-based coding system.

As noted above, the CAI program included checks that alerted respondents or interviewers when an entered answer was inconsistent with a previous answer in a given module. In this way, the inconsistency could be resolved while the interview was in progress. However, not every inconsistency was resolved during the interview, and the CAI program did not include checks for every possible inconsistency that might have occurred in the data.

Therefore, the first step in processing the raw NSDUH data was logical editing of the data. Logical editing involved using data from within a respondent's record to (a) reduce the amount of item nonresponse (i.e., missing data) in interview records, including identification of items that were legitimately skipped; (b) make related data elements consistent with each other; and (c) identify ambiguities or inconsistencies to be resolved through statistical imputation procedures (see Section A.3.2). An important aspect of editing the mental health variables was

documentation of situations in which it was known unambiguously that respondents legitimately skipped out of the corresponding questions. These included situations in which respondents were not asked questions based on their age and those that were based on routing logic within a given set of mental health questions. For example, if adult respondents reported that they did not stay overnight or longer in a hospital or other facility to receive mental health counseling in the past 12 months, the CAI logic skipped them out of all remaining adult mental health treatment questions about inpatient mental health services. In the editing procedures, the skipped variables were assigned codes to indicate that these additional inpatient adult mental health treatment variables did not apply.

If respondents were skipped out of drug use questions because they reported that they never used a given drug, the corresponding drug variables used in this report also were edited to assign codes indicating lifetime nonuse. In addition, respondents could report that they were lifetime users of a drug but not provide specific information on when they last used it. In this situation, a temporary "indefinite" value for the most recent period of use was assigned to the edited recency-of-use variable (e.g., "Used at some point in the lifetime LOGICALLY ASSIGNED"), and a final, specific value was statistically imputed. The editing procedures for key drug use variables also involved identifying inconsistencies between related variables so that these inconsistencies could be resolved through statistical imputation. For example, if a respondent reported last using a drug more than 12 months ago and also reported first using it at his or her current age, both of those responses could not be true. In this example, the inconsistent period of most recent use was replaced with an "indefinite" value, and the inconsistent age at first use was replaced with a missing data code. These indefinite or missing values were subsequently imputed through statistical procedures to yield consistent data for the related measures, as discussed in the next section. Procedures for editing the drug use variables also are discussed in Appendix A of the national findings report for the 2011 NSDUH (Center for Behavioral Health Statistics and Quality, 2012b).

In the adult NSDUH data for 2011, all respondents with skipped or missing item scores for psychological distress (based on the Kessler-6 [K6] distress scale) or functional impairment because of psychological distress (based on the abridged World Health Organization Disability Assessment Schedule [WHODAS]) had their scores assigned as zeros.[15] This included cases where all item scores were missing and those where the skip pattern allowed all WHODAS questions to be skipped when the sum of all K6 item scores was zero. Specifically, of the 46,599 adult respondents in the 2011 NSDUH, more than 500 (1.1 percent) had at least one of the six past month K6 item scores missing. Of those, nearly 100 (17.8 percent) had all six item scores missing. There were approximately 8,700 respondents (18.6 percent) who were skipped out of the WHODAS questions because the sum of all K6 item scores was zero, and approximately 500 respondents (1.0 percent) had at least one of the eight WHODAS item scores missing. Of those, nearly 100 (17.8 percent) had all eight item scores missing. As a result of assigning zeros to the K6 and WHODAS scores in these situations, there are no missing values in the 2011 survey for measures of adult serious mental illness (SMI) and other mental illness measures that were created from a model using K6 and WHODAS scores. Further details on the creation of these mental illness measures can be found in Section B.4.3 in Appendix B.

[15] The content of the K6 and WHODAS in the 2011 NSDUH and procedures for scoring these scales are described further in Section B.4.3 in Appendix B.

A.3.2 Statistical Imputation

For substance use, demographic, and other key variables that still had missing or ambiguous values after editing, statistical imputation was used to replace these values with appropriate response codes. However, the mental health variables related to mental health service utilization, suicidal ideation, and MDE used in this report were not imputed. Consequently, these variables continued to have some amount of missing data after they were edited.

The remainder of this section discusses procedures for substance use and other variables that underwent statistical imputation to replace missing or ambiguous values. For example, a response is ambiguous if the editing procedures assigned a respondent's most recent use of a drug to "Used at some point in the lifetime," with no definite period within the lifetime. In this case, the imputation procedure assigns a value for when the respondent last used the drug (e.g., in the past 30 days, more than 30 days ago but within the past 12 months, more than 12 months ago). Similarly, if a response is completely missing, the imputation procedures replace missing values with nonmissing ones.

For most variables, missing or ambiguous values are imputed in NSDUH using a methodology called predictive mean neighborhoods (PMN), which was developed specifically for the 1999 survey and has been used in all subsequent survey years. PMN allows for the following: (1) the ability to use covariates to determine donors is greater than that offered in the hot-deck imputation procedure, (2) the relative importance of covariates can be determined by standard modeling techniques, (3) the correlations across response variables can be accounted for by making the imputation multivariate, and (4) sampling weights can be easily incorporated in the models. The PMN method has some similarity with the predictive mean matching method of Rubin (1986) except that, for the donor records, Rubin used the observed variable value (not the predictive mean) to compute the distance function. Also, the well-known method of nearest neighbor imputation is similar to PMN, except that the distance function is in terms of the original predictor variables and often requires somewhat arbitrary scaling of discrete variables. PMN is a combination of a model-assisted imputation methodology and a random nearest neighbor hot-deck procedure. The hot-deck procedure within the PMN method ensures that missing values are imputed to be consistent with nonmissing values for other variables. Whenever feasible, the imputation of variables using PMN is multivariate, in which imputation is accomplished on several response variables at once. Variables imputed using PMN are the core demographic variables, core drug use variables (recency of use, frequency of use, and age at first use), income, health insurance, and noncore demographic variables for work status, immigrant status, and the household roster.

In the modeling stage of PMN, the model chosen depends on the nature of the response variable. In the 2011 NSDUH, the models included binomial logistic regression, multinomial logistic regression, Poisson regression, and ordinary linear regression, where the models incorporated the sampling design weights.

In general, hot-deck imputation replaces an item nonresponse (missing or ambiguous value) with a recorded response that is donated from a "similar" respondent who has nonmissing data. For random nearest neighbor hot-deck imputation, the missing or ambiguous value is replaced by a responding value from a donor randomly selected from a set of potential donors.

Potential donors are those defined to be "close" to the unit with the missing or ambiguous value according to a predefined function called a distance metric. In the hot-deck procedure of PMN, the set of candidate donors (the "neighborhood") consists of respondents with complete data who have a predicted mean close to that of the item nonrespondent. The predicted means are computed both for respondents with and without missing data, which differs from Rubin's method where predicted means are not computed for the donor respondent (Rubin, 1986). In particular, the neighborhood consists of either the set of the closest 30 respondents or the set of respondents with a predicted mean (or means) within 5 percent of the predicted mean(s) of the item nonrespondent, whichever set is smaller. If no respondents are available who have a predicted mean (or means) within 5 percent of the item nonrespondent, the respondent with the predicted mean(s) closest to that of the item nonrespondent is selected as the donor.

In the univariate case (where only one variable is imputed using PMN), the neighborhood of potential donors is determined by calculating the relative distance between the predicted mean for an item nonrespondent and the predicted mean for each potential donor, then choosing those means defined by the distance metric. The pool of donors is restricted further to satisfy logical constraints whenever necessary (e.g., age at first crack use must not be less than age at first cocaine use).

Whenever possible, missing or ambiguous values for more than one response variable are considered together. In this (multivariate) case, the distance metric is a Mahalanobis distance, which takes into account the correlation between variables (Manly, 1986), rather than a Euclidean distance. The Euclidean distance is the square root of the sum of squared differences between each element of the predictive mean vector for the respondent and the predictive mean vector for the nonrespondent. The Mahalanobis distance standardizes the Euclidean distance by the variance-covariance matrix, which is appropriate for random variables that are correlated or have heterogeneous variances. Whether the imputation is univariate or multivariate, only missing or ambiguous values are replaced, and donors are restricted to be logically consistent with the response variables that are not missing. Furthermore, donors are restricted to satisfy "likeness constraints" whenever possible. That is, donors are required to have the same values for variables highly correlated with the response. For example, donors for the age at first use variable are required to be of the same age as recipients, if at all possible. If no donors are available who meet these conditions, these likeness constraints can be loosened. Further details on the PMN methodology are provided by Singh, Grau, and Folsom (2002).

Although statistical imputation could not proceed separately within each State due to insufficient pools of donors, information about each respondent's State of residence was incorporated in the modeling and hot-deck steps. For most drugs, respondents were separated into three "State usage" categories as follows: respondents from States with high usage of a given drug were placed in one category, respondents from States with medium usage into another, and the remainder into a third category. This categorical "State rank" variable was used as one set of covariates in the imputation models. In addition, eligible donors for each item nonrespondent were restricted to be of the same State usage category (i.e., the same "State rank") as the nonrespondent.

In the 2011 NSDUH, the majority of variables that underwent statistical imputation required less than 5 percent of their records to be logically assigned or statistically imputed.

Variables for measures that are highly sensitive or that may not be known to younger respondents (e.g., family income) often have higher rates of item nonresponse. In addition, certain variables that are subject to a greater number of skip patterns and consistency checks (e.g., frequency of use in the past 12 months and past 30 days) often require greater amounts of imputation.

A.3.3 Development of Analysis Weights

The general approach to developing and calibrating analysis weights involved developing design-based weights as the product of the inverse of the selection probabilities at each selection stage. Since 2005, NSDUH has used a four-stage sample selection scheme in which an extra selection stage of census tracts was added before the selection of a segment. Thus, the design-based weights, d_k, incorporate an extra layer of sampling selection to reflect the sample design change. Adjustment factors, $a_k(\lambda)$, then were applied to the design-based weights to adjust for nonresponse, to poststratify to known population control totals, and to control for extreme weights when necessary. In view of the importance of State-level estimates with the 50-State design, it was necessary to control for a much larger number of known population totals. Several other modifications to the general weight adjustment strategy that had been used in past surveys also were implemented for the first time beginning with the 1999 CAI sample.

Weight adjustments were based on a generalization of Deville and Särndal's (1992) logit model. This generalized exponential model (GEM) (Folsom & Singh, 2000) incorporates unit-specific bounds $(\ell_k, u_k), k \in s,$ for the adjustment factor $a_k(\lambda)$ as follows:

$$a_k(\lambda) = \frac{\ell_k(u_k - c_k) + u_k(c_k - \ell_k)\exp(A_k x_k'\lambda)}{(u_k - c_k) + (c_k - \ell_k)\exp(A_k x_k'\lambda)},$$

where c_k are prespecified centering constants, such that $\ell_k < c_k < u_k$ and $A_k = (u_k - \ell_k)/(u_k - c_k)(c_k - \ell_k)$. The variables $\ell_k, c_k,$ and u_k are user-specified bounds, and λ is the column vector of *p* model parameters corresponding to the *p* covariates *x*. The λ-parameters are estimated by solving

$$\sum\nolimits_s x_k d_k a_k(\lambda) - \tilde{T}_x = 0,$$

where $\tilde{T}_x$ denotes control totals that could be either nonrandom, as is generally the case with poststratification, or random, as is generally the case for nonresponse adjustment.

The final weights $w_k = d_k a_k(\lambda)$ minimize the distance function $\Delta(w, d)$ defined as

$$\Delta(w,d) = \sum_{k \in s} \frac{d_k}{A_k}\left\{(a_k - \ell_k)\log\frac{a_k - \ell_k}{c_k - \ell_k} + (u_k - a_k)\log\frac{u_k - a_k}{u_k - c_k}\right\}.$$

This general approach was used at several stages of the weight adjustment process, including (1) adjustment of household weights for nonresponse at the screener level, (2)

poststratification of household weights to meet population controls for various household-level demographics by State, (3) adjustment of household weights for extremes, (4) poststratification of selected person weights, (5) adjustment of responding person weights for nonresponse at the questionnaire level, (6) poststratification of responding person weights, and (7) adjustment of responding person weights for extremes.

Every effort was made to include as many relevant State-specific covariates (typically defined by demographic domains within States) as possible in the multivariate models used to calibrate the weights (nonresponse adjustment and poststratification steps). Because further subdivision of State samples by demographic covariates often produced small cell sample sizes, it was not possible to retain all State-specific covariates (even after meaningful collapsing of covariate categories) and still estimate the necessary model parameters with reasonable precision. Therefore, a hierarchical structure was used in grouping States with covariates defined at the national level, at the census division level within the Nation, at the State group within the census division, and, whenever possible, at the State level. In every case, the controls for the total population within a State and the five age groups (12 to 17, 18 to 25, 26 to 34, 35 to 49, 50 or older) within a State were maintained except that, in the last step of poststratification of person weights, six age groups (12 to 17, 18 to 25, 26 to 34, 35 to 49, 50 to 64, 65 or older) were used. Census control totals by age, race, gender, and Hispanic origin were required for the civilian, noninstitutionalized population of each State. Beginning with the 2002 NSDUH, the Population Estimates Branch of the U.S. Census Bureau has produced the necessary population estimates for the same year as each NSDUH survey in response to a special request.

Census control totals for the 2011 NSDUH weights were based on population estimates from the 2010 decennial census, whereas the control totals for the 2010 NSDUH weights still were based on the 2000 census. Section B.4.5 in Appendix B discusses the results of an investigation assessing the effects of using control totals based on the 2010 census instead of the 2000 census for making mental health estimates for 2010.

Consistent with the surveys from 1999 onward, control of extreme weights through separate bounds for adjustment factors was incorporated into the GEM calibration processes for both nonresponse and poststratification. This is unlike the traditional method of winsorization in which extreme weights are truncated at prespecified levels and the trimmed portions of weights are distributed to the nontruncated cases. In GEM, it is possible to set bounds around the prespecified levels for extreme weights, then the calibration process provides an objective way of deciding the extent of adjustment (or truncation) within the specified bounds. A step was included to poststratify the household-level weights to obtain census-consistent estimates based on the household rosters from all screened households. An additional step poststratified the selected person sample to conform to the adjusted roster estimates. This additional step takes advantage of the inherent two-phase nature of the NSDUH design. The respondent poststratification step poststratified the respondent person sample to external census data (defined within the State whenever possible, as discussed above).

In the 2011 NSDUH, the GCO sample was integrated into the main study sample. The weighting process accounted for the oversampling without additional adjustment needing to be implemented. Special analysis weights were developed for studies focused on the gulf coast area, but these were not used for any estimates for this report.

Appendix B: Statistical Methods and Measurement

B.1 Target Population

The estimates of the prevalence of mental disorders and substance use from the National Survey on Drug Use and Health (NSDUH) are designed to describe the target population of the survey—the civilian, noninstitutionalized population aged 12 or older living in the United States. This population includes almost 98 percent of the total U.S. population aged 12 or older. However, it excludes some small subpopulations that may have very different estimates of mental disorders and substance use and therefore may have specific mental health issues or needs. For example, the survey excludes active military personnel, who may be exposed to combat situations or stressors associated with extended overseas deployment. In addition, military personnel have been shown to have significantly lower rates of illicit drug use but higher rates of heavy alcohol use compared with their counterparts in the civilian population. The survey also excludes persons living in institutional group quarters, such as prisons and residential mental health or substance abuse treatment centers. Persons in some of these institutional settings may have higher rates of mental health or substance use disorders compared with the general population. Another subpopulation excluded from NSDUH consists of homeless persons not living in a shelter on the survey date; they are another population shown to have higher than average rates of mental disorders and illicit drug use. Readers are reminded to consider the exclusion of these subpopulations when interpreting results. Appendix C describes other surveys that provide mental health data for these populations.

B.2 Sampling Error and Statistical Significance

This report includes national mental health estimates that were drawn from a set of tables referred to as "mental health detailed tables" that are available at http://www.samhsa.gov/data/. The national estimates, along with the associated standard errors (SEs, which are the square roots of the variances), were computed for all mental health detailed tables using a multiprocedure package, SUDAAN® Software for Statistical Analysis of Correlated Data. This software accounts for the complex survey design in NSDUH in estimating the SEs (RTI International, 2008). The final, nonresponse-adjusted, and poststratified analysis weights were used in SUDAAN to compute unbiased design-based estimates.

The sampling error of an estimate is the error caused by the selection of a sample instead of conducting a census of the population. The sampling error may be reduced by selecting a large sample and/or by using efficient sample design and estimation strategies, such as stratification, optimal allocation, and ratio estimation. The use of probability sampling methods in NSDUH allows estimation of sampling error from the survey data. SEs have been calculated using SUDAAN for all estimates presented in this report using a Taylor series linearization approach that takes into account the effects of NSDUH's complex design features. The SEs are used to identify unreliable estimates and to test for the statistical significance of differences between estimates.

B.2.1 Variance Estimation for Totals

The variances and SEs of estimates of means and proportions can be calculated reasonably well in SUDAAN using a Taylor series linearization approach. Estimates of means or proportions, $\hat{p}_d$, such as drug use prevalence estimates for a domain d, can be expressed as a ratio estimate:

$$\hat{p}_d = \frac{\hat{Y}_d}{\hat{N}_d},$$

where $\hat{Y}_d$ is a linear statistic estimating the number of substance users in the domain d and $\hat{N}_d$ is a linear statistic estimating the total number of persons in domain d (including both users and nonusers). The SUDAAN software package is used to calculate direct estimates of $\hat{Y}_d$ and $\hat{N}_d$ (and, therefore, $\hat{p}_d$) and also can be used to estimate their respective SEs. A Taylor series approximation method implemented in SUDAAN provides the estimate for the SE of $\hat{p}_d$.

When the domain size, $\hat{N}_d$, is free of sampling error, an appropriate estimate of the SE for the total number of substance users is

$$\mathrm{SE}(\hat{Y}_d) = \hat{N}_d \mathrm{SE}(\hat{p}_d).$$

This approach is theoretically correct when the domain size estimates, $\hat{N}_d$, are among those forced to match their respective U.S. Census Bureau population estimates through the weight calibration process. In these cases, $\hat{N}_d$ is not subject to a sampling error induced by the NSDUH design. Section A.3.3 in Appendix A contains further information about the weight calibration process. In addition, more detailed information about the weighting procedures for 2011 will appear in the *2011 NSDUH Methodological Resource Book*, which is in process. Until that volume becomes available, refer to the *2010 NSDUH Methodological Resource Book* (RTI International, 2012).

For estimated domain totals, $\hat{Y}_d$, where $\hat{N}_d$ is not fixed (i.e., where domain size estimates are not forced to match the U.S. Census Bureau population estimates), this formulation still may provide a good approximation if it can be assumed that the sampling variation in $\hat{N}_d$ is negligible relative to the sampling variation in $\hat{p}_d$. This is a reasonable assumption for many cases in this study.

For some subsets of domain estimates, the above approach can yield an underestimate of the SE of the total when $\hat{N}_d$ was subject to considerable variation. Because of this underestimation, alternatives for estimating SEs of totals were implemented. Since the 2005 NSDUH report, a "mixed" method approach has been implemented for all detailed tables to improve the accuracy of SEs and to better reflect the effects of poststratification on the variance

of total estimates. This approach assigns the methods of SE calculation to domains (i.e., subgroups for which the estimates were calculated) within tables so that all estimates among a select set of domains with fixed $\hat{N}_d$ were calculated using the formula above, and all other estimates were calculated directly in SUDAAN, regardless of what the other estimates are within the same table. The set of domains considered controlled (i.e., those with a fixed $\hat{N}_d$) was restricted to main effects and two-way interactions in order to maintain continuity between years. Domains consisting of three-way interactions may be controlled in a single year but not necessarily in preceding or subsequent years. The use of such SEs did not affect the SE estimates for the corresponding proportions presented in the same sets of tables because all SEs for means and proportions are calculated directly in SUDAAN. As a result of the use of this mixed-method approach, the SEs for the total estimates within many detailed tables were calculated differently from those in NSDUH reports prior to the 2005 report.

Table B.1 at the end of this appendix contains a list of domains with a fixed $\hat{N}_d$ that were used in the weight calibration process. This table includes both the main effects and two-way interactions and may be used to identify the method of SE calculation employed for estimates of totals in the mental health detailed tables from which data are presented in this report. For example, Tables 1.2 and 1.7 in the mental health detailed tables present estimates of any mental illness (AMI) and serious mental illness (SMI), respectively, among persons aged 18 or older within the domains of gender, Hispanic origin and race, and current employment. Estimates among the total population (age main effect), males and females (age by gender interaction), and Hispanics and non-Hispanics (age by Hispanic origin interaction) were treated as controlled in these tables, and the formula above was used to calculate the SEs. The SEs for all other estimates, including white and black or African American (age by Hispanic origin by race interaction) were calculated directly from SUDAAN. Estimates presented in this report for racial groups are for non-Hispanics. Thus, the domain for whites by age group in the weight calibration process in Table B.1 is a two-way interaction. However, published estimates for whites by age group in this report and in the 2011 mental detailed tables actually represent a three-way interaction: white by Hispanic origin (i.e., not Hispanic) by age group.

B.2.2 Suppression Criteria for Unreliable Estimates

As has been done in past NSDUH reports, direct estimates from NSDUH that are designated as unreliable are not shown in this report and are noted by asterisks (*) in figures containing these estimates. The criteria used to define unreliability of direct estimates from NSDUH are based on the prevalence (for proportion estimates), relative standard error (RSE) (defined as the ratio of the SE over the estimate), nominal (actual) sample size, and effective sample size for each estimate. These suppression criteria for various NSDUH estimates are summarized in Table B.2 at the end of this appendix.

Proportion estimates $(\hat{p})$, or rates, within the range $[0 < \hat{p} < 1]$, and the corresponding estimated numbers of users were suppressed if

$$\text{RSE}[-\ln(\hat{p})] > .175 \text{ when } \hat{p} \leq .5$$

or

$$\text{RSE}[-\ln(1-\hat{p})] > .175 \text{ when } \hat{p} > .5 .$$

Using a first-order Taylor series approximation to estimate $\text{RSE}[-\ln(\hat{p})]$ and $\text{RSE}[-\ln(1-\hat{p})]$, the following equation was derived and used for computational purposes when applying a suppression rule dependent on effective sample size:

$$\frac{\text{SE}(\hat{p})/\hat{p}}{-\ln(\hat{p})} > .175 \text{ when } \hat{p} \leq .5$$

or

$$\frac{\text{SE}(\hat{p})/(1-\hat{p})}{-\ln(1-\hat{p})} > .175 \text{ when } \hat{p} > .5 .$$

The separate formulas for $\hat{p} \leq .5$ and $\hat{p} > .5$ produce a symmetric suppression rule; that is, if $\hat{p}$ is suppressed, $1-\hat{p}$ will be suppressed as well (see Figure B.1 following Table B.2). When $.05 < \hat{p} < .95$, the symmetric properties of the rule produce a local minimum effective sample size of 50 at $\hat{p} = .2$ and at $\hat{p} = .8$. Using the minimum for the suppression rule would mean that estimates of $\hat{p}$ between .05 and .95 would be suppressed if their corresponding effective sample sizes were less than 50. Within this same interval, a local maximum effective sample size of 68 is found at $\hat{p} = .5$. To simplify requirements and maintain a conservative suppression rule, estimates of $\hat{p}$ between .05 and .95 were suppressed if they had an effective sample size below 68.

In addition, a minimum nominal sample size suppression criterion (n = 100) that protects against unreliable estimates caused by small design effects and small nominal sample sizes was employed; Table B.2 shows a formula for calculating design effects. Prevalence estimates also were suppressed if they were close to 0 or 100 percent (i.e., if $\hat{p} < .00005$ or if $\hat{p} \geq .99995$).

Estimates of totals were suppressed if the corresponding prevalence rates were suppressed. Estimates of means that are not bounded between 0 and 1 (e.g., mean of age at first use) were suppressed if the RSEs of the estimates were larger than .5 or if the nominal sample size was smaller than 10 respondents.

B.2.3 Statistical Significance of Differences

This section describes the methods used to compare prevalence estimates in this report. Customarily, the observed difference between estimates is evaluated in terms of its statistical significance. Statistical significance is based on the p value of the test statistic and refers to the probability that a difference as large as that observed would occur because of random variability in the estimates if there were no difference in the prevalence estimates for the population groups being compared. The significance of observed differences in this report is reported at the .05 level. When comparing prevalence estimates, the null hypothesis (no difference between

prevalence estimates) was tested against the alternative hypothesis (there is a difference in prevalence estimates) using the standard difference in proportions test expressed as

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\text{var}(\hat{p}_1) + \text{var}(\hat{p}_2) - 2\,\text{cov}(\hat{p}_1, \hat{p}_2)}},$$

where $\hat{p}_1$ = first prevalence estimate, $\hat{p}_2$ = second prevalence estimate, $\text{var}(\hat{p}_1)$ = variance of first prevalence estimate, $\text{var}(\hat{p}_2)$ = variance of second prevalence estimate, and $\text{cov}(\hat{p}_1, \hat{p}_2)$ = covariance between $\hat{p}_1$ and $\hat{p}_2$. In cases where significance tests between years were performed, the prevalence estimate from the earlier year becomes the first prevalence estimate, and the prevalence estimate from the later year becomes the second prevalence estimate (e.g., 2010 is the first estimate and 2011 the second).

Under the null hypothesis, *Z* is asymptotically distributed as a standard normal random variable. Therefore, calculated values of *Z* can be referred to the unit normal distribution to determine the corresponding probability level (i.e., *p* value). Because the covariance term between the two estimates is not necessarily zero, SUDAAN was used to compute estimates of *Z* along with the associated *p* values using the analysis weights and accounting for the sample design as described in Appendix A. A similar procedure and formula for *Z* were used for estimated totals. Whenever it was necessary to calculate the SE outside of SUDAAN (i.e., when domains were forced by the weighting process to match their respective U.S. Census Bureau population estimates), the corresponding test statistics also were computed outside of SUDAAN.

When comparing population subgroups across three or more levels of a categorical variable, log-linear chi-square tests of independence of the subgroups and the prevalence variables were conducted using SUDAAN in order to first control the error level for multiple comparisons. If Shah's Wald *F* test (transformed from the standard Wald chi-square) indicated overall significant differences, the significance of each particular pairwise comparison of interest was tested using SUDAAN analytic procedures to properly account for the sample design (RTI International, 2008). Using the published estimates and SEs to perform independent *t* tests for the difference of proportions usually will provide the same results as tests performed in SUDAAN. However, where the significance level is borderline, results may differ for two reasons: (1) the covariance term is included in SUDAAN tests, whereas it is not included in independent *t* tests; and (2) the reduced number of significant digits shown in the published estimates may cause rounding errors in the independent *t* tests.

B.3 Other Information on Data Accuracy

The accuracy of survey estimates can be affected by nonresponse, coding errors, computer processing errors, errors in the sampling frame, reporting errors, and other errors not due to sampling. They are sometimes referred to as "nonsampling errors." These types of errors and their impact are reduced through data editing, statistical adjustments for nonresponse, close monitoring and periodic retraining of interviewers, and improvement in various quality control procedures.

Although these types of errors often can be much larger than sampling errors, measurement of most of these errors is difficult. However, some indication of the effects of some types of these errors can be obtained through proxy measures, such as response rates and from other research studies.

B.3.1 Screening and Interview Response Rate Patterns

In 2011, respondents continued to receive a $30 incentive for the main study in an effort to maximize response rates. The weighted screening response rate (SRR) is defined as the weighted number of successfully screened households[16] divided by the weighted number of eligible households (as defined in Table B.3), or

$$SRR = \frac{\sum w_{hh} complete_{hh}}{\sum w_{hh} eligible_{hh}},$$

where w_{hh} is the inverse of the unconditional probability of selection for the household and excludes all adjustments for nonresponse and poststratification defined in Section A.3.3 of Appendix A. Of the 179,293 eligible households sampled for the 2011 NSDUH, 156,048 were screened successfully, for a weighted screening response rate of 87.0 percent (Table B.3). At the person level, the weighted interview response rate (IRR) is defined as the weighted number of respondents divided by the weighted number of selected persons (see Table B.4), or

$$IRR = \frac{\sum w_i complete_i}{\sum w_i selected_i},$$

where w_i is the inverse of the probability of selection for the person and includes household-level nonresponse and poststratification adjustments (adjustments 1, 2, and 3 in Section A.3.3 of Appendix A). To be considered a completed interview, a respondent must provide enough data to pass the usable case rule.[17] In the 156,048 screened households, a total of 88,536 sample persons were selected, and completed interviews were obtained from 70,109 of these sample persons, for a weighted IRR of 74.4 percent (Table B.4). A total of 13,311 (18.1 percent) sample persons were classified as refusals or parental refusals, 2,917 (3.4 percent) were not available or never at home, and 2,199 (4.1 percent) did not participate for various other reasons, such as physical or mental incompetence or language barrier (see Table B.4, which also shows the distribution of the selected sample by interview code and age group). Among demographic subgroups, the weighted IRR was higher among 12 to 17 year olds (85.0 percent), females (76.1 percent), blacks (79.8 percent), persons in the South (76.9 percent), and residents of nonmetropolitan areas (77.0 percent) than among other related groups (Table B.5).

[16] A successfully screened household is one in which all screening questionnaire items were answered by an adult resident of the household and either zero, one, or two household members were selected for the NSDUH interview.

[17] The usable case rule requires that a respondent answer "yes" or "no" to the question on lifetime use of cigarettes and "yes" or "no" to at least nine additional lifetime use questions.

The overall weighted response rate, defined as the product of the weighted screening response rate and weighted interview response rate or

$$ORR = SRR \times IRR,$$

was 64.7 percent in 2011. Nonresponse bias can be expressed as the product of the nonresponse rate $(1-R)$ and the difference between the characteristic of interest between respondents and nonrespondents in the population $(P_r - P_{nr})$. By maximizing NSDUH response rates, it is hoped that the bias due to the difference between the estimates from respondents and nonrespondents is minimized. Drug use surveys are particularly vulnerable to nonresponse because of the difficult nature of accessing heavy drug users. However, in a study that matched 1990 census data to 1990 NHSDA nonrespondents,[18] it was found that populations with low response rates did not always have high drug use rates. For example, although some populations were found to have low response rates and high drug use rates (e.g., residents of large metropolitan areas and males), other populations had low response rates and low drug use rates (e.g., older adults and high-income populations). Therefore, many of the potential sources of bias tend to cancel each other in estimates of overall prevalence (Gfroerer, Lessler, & Parsley, 1997).

B.3.2 Inconsistent Responses and Item Nonresponse

Among survey participants, item response rates were generally very high for most mental health and drug use items. For example, 0.1 percent of the adult respondents in 2011 had missing data (i.e., responses other than "yes" or "no") for whether they received mental health treatment in the past 12 months as an inpatient, and 0.3 percent had missing data for whether they received outpatient mental health treatment in this period. Also, about 0.4 percent of adults had missing data for questions about suicidal thoughts and behavior. About 0.6 to 0.8 percent of adults had missing data for questions about specific lifetime symptoms of depression; the highest percentage of missing data (0.8 percent) occurred in the question about the specific number of pounds that respondents lost without trying to lose weight (question AD26f in the adult depression module). In addition, about 0.5 to 0.7 percent of adults had missing data for these lifetime depression symptom questions because they had missing data (e.g., answers of "don't know" or "refused") for preceding questions that needed to be answered affirmatively in order for them to be asked the questions about depression symptoms. Information on item nonresponse for questions used to measure psychological distress and functional impairment among adults is presented in Section A.3.1 in Appendix A of this report.

For respondents aged 12 to 17 in the 2011 NSDUH, 1.6 to 2.1 percent had missing data for questions about specific lifetime symptoms of depression; as for adults, the highest percentage of missing data (2.1 percent) occurred in the question about the specific number of pounds that youths lost without trying (question YD26f in the adolescent depression module). About 1.5 to 1.9 percent of youths had missing data for these lifetime depression symptom questions because they had missing data for preceding questions that youths needed to answer affirmatively in order to be asked the questions about depression symptoms.

[18] Prior to 2002, NSDUH was known as the National Household Survey on Drug Abuse (NHSDA).

In addition, the logic in the 2011 NSDUH computer-assisted interviewing (CAI) instrumentation skipped respondents out of the mental health and other questions that would not apply based on their answers to previous questions. This skip logic reduced the potential for inconsistent data by limiting respondents' opportunity to provide answers that were inconsistent with previous answers. For example, if adult respondents did not report that they stayed overnight in a hospital or other facility to receive mental health treatment in the past 12 months, they were not asked questions about the type of inpatient facility where they received mental health treatment, the number of nights they spent in inpatient facilities, or the payment sources for their inpatient treatment in that period. Thus, respondents could not report that they did not receive inpatient mental health treatment in the past 12 months and then answer one or more of these additional questions as though they had.

Respondents also could give inconclusive or inconsistent information about whether they ever used a given drug (i.e., "yes" or "no") and, if they had used a drug, when they last used it; the latter information is needed to identify those lifetime users of a drug who used it in the past year or past month. Further, the logic in the CAI instrument did not eliminate all occurrences of inconsistent data. For example, respondents could give inconsistent responses to items such as when they first used a drug compared with their most recent use of a drug. These missing or inconsistent responses first are resolved where possible through a logical editing process. Additionally, missing or inconsistent responses are imputed using statistical methodology. These imputation procedures in NSDUH are based on responses to multiple questions, so that the maximum amount of information is used in determining whether a respondent is classified as a user or nonuser, and if the respondent is classified as a user, whether the respondent is classified as having used in the past year or the past month. For example, ambiguous data on the most recent use of cocaine are statistically imputed based on a respondent's data for use (or most recent use) of tobacco products, alcohol, inhalants, marijuana, hallucinogens, and nonmedical use of prescription psychotherapeutic drugs. Nevertheless, editing and imputation of missing responses are potential sources of measurement error.

As was the case with the drug use variables, the CAI skip logic also did not eliminate all opportunities for inconsistent reports in the mental health questions. Consequently, the logical editing procedures for the mental health data could slightly increase the amount of missing data when inconsistent answers were given. For example, if adult or adolescent respondents reported an age at onset for their worst period of depression symptoms that was greater than their current age, the inconsistent age-at-onset variable was set to a missing value.

For more information on editing and statistical imputation, see Sections A.3.1 and A.3.2 of Appendix A. Details of the editing and imputation procedures for 2011 also will appear in the *2011 NSDUH Methodological Resource Book*, which is in process. Until that volume becomes available, refer to the *2010 NSDUH Methodological Resource Book* (RTI International, 2012).

B.3.3 Data Reliability

A reliability study was conducted as part of the 2006 NSDUH to assess the reliability of responses to the NSDUH questionnaire. An interview/reinterview method was employed in which 3,136 individuals were interviewed on two occasions during 2006 generally 5 to 15 days apart; the initial interviews in the reliability study were a subset of the main study interviews.

The reliability of the responses was assessed by comparing the responses of the first interview with the responses from the reinterview. Responses from the first interview and reinterview that were analyzed for response consistency were raw data that had been only minimally edited for ease of analysis and had not been imputed (see Sections A.3.1 and A.3.2 of Appendix A).

This section summarizes results for the reliability of selected variables related to substance use, mental health, and demographic characteristics. Reliability is expressed by estimates of Cohen's kappa (κ), which ranges from -1.00 to 1.00 (Cohen, 1960). Cohen's kappa can be interpreted according to benchmarks proposed by Landis and Koch (1977, p. 165): (a) *poor* agreement for kappas less than 0.00, (b) *slight* agreement for kappas of 0.00 to 0.20, (c) *fair* agreement for kappas of 0.21 to 0.40, (d) *moderate* agreement for kappas of 0.41 to 0.60, (e) *substantial* agreement for kappas of 0.61 to 0.80, and (f) *almost perfect* agreement for kappas of 0.81 to 1.00.

The kappa values for the lifetime and past year substance use variables (marijuana use, alcohol use, and cigarette use) among persons aged 12 or older all showed almost perfect response consistency, ranging from 0.82 for past year marijuana use to 0.93 for lifetime marijuana use and past year cigarette use. The value obtained for the substance dependence or abuse measure in the past year showed substantial agreement (0.67), while the substance abuse treatment variable showed almost perfect consistency in both the lifetime (0.89) and past year (0.87).

Among adults, the values for past year outpatient mental health treatment and prescription medication mental health treatment showed almost perfect consistency (0.85 each). Reliability statistics for the adult major depressive episode (MDE) measures were moderate to substantial (lifetime: 0.67; past year: 0.52).

A dichotomous measure of whether adults had scores of less than 13 or scores of 13 or higher based on six items (the Kessler-6 or K6 scale; see Section B.4.3 in this appendix for more information on the K6 scale) was used to estimate symptoms of psychological distress during the one month in the past 12 months when respondents were at their worst emotionally.[19] This measure showed substantial agreement (0.64) between the first interview and the reinterview. The kappa for the K6 score, which ranged from 0 to 24, was weak (0.21) when exact agreement was required between the scores from the first interview and the reinterview. When the K6 scores were allowed to differ by no more than three points between the two interviews, however, the kappa increased to 0.63.

The demographic variables showed almost perfect agreement, ranging from 0.95 for current enrollment in school to 1.00 for gender. For further information on the reliability of a wide range of measures contained in NSDUH, see the complete methodology report (Chromy et al., 2010).

[19] In NSDUHs prior to 2008, a score of 13 or higher on the K6 scale was used to define a measure of serious psychological distress among adults.

B.3.4 Revised Estimates for 2006 to 2010

During regular data collection and processing checks for the 2011 NSDUH, data errors were identified. These errors resulted from fraudulent cases submitted by field interviewers and affected the data for Pennsylvania (2006 to 2010) and Maryland (2008 and 2009). Although all fraudulent interview cases were removed from the data files, the affected screening cases were not removed because they were part of the assigned sample. Instead, these screening cases were assigned a final screening code of 39 ("Fraudulent Case") and treated as incomplete with unknown eligibility. The screening eligibility status for these cases was then imputed. Those cases that were imputed to be eligible were treated as unit nonrespondents for weighting purposes; however, these cases were not treated differently from other unit nonrespondents in the weighting process (see Section A.3.3 in Appendix A). In Table B.3, cases that were imputed to be eligible are classified with a final code of 39 ("Fraudulent Case"). The cases that were imputed to be ineligible did not contribute to the weights and are reported as "Other, Ineligible" in Table B.3. Because all of these cases were treated either as ineligible or as unit nonrespondents at the screening level, they were excluded from the interview data in Table B.4. However, some estimates for 2006 to 2010 in the 2011 mental health findings report and the 2011 mental health detailed tables, as well as other new reports, may differ from corresponding estimates found in some previous reports or tables.

These errors had minimal impact on the national estimates and no effect on direct estimates for the other 48 States and the District of Columbia. In reports where model-based small area estimation techniques are used, estimates for all States may be affected, even though the errors were concentrated in only two States. In reports that do not use model-based estimates, the only estimates appreciably affected are estimates for Pennsylvania, Maryland, the mid-Atlantic division, and the Northeast region.

The 2011 mental health findings report and mental health detailed tables do not include division-level, State-level, or model-based estimates. However, they do show region-level estimates, including estimates for the Northeast region. Single-year estimates based on 2006 to 2010 data may differ from previously published estimates. Tables and estimates based only on 2011 data are unaffected by these data errors.

Caution is advised when comparing data from older reports with data from more recent reports that are based on corrected data files. As discussed above, comparisons of mental health estimates for Pennsylvania, Maryland, the mid-Atlantic division, and the Northeast region are of most concern, while comparisons of national data or data for other States and regions are essentially still valid. The Center for Behavioral Health Statistics and Quality (CBHSQ) within the Substance Abuse and Mental Health Services Administration (SAMHSA) is producing a selected set of corrected versions of reports and tables. In particular, CBHSQ has released a set of modified detailed tables for 2006 to 2008 that include revised estimates for the Northeast region for certain mental health measures. However, CBHSQ does not recommend making comparisons between unrevised 2006 to 2010 mental health estimates and estimates based on 2011 data for the Northeast region.

B.4 Measurement Issues

Several measurement issues associated with the 2011 NSDUH are discussed in this section. Specifically, these issues include the methods for measuring substance dependence and abuse and mental health issues.

B.4.1 Illicit Drug and Alcohol Dependence and Abuse

The 2011 NSDUH CAI instrumentation included questions that were designed to measure alcohol and illicit drug dependence and abuse. For these substances,[20] dependence and abuse questions were based on the criteria in the American Psychiatric Association (APA) *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV) (APA, 1994).

Specifically, for marijuana, hallucinogens, inhalants, and tranquilizers, a respondent was defined as having dependence if he or she met three or more of the following six dependence criteria:

1. Spent a great deal of time over a period of a month getting, using, or getting over the effects of the substance.

2. Used the substance more often than intended or was unable to keep set limits on the substance use.

3. Needed to use the substance more than before to get desired effects or noticed that the same amount of substance use had less effect than before.

4. Inability to cut down or stop using the substance every time tried or wanted to.

5. Continued to use the substance even though it was causing problems with emotions, nerves, mental health, or physical problems.

6. The substance use reduced or eliminated involvement or participation in important activities.

For alcohol, cocaine, heroin, pain relievers, sedatives, and stimulants, a seventh withdrawal criterion was added. A respondent was defined as having dependence if he or she met three or more of seven dependence criteria. The seventh withdrawal criterion is defined by a respondent reporting having experienced a certain number of withdrawal symptoms that vary by substance (e.g., having trouble sleeping, cramps, hands tremble).

For each illicit drug and alcohol, a respondent was defined as having abused that substance if he or she met one or more of the following four abuse criteria and was determined not to be dependent on the respective substance in the past year:

[20] Substances include alcohol, marijuana, cocaine, heroin, hallucinogens, inhalants, pain relievers, tranquilizers, stimulants, and sedatives.

1. Serious problems at home, work, or school caused by the substance, such as neglecting your children, missing work or school, doing a poor job at work or school, or losing a job or dropping out of school.

2. Used the substance regularly and then did something that might have put you in physical danger.

3. Use of the substance caused you to do things that repeatedly got you in trouble with the law.

4. Had problems with family or friends that were probably caused by using the substance and continued to use the substance even though you thought the substance use caused these problems.

Criteria used to determine whether a respondent was asked the dependence and abuse questions during the interview included responses from the core substance use questions and the frequency of substance use questions, as well as the noncore substance use questions. Missing or incomplete responses in the core substance use and frequency of substance use questions were imputed. However, the imputation process did not take into account reported data in the noncore (i.e., substance dependence and abuse) CAI modules. Very infrequently, this may have resulted in responses to the dependence and abuse questions that were inconsistent with the imputed substance use or frequency of substance use.

For alcohol and marijuana, respondents were asked the dependence and abuse questions if they reported substance use on more than 5 days in the past year, or if they reported any substance use in the past year but did not report their frequency of past year use. Therefore, inconsistencies could have occurred where the imputed frequency of use response indicated less frequent use than required for respondents to be asked the dependence and abuse questions originally. For alcohol, for example, about 42,000 respondents were past year alcohol users in 2011. Of these, fewer than 100 respondents (about 0.2 percent) were asked the alcohol dependence and abuse questions, but their final imputed frequency of use indicated that they used alcohol on 5 or fewer days in the past year.

For cocaine, heroin, and stimulants, respondents were asked the dependence and abuse questions if they reported past year use in a core drug module or past year use in the noncore special drugs module. Thus, the CAI logic allowed some respondents to be asked the dependence and abuse questions for these drugs even if they did not report past year use in the corresponding core module. For cocaine, for example, more than 1,500 respondents in 2011 were asked the questions about cocaine dependence and abuse because they reported past year use of cocaine or crack in the core section of the interview. Fewer than 10 additional respondents were asked these questions because they reported past year use of cocaine with a needle in the special drugs module despite not having previously reported past year use of cocaine or crack.

In 2005, two new questions were added to the noncore special drugs module about past year methamphetamine use: "Have you ever, even once, used methamphetamine?" and "Have you ever, even once, used a needle to inject methamphetamine?" In 2006, an additional follow-up question was added to the noncore special drugs module confirming prior responses about methamphetamine use: "Earlier, the computer recorded that you have never used

methamphetamine. Which answer is correct?" The responses to these new questions were used in the skip logic for the stimulant dependence and abuse questions. Based on the decisions made during the methamphetamine analysis,[21] respondents who indicated past year methamphetamine use solely from these new special drug use questions (i.e., did not indicate methamphetamine use from the core drug module or other questions in the special drugs module) were categorized as NOT having past year stimulant dependence or abuse regardless of how they answered the dependence and abuse questions. Furthermore, if these same respondents were categorized as not having past year dependence or abuse of any other substance (e.g., pain relievers, tranquilizers, or sedatives for the psychotherapeutic drug grouping), then they were categorized as NOT having past year dependence or abuse of psychotherapeutics, illicit drugs, illicit drugs or alcohol, and illicit drugs and alcohol.

In 2008, questionnaire logic for determining hallucinogen, stimulant, and sedative dependence or abuse was modified. The revised skip logic used information collected in the noncore special drugs module in addition to that collected in questions from the core drug modules. Respondents were asked about hallucinogen dependence and abuse if they additionally reported in the special drugs module using Ketamine, DMT, AMT, Foxy, or *Salvia divinorum*; stimulant dependence and abuse if they reported additionally using Adderall®; and sedative dependence and abuse if they reported additionally using Ambien®. Complying with the previous decision to exclude respondents whose methamphetamine use was based solely on responses in a noncore module from being classified as having stimulant dependence or abuse, respondents who indicated past year hallucinogen, stimulant, or sedative use based solely on these special drug questions were categorized as NOT having past year dependence or abuse of the relevant substance regardless of how they answered the dependence and abuse questions.

Respondents might have provided ambiguous information about past year use of any individual substance, in which case these respondents were not asked the dependence and abuse questions for that substance. Subsequently, these respondents could have been imputed to be past year users of the respective substance. In this situation, the dependence and abuse data were unknown; thus, these respondents were classified as not having dependence or abuse of the respective substance. However, such a respondent never actually was asked the dependence and abuse questions.

B.4.2 Effects of Questionnaire Changes on Mental Health Measures

Changes were made to the mental health questions in the 2008 and 2009 NSDUH questionnaires. These changes are summarized as follows:

1. For adults aged 18 or older, a split-sample study was embedded within the 2008 NSDUH, such that a reduced set of questions from the World Health Organization Disability Assessment Schedule (WHODAS) or the Sheehan Disability Scale (SDS) were randomly assigned to respondents. The WHODAS questions were retained for use in the 2009 NSDUH and future surveys. The SDS items were no longer included after 2008.

[21] See Section B.4.8 in the *Results from the 2008 National Survey on Drug Use and Health: National Findings* (Office of Applied Studies [OAS], 2009) for the methamphetamine analysis decisions.

2. For youths aged 12 to 17, a total of five questions that were in the youth mental health service utilization (YMHSU) module in 2008 were no longer included in 2009. These questions asked about the receipt of special education services and school counseling, as well as time spent in jail or foster care.

3. For youths, seven questions have been included since 2009 that asked about receipt of mental health services in the education and justice system sectors. These questions replaced the previous questions that were removed from the YMHSU module in 2009.

These types of changes to questions in a given module between survey years could affect how respondents answer questions in subsequent modules (i.e., context effects). A context effect may be said to take place when the response to a question is affected by information that is not part of the question itself. For example, the content of a preceding question may affect the interpretation of a subsequent question. Or a respondent may answer a subsequent question in a manner that is consistent with responses to a preceding question if the two questions are closely related to each other.

Effects of Changes to the Questions for Adults. The split-sample design in 2008 for adults (item 1 above) affected reporting of MDE, depending on whether adult respondents received the WHODAS or SDS. Therefore, CBHSQ decided to publish estimates of adult MDE in 2008 that were based on the half sample of adults who received the WHODAS because it was decided that the WHODAS would be retained in subsequent surveys. Investigation of the effects of the split-sample design on estimates of adult MDE in 2008 is discussed in further detail in Sections B.4.4 and B.4.7 of the 2008 NSDUH's national findings report (OAS, 2009). However, subsequent adjustment procedures were developed for adult MDE from the SDS half sample to allow data from all adult respondents in 2008 to be used for estimating MDE among adults. These adjustment procedures are described further in Section B.4.4 in this appendix.

Administration of the WHODAS or SDS in 2008 did not appear to differentially affect responses to the questions for adults about suicide that also were added in 2008 (OAS, 2009). Therefore, further investigation was not done to examine the effects on estimates of suicidal ideation and behavior in 2009 due to the removal of the SDS items.

Effects of Changes to the Questions for Youths. The changes to the YMHSU module (items 2 and 3 above) in 2009 could have affected how adolescents answered the items at the beginning of the adolescent depression module (i.e., due to context effects). The adolescent depression module follows the YMHSU module for youths. In turn, changes in youths' answers to these introductory adolescent depression items could affect estimates of adolescent MDE.

The effects of these changes to the YMHSU module on subsequent reports in the adolescent depression module were investigated using data from the first 6 months of the 2009 NSDUH. As discussed in Section B.4.2 in Appendix B of the 2009 mental health findings report (CBHSQ, 2010), the changes to the YMHSU module in 2009 did not appear to affect estimates for the variables based on the lead adolescent depression questions or estimates of adolescent MDE between 2008 and 2009.

B.4.3 Estimation of Serious and Other Levels of Mental Illness

Background. In NSDUH reports prior to 2004, the K6 distress scale was used to measure SMI. However, SAMHSA discontinued producing SMI estimates with the release of the 2004 data because of concerns about the validity of using only the K6 distress scale without an impairment scale; see Section B.4.4 of Appendix B in the 2004 NSDUH national findings report (OAS, 2005) for a discussion. The SMI estimates presented in this report for 2008 and 2009 are not comparable with the SMI estimates produced from NSDUH in earlier years.

On May 20, 1993, SAMHSA's Center for Mental Health Services (CMHS) published its definition of SMI in the *Federal Register*:

> Pursuant to Section 1912(c) of the Public Health Services Act, as amended by Public Law 102-321, "adults with serious mental illness" are defined as the following:
>
> - Persons aged 18 and over, who currently or at any time during the past year, have had diagnosable mental, behavioral, or emotional disorder of sufficient duration to meet diagnostic criteria specified within DSM-III-R [sic] that has resulted in functional impairment, which substantially interferes with or limits one or more major life activities.
>
> - These disorders include any mental disorders (including those of biological etiology) listed in DSM-III-R or their ICD-9-CM equivalent (and subsequent revisions), with the exception of DSM-III-R "V" codes, substance use disorders, and developmental disorders, which are excluded unless they co-occur with other diagnosable serious mental illness.
>
> - All of these disorders have episodic, recurrent, or persistent features; however, they vary in terms of severity or disabling effects. Functional impairment is defined as difficulties that substantially interfere with or limit role functioning in one or more major life activities including basic daily living skills (e.g., eating, bathing, dressing); instrumental living skills (e.g., maintaining a household, managing money, getting around the community, taking prescribed medication); and functioning in social, family, and vocational/educational contexts.
>
> - Adults who would have met functional impairment criteria during the referenced year without benefit of treatment or other support services are considered to have serious mental illness.

In December 2006, a technical advisory group (TAG) meeting of expert consultants was convened by CMHS to solicit recommendations for mental health surveillance data collection strategies among the U.S. population. The panel recommended that NSDUH should be used to produce estimates of SMI among adults using NSDUH's mental health measures and a gold-standard clinical psychiatric interview. In response, SAMHSA's CBHSQ initiated a Mental Health Surveillance Study (MHSS) under its NSDUH contract with RTI International to develop and implement methods to estimate SMI.

To develop methods for estimating SMI and other measures of mental illness, the MHSS has been conducted since 2008 as part of the NSDUH design and analysis. Because of constraints on the interview time in NSDUH and the need for trained mental health clinicians, it was not possible to administer a full structured diagnostic clinical interview to assess mental illness on all 45,000 adult respondents; therefore, the approach adopted by SAMHSA was to utilize short scales separately measuring psychological distress and functional impairment that could be used in a statistical model to accurately predict whether a respondent had mental illness. Models that used these short scales to predict mental illness status were developed using a subsample of NSDUH respondents who had completed the NSDUH interview and were administered a diagnostic interview[22] via a clinical follow-up study. In 2008, the first year of the MHSS, approximately 1,500 NSDUH respondents participated in the clinical follow-up, half of whom (approximately 750) were administered the WHODAS. This sample was used to develop prediction models that have been used to produce estimates of mental illness from the main NSDUH samples for 2008 through 2011.

The remainder of this section summarizes methods developed to produce the prediction model that has been used to generate estimates of mental illness from the main NSDUH samples for 2011. In particular, this section describes the content and scoring procedures for the K6 and WHODAS scales, definitions for levels of mental illness, and the statistical procedures for estimating levels of mental illness in the 2011 NSDUH. Methods for the MHSS in 2008, 2009, and 2010 are described in more detail in Section B.4.3 of Appendix B in the 2010 mental health findings report (CBHSQ, 2012a).

K6. The K6 in NSDUH consists of two sets of six questions that asked adult respondents how frequently they experienced symptoms of psychological distress during two different time periods: (1) during the past 30 days, and (2) if applicable, the one month in the past year when they were at their worst emotionally. Respondents were asked about the second time period only if they indicated that there was a month in the past 12 months when they felt more depressed, anxious, or emotionally stressed than they felt during the past 30 days.

The six questions comprising the K6 scale for the past month are as follows:

NERVE30 During the past 30 days, how often did you feel nervous?

1 All of the time
2 Most of the time
3 Some of the time
4 A little of the time
5 None of the time
Don't know/Refused

Response categories are the same for the remaining questions shown below.

HOPE30 During the past 30 days, how often did you feel hopeless?

[22] The Structured Clinical Interview for the DSM-IV-TR Axis I Disorders, Research Version, Non-patient Edition (SCID-I/NP) (First et al., 2002).

FIDG30 During the past 30 days, how often did you feel restless or fidgety?

NOCHR30 During the past 30 days, how often did you feel so sad or depressed that nothing could cheer you up?

EFFORT30 During the past 30 days, how often did you feel that everything was an effort?

DOWN30 During the past 30 days, how often did you feel down on yourself, no good or worthless?

To create a score, the six items (NERVE30, HOPE30, FIDG30, NOCHR30, EFFORT30, and DOWN30) on the K6 scale were recoded from 0 to 4 so that "all of the time" was coded 4, "most of the time" 3, "some of the time" 2, "a little of the time" 1, and "none of the time" 0, with "don't know" and "refused" also coded as 0. Summing across the transformed responses in these six items resulted in a score with a range from 0 to 24.

If respondents were asked about a month in the past 12 months when they felt more depressed, anxious, or emotionally stressed than they felt during the past 30 days, they were asked comparable K6 items for that particular month in the past 12 months. The scoring procedures for these K6 items for the past 12 months were the same as those described above. The higher of the two K6 total scores for the past 30 days or past 12 months was used both for MHSS analysis purposes and in the adult respondents' final data.

An alternative K6 total score also was created in which K6 scores less than 8 were recoded as 0 and scores from 8 to 24 were recoded as 1 to 17. The rationale for creating the alternative past year K6 score was that SMI prevalence was typically extremely low for respondents with past year K6 scores less than 8, and the prevalence rates started increasing only when scores were 8 or greater.

WHODAS. An initial step of the MHSS was to modify the WHODAS for use in a general population survey, including making minor changes to question wording and reducing its length (Novak, 2007). That is, a subset of 8 items was found to capture the information represented in the full 16-item scale with no significant loss of information.

These eight WHODAS items that were included in NSDUH were assessed on a 0 to 3 scale, with responses of "no difficulty," "don't know," and "refused" coded as 0; "mild difficulty" coded as 1; "moderate difficulty" coded as 2; and "severe difficulty" coded as 3. Some items had an additional category for respondents who did not engage in a particular activity (e.g., they did not leave the house on their own). Respondents who reported that they did not engage in an activity were asked a follow-up question to determine if they did not do so because of emotions, nerves, or mental health. Those who answered "yes" to this follow-up question were subsequently assigned to the "severe difficulty" category; otherwise (i.e., for responses of "no," "don't know," or "refused"), they were assigned to the "no difficulty" category. Summing across these codes for the eight responses resulted in a total score with a range from 0 to 24. More information about scoring of the WHODAS can be found in the 2010 NSDUH public use file codebook (CBHSQ, 2011).

In addition, an alternative WHODAS total score was created in which individual WHODAS item scores less than 2 were recoded as 0, and item scores of 2 to 3 were recoded as 1. The individual alternative item scores then were summed to yield a total alternative score ranging from 0 to 8. Creation of an alternative version of the WHODAS score was driven by the assumption that results of dichotomous responses dividing severely impaired from less severely impaired respondents might fit better than a linear continuous measure in models predicting SMI.

Mental Illness Definitions. Mental illness was measured using an adapted version of the SCID-I/NP (First et al., 2002) and differentiated by the level of functional impairment based on the Global Assessment of Functioning (GAF) scale (Endicott, Spitzer, Fleiss, & Cohen, 1976). Past year disorders that were assessed through the SCID included mood disorders (e.g., MDE, manic episode), anxiety disorders (e.g., panic disorder, generalized anxiety disorder, posttraumatic stress disorder), eating disorders (e.g., anorexia nervosa), intermittent explosive disorder, and adjustment disorder. In addition, the presence of psychotic symptoms was assessed. Substance use disorders also were assessed, although these disorders were not used to produce estimates of mental illness.

- Respondents were defined as having *any mental illness* (AMI) if they were determined to have any of the mental disorders assessed in the SCID (not including substance use disorders), regardless of the level of functional impairment.

- Respondents were defined as having *low (mild) mental illness* if they had any of the mental disorders assessed in the SCID (not including substance use disorders), but these disorders resulted in no more than mild impairment, based on GAF scores of greater than 59.

- Respondents were defined as having *moderate mental illness* if they had any of the mental disorders assessed in the SCID (not including substance use disorders), and these disorders resulted in moderate impairment, based on GAF scores of 51 to 59.

- Respondents were defined as having *serious mental illness* (SMI) if they had any of the mental disorders assessed in the SCID (not including substance use disorders), and these disorders resulted in substantial impairment in carrying out major life activities, based on GAF scores of 50 or below.

The SCID and the GAF in combination were considered to be the gold standard for measuring mental illness.

MHSS Sampling and Weighting. In 2008, MHSS samples were stratified based on respondents' K6 scores to optimize the MHSS sample allocation for the statistical modeling. Except for oversampling of respondents in the first quarter for the 2008 MHSS, probability samples of clinical follow-up interviews were distributed across four calendar quarters to yield approximately equal numbers of interviews per quarter. The targeted sample size in the 2008 MHSS was 1,500 (over 400 interviews in quarter 1 and over 300 interviews per quarter in the remainder). Approximately 1,500 adult respondents completed the clinical interview. Of these, approximately half (i.e., those who were administered the WHODAS) were used in the estimation of the prediction model that was developed to produce estimates of mental illness in 2008 to 2011.

Special MHSS analysis weights were created as the product of the following four weight components: (1) NSDUH analysis weight, (2) inverse of probability of selection for clinical follow-up, (3) nonresponse adjustment applied to all NSDUH respondents selected for the MHSS but who did not complete the clinical interview (i.e., includes those who refused to participate and those who agreed to participate but did not complete the clinical interview), and (4) poststratification adjustments by gender, age, and race/ethnicity using data from the main NSDUH interview. For further details about the NSDUH weighting procedures, see Section A.3.3 in Appendix A of this report.

2008 Prediction Model. Because an important objective of the MHSS was to determine whether true differences in estimates of SMI existed among the 2008 to 2011 surveys, the decision was made to use the same mental illness prediction model (described below) from 2008 to produce estimates of mental illness in 2011. Using the combined clinical interview and short scales from the NSDUH CAI data for approximately 750 MHSS respondents who were administered the WHODAS in 2008, a statistical model was developed that used the SCID-based SMI status as a dependent variable and the short scales (the K6 in combination with the WHODAS) as independent variables. Once the model was estimated, the predicted probability of having SMI for each respondent was calculated, and an optimal cut point was identified that equalized the weighted number of false positives and false negatives by comparing SMI estimates measured using the SCID with those based on the model and cut point (i.e., predicted probabilities at or above the cut point were coded as SMI positive).

The prediction model is a weighted logistic regression. With SMI status based on having a SCID diagnosis plus a GAF less than or equal to 50, the response variable Y was defined so that $Y = 1$ when an SMI diagnosis is positive; otherwise, $Y = 0$. If $\mathbf{X}$ is a vector of explanatory variables, then the response probability $\pi = \Pr(Y = 1 | \mathbf{X})$ can be estimated using a weighted logistic regression model. The final prediction model was determined as follows:

$$\text{logit}(\hat{\pi}) \equiv \log[\hat{\pi}/(1-\hat{\pi})] = -4.7500 + 0.2098 X_k + 0.3839 X_w, \quad (1)$$

where $\hat{\pi}$ refers to an estimate of the SMI response probability π. The X_k and X_w terms refer to the alternative K6 and WHODAS scores that were described previously:

- X_k = *Alternative Past Year K6 Score*: Past year K6 score less than 8 recoded as 0; past year K6 score 8 to 24 recoded as 1 to 17.
- X_w = *Alternative WHODAS Score*: WHODAS item scores less than 2 recoded as 0; WHODAS item scores 2 to 3 recoded as 1, then summed for a score ranging from 0 to 8.

Rearranging the terms of the model provided a direct calculation of the *predicted probability* of SMI:

$$\hat{\pi} = \frac{1}{1 + \exp[-(-4.7500 + 0.2098 X_k + 0.3839 X_w)]}.$$

Next, a cut point probability π_0 was determined, so that if $\hat{\pi} \geq \pi_0$ for a particular respondent, then he or she was *predicted* to be SMI positive; otherwise, he or she was predicted to be SMI negative. Receiver operating characteristic (ROC) analyses were used to determine the cut point that resulted in the weighted number of false-positive and false-negative counts being (approximately) equal, thus ensuring unbiased estimates. The optimal cut point was determined to be 0.26972. See Aldworth et al. (2009) for further details.

The estimates of the parameters of this model are given in Table B.6. Figure B.2 at the end of this appendix shows the combined thresholds in terms of both the alternative WHODAS and K6 scores that are necessary to classify a respondent as having or not having mental illness, including SMI. That is, the various combinations of the alternative WHODAS and K6 scores result in specific designations of SMI, low (mild) or moderate mental illness, or no mental illness. For example, a respondent with an alternative K6 score of 15 and an alternative WHODAS score of 2 is classified as having SMI. In comparison, a respondent with an alternative K6 score of 14 and a WHODAS score of 2 is classified as having low (mild) mental illness or moderate mental illness. A respondent with an alternative K6 score of 4 and an alternative WHODAS score of 0 is classified as not having mental illness.

The prediction model described above was selected from a set of candidate models based on model fit statistics, sensitivity, and parsimony. The modeling analysis showed that in terms of model fit statistics and sensitivity, models with the WHODAS and the K6 improved the prediction of SMI over models with only the K6.

Various methods to estimate AMI also were investigated in the 2008 MHSS. These methods were subject to the constraint that they would have no effect on the SMI estimates produced by the model discussed above. The methods investigated included logistic models with AMI as the response variable, SMI as the response variable, and multilogistic models based on a multilevel mental illness variable from which both SMI and AMI could be derived. Analyses suggested that models based on SMI as the response variable provided almost identical results to those of the other models, so this method was chosen to estimate AMI. The same method was chosen to estimate the cumulative category that included both SMI and moderate mental illness. The text below describes the cut points that were used to estimate AMI, low (mild) mental illness, and moderate mental illness.

Estimates of AMI were obtained from the SMI-predicted probabilities calculated using the model described above. Respondents with an SMI-predicted probability greater than the cut point of 0.02400 for AMI were classified as having AMI. Estimates of the cumulative category for SMI *or* moderate mental illness were similarly obtained, except that a cut point of 0.10965 was used.

Estimates of low (mild) mental illness and moderate mental illness were derived by a process of subtraction. Respondents were classified as belonging to the moderate mental illness category if they belonged to the cumulative category of having SMI *or* moderate mental illness, but they did not belong to the SMI category. Respondents were classified as belonging to the low (mild) mental illness category if they belonged to the AMI category, but not to the SMI or moderate mental illness categories.

B.4.4 Major Depressive Episode (Depression)

Beginning in 2004, modules related to MDE derived from DSM-IV (APA, 1994) criteria for major depression were included in the questionnaire. These questions permit estimates to be calculated for prevalence of MDE and treatment for MDE. Separate modules were administered to adults aged 18 or older and youths aged 12 to 17. The adult questions were adapted from the depression section of the National Comorbidity Survey Replication (NCS-R), and the questions for youths were adapted from the depression section of the National Comorbidity Survey Adolescent (NCS-A).[23] To make the modules developmentally appropriate for youths, there are minor wording differences in a few questions between the adult and youth modules. Revisions to the questions in both modules were made primarily to reduce their length and to modify the NCS questions, which are interviewer-administered, to the audio computer-assisted self-interviewing (ACASI) format used in NSDUH. In addition, some revisions, based on cognitive testing, were made to improve comprehension. Furthermore, even though titles similar to those used in the NCS were used for the NSDUH modules, the results of these items may not be directly comparable. This is mainly due to differing modes of administration in each survey (ACASI in NSDUH vs. computer-assisted personal interviewing [CAPI] in NCS), revisions to wording necessary to maintain the logical processes of the ACASI environment, and possible context effects resulting from deleting questions not explicitly pertinent to severe depression.

According to DSM-IV, a person is defined as having had MDE in his or her lifetime if he or she has had at least five or more of the following nine symptoms nearly every day in the same 2-week period, where at least one of the symptoms is a depressed mood or loss of interest or pleasure in daily activities (APA, 1994): (1) depressed mood most of the day; (2) markedly diminished interest or pleasure in all or almost all activities most of the day; (3) significant weight loss when not sick or dieting, or weight gain when not pregnant or growing, or decrease or increase in appetite; (4) insomnia or hypersomnia; (5) psychomotor agitation or retardation; (6) fatigue or loss of energy; (7) feelings of worthlessness; (8) diminished ability to think or concentrate or indecisiveness; and (9) recurrent thoughts of death or suicidal ideation. Respondents who have had MDE in their lifetime are asked if, during the past 12 months, they had a period of depression lasting 2 weeks or longer while also having some of the other symptoms mentioned. Those reporting that they have had MDE in the past year are asked questions from the SDS to measure the level of functional impairment in major life activities reported to be caused by the MDE in the past 12 months (Leon, Olfson, Portera, Farber, & Sheehan, 1997).

NSDUH measures the nine attributes associated with MDE as defined in DSM-IV with the following questions. Note that the questions shown are taken from the adult depression module. A few of the questions in the youth module were modified slightly to use wording more appropriate for youths aged 12 to 17. It should be noted that no exclusions were made for MDE caused by medical illness, bereavement, or substance use disorders.

[23] For details, see http://www.hcp.med.harvard.edu/ncs/.

1. **Depressed mood most of the day**

The following questions refer to the worst or most recent period of time when the respondent experienced any or all of the following: sadness, discouragement, or lack of interest in most things.

During that [worst/most recent] period of time…

a. … did you feel sad, empty, or depressed **most of the day nearly every day**?
b. … did you feel discouraged about how things were going in your life **most of the day nearly every day**?

2. **Markedly diminished interest or pleasure in all or almost all activities most of the day**

a. … did you lose interest in almost all things like work and hobbies and things you like to do for fun?
b. … did you lose the ability to take pleasure in having good things happen to you, like winning something or being praised or complimented?

3. **Weight**

In answering the next questions, think about the [worse/most recent] period of time.

a. Did you have a much smaller appetite than usual nearly every day during that time?
b. Did you have a much **larger** appetite than usual nearly every day?
c. Did you gain weight without trying to during that [worst/most recent] period of time?
    a. … because you were growing?
    b. … because you were pregnant?
    c. How many pounds did you gain?
d. Did you lose weight without trying to?
    a. … because you were sick or on a diet?
    b. How many pounds did you lose?

4. **Insomnia or hypersomnia**

a. Did you have a lot more trouble than usual falling asleep, staying asleep, or waking too early nearly every night during that [worst/most recent] period of time?
b. During that [worst/most recent] period of time, did you sleep a lot more than usual nearly every night?

5. **Psychomotor agitation or retardation**

a. Did you talk or move more slowly than is normal for you nearly every day?
b. Were you so restless or jittery nearly every day that you paced up and down or couldn't sit still?

6. Fatigue or loss of energy

a. During that [worst/most recent] period of time, did you feel tired or low in energy nearly every day even when you had not been working very hard?

7. Feelings of worthlessness

a. Did you feel that you were not as good as other people nearly every day?
b. Did you feel totally worthless nearly every day?

8. Diminished ability to think or concentrate or indecisiveness

a. During that [worst/most recent] time period, did your thoughts come much more slowly than usual or seem confused nearly every day?
b. Did you have a lot more trouble concentrating than usual nearly every day?
c. Were you unable to make decisions about things you ordinarily have no trouble deciding about?

9. Recurrent thoughts of death or recurrent suicidal ideation

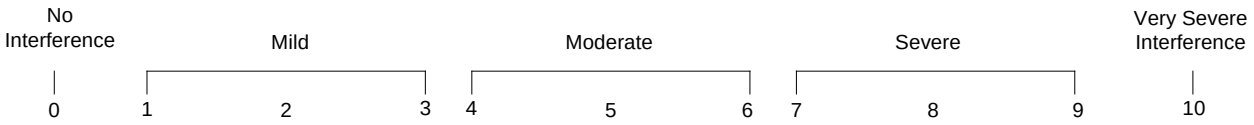
a. Did you often think about death, either your own, someone else's, or death in general?
b. During that period, did you ever think it would be better if you were dead?
c. Did you think about committing suicide?

NSDUH also collects data on impairment using the SDS, which is a measure of mental health-related impairment in four major life activities or role domains. These four domains are defined separately for adults aged 18 or older and youths aged 12 to 17 to reflect the different roles associated with the two age groups. Each module consists of four questions, and each item uses an 11-point scale ranging from 0 (no interference) to 10 (very severe interference). The impairment score is defined as the single highest severity level of role impairment across the four SDS role domains. Ratings greater than or equal to 7 on the scale were considered severe impairment. In addition to past year MDE, NSDUH shows estimates for past year MDE with severe impairment. Estimates for severe impairment are calculated separately for youths and adults because the four domains are slightly different for the two groups. The questions pertaining to the four domains are listed below for both groups.

Adult Depression Module: Functional Impairment

ASDSHOME Think about the time in the past 12 months when these problems with your mood were **most severe.**

Using the 0 to 10 scale shown below, where 0 means **no** interference and 10 means very **severe** interference, select the number that describes how much these problems interfered with **your ability to do** each of the following activities during that period. You can use any number between 0 and 10 to answer.



How much did your [depression symptoms] interfere with your **ability to do home management tasks**, like cleaning, shopping, and working around the house, apartment, or yard?

ASDSWORK During the time in the past 12 months when your [depression symptoms] were most severe, how much did this interfere with **your ability to work**?

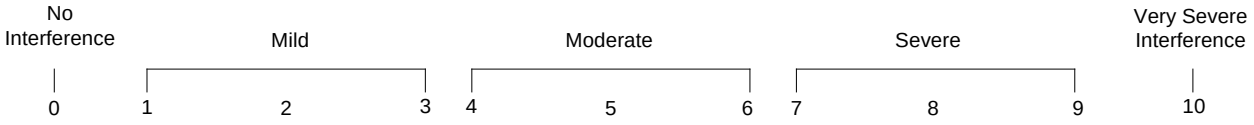
ASDSREL How much did your [depression symptoms] interfere with your **ability to form and maintain close relationships** with other people during that period of time?

ASDSSOC How much did [depression symptoms] interfere with your **ability to have a social life** during that period of time?

Youth Depression Module: Functional Impairment

YSDSHOME Think about the time in the past 12 months when these problems with your mood were the **worst.**

Using the 0 to 10 scale shown below, where 0 means **no** problems and 10 means very **severe** problems, select the number that describes how much your [depression symptoms] caused problems with **your ability to do** each of the following activities during that time. You can use any number between 0 and 10 to answer.



How much did your [depression symptoms] cause problems with your chores at home?

YSDSWORK During the time in the past 12 months when your [depression symptoms] were worst, how much did this cause problems with your **ability to do well at school or work**?

YSDSREL How much did your [depression symptoms] cause problems with your **ability to get along with your family** during that time?

YSDSSOC How much did your [depression symptoms] cause problems with your **ability to have a social life** during that time?

Adjustment of MDE Data for Context Effects. Since 2004, the NSDUH questions that determine MDE have remained unchanged for both adults and youths. In the 2008 questionnaire, however, changes were made in other mental health items that precede the MDE questions (K6, suicide, and impairment) for adults. Questions also were retained in 2009 for the WHODAS impairment scale, and the questions for the SDS impairment scale were deleted; see Sections B.4.2 and B.4.3 of this report for further details about these questionnaire changes. These questionnaire changes in 2008 appear to have affected the reporting on MDE questions among adults. Thus, adult MDE estimates for 2008 and 2009 cannot be directly compared with NSDUH adult MDE estimates based on data prior to 2008. See Sections B.4.4 and B.4.7 of the 2008 NSDUH's national findings report (OAS, 2009) for a further discussion. In addition, estimates of adult MDE in 2008 that were included in the 2009 mental health findings report (CBHSQ, 2010) were based only on half of the sample (see Section B.4.2 in this current appendix).

To address the break in comparability of the adult MDE data beginning in 2008 and to estimate adult MDE based on the full sample of adults from 2008, adjusted versions of lifetime and past year MDE variables for adults were created retroactively for 2005 to 2008. These variables were adjusted to make MDE estimates from the SDS half sample in 2008 and from all adult respondents for 2005 to 2007 that would be comparable with the MDE estimates based on data from the half sample who received the WHODAS in 2008 and from all adult respondents in later years. The adjusted data from 2005 to 2008 were used in conjunction with unadjusted data from later years to estimate trends in adult MDE over the entire period from 2005 to 2011.

Specifically, a weighted logistic regression was fit for the NSDUH data from 2005 to 2009 with past year MDE as the binary dependent variable. Independent variables in this model controlled for the questionnaire differences between NSDUHs from 2005 to 2007 and NSDUHs from 2008 and 2009, as well as for the context effects associated with the SDS half sample in 2008. This model was used to compute predicted probabilities of past year MDE for each respondent. The predicted probabilities, which can have any value between 0 and 1, then were dichotomized such that each respondent was specified as having or not having MDE in the past year. Adjusted lifetime MDE estimates were similarly constructed, with the additional condition that respondents reporting past year MDE were assumed to have lifetime MDE. Details about the adjustment of the adult MDE data for 2005 to 2008 can be found in a report describing these procedures (Aldworth, Kott, Yu, Mosquin, & Barnett-Walker, 2012).

In addition, changes to YMHSU module questions in 2009 that preceded the questions about adolescent depression could have affected adolescents' responses to the adolescent depression questions and estimates of adolescent MDE. As discussed in Section B.4.2 in this report, however, these changes in 2009 did not appear to affect the estimates of adolescent MDE. Therefore, data on trends in past year MDE from 2004 to 2009 did not require adjustment for adolescents aged 12 to 17.

B.4.5 Impact of Decennial Census Effects on NSDUH Mental Health Estimates

As discussed in Section A.3.3 in Appendix A, the person-level weights in NSDUH were calibrated to population estimates (or control totals) obtained from the U.S. Census Bureau. For the weights in 2002 through 2010, annually updated control totals based on the 2000 census were used. Beginning with the 2011 weights, however, the control totals from the Census Bureau were

based on the 2010 census. For the years between each decennial census, the Census Bureau produces annual national-level postcensal population estimates, based on the most recent census data, applying adjustments to account for births to U.S.-resident women, deaths of U.S. residents, and net international migration.[24,25] The purpose of this section is to determine if changing from the 2000 census to the 2010 census as the underlying source of data for the control totals (i.e., the "decennial census effect" or "census effect") affected the NSDUH mental health estimates and interpretation of trends.

As a first step, estimates of the 2010 population were compared based on the 2000 census and 2010 census. Table B.7 shows the estimated numbers of persons for the civilian, noninstitutionalized population aged 12 or older in 2010 based on both the 2000 census and the 2010 census. Overall, the estimated numbers for the 2010 population characteristics based on the 2000 census were similar to the numbers for the 2010 census-based population characteristics, with a difference of less than 1 percent (0.7 percent). However, larger differences were observed in several domains for race (e.g., American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons reporting two or more races).[26]

Methods for Assessing Census Effects on Mental Health Estimates. For the 9-month period from April through December 2010, the Census Bureau produced control totals based on both the 2000 and 2010 censuses. To assess the decennial census effects on NSDUH mental health estimates, the person-level poststratification adjustment also was done for the 2010 NSDUH respondents using the 2010 census-based control totals, leading to the creation of a second set of analysis weights for 2010. In order for analysis weights to be produced that reflect the entire year, the population estimates for the first quarter of 2010 were projected, and the annualized numbers were used in the poststratification adjustment. Therefore, two sets of weights were created for 2010: one based on the 2000 census and one based on the 2010 census. This evaluation was based on the premise that any difference between estimates based on these two weights could solely be attributed to the census effect because the underlying data were the same. A similar study was done to evaluate the effects of NSDUH substance use estimates (CBHSQ, 2012b).

Estimates from 92 selected mental health estimate tables that included 46 tables for estimated numbers and 46 tables for estimated percentages were used to examine the effects on estimates in 2010 when weights were based on the 2010 census control totals. These estimates were compared with those when weights were based on the 2000 census control totals. Among them, 74 tables were for adults aged 18 or older and 18 tables were for youths aged 12 to 17.

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[24] For details on how the Census Bureau creates the postcensal estimates, see http://www.census.gov/popest/methodology/2011-nat-st-co-meth.pdf.

[25] As a result, the postcensal estimates made for the years immediately following a census are likely to be more accurate (e.g., 2002 postcensal estimates are expected to be more accurate than 2010 postcensal estimates). Therefore, the population control totals for 2010 based on the 2010 census, provided specifically for this study by the Census Bureau to SAMHSA, would presumably represent the characteristics of the population more accurately than the projections for 2010 that were based on the 2000 census. For NSDUH estimation purposes, the first set of control totals that incorporated data from the 2010 census for the regular NSDUH weighting processes was for 2011.

[26] Unlike racial/ethnic groups discussed elsewhere in this report, race domains in this section include Hispanics in addition to persons who were not Hispanic.

These tables are available at http://www.samhsa.gov/data/NSDUH/NSDUHCensusEffects/Index.aspx.

In these tables, estimates for 2011 used weights that were poststratified to 2011 control totals based on the 2010 census. The following terms also were defined in the tables for estimates for 2010:

- *2010 (Old)*: estimates for 2010 with weights poststratified to 2010 control totals based on the 2000 census; and
- *2010 (New)*: estimates for 2010 with weights poststratified to 2010 control totals based on the 2010 census.

The estimates referred to as "2010 (Old)" represent the official NSDUH estimates for 2010.[27]

To assess census effects, significance testing was conducted between 2011 and 2010 (Old) and between 2011 and 2010 (New). This evaluation examined whether differences between estimates for 2011 and those in 2010 would be significant (or not significant) depending on whether the 2010 estimates were based on the control totals from the 2000 census or the 2010 census. Ideally, the change in control totals would not affect whether differences between 2010 and 2011 were statistically significant.

Comparisons of the results of the significance tests between estimates for 2011 and corresponding old and new estimates for 2010 are presented separately for estimated numbers and estimated percentages. Also, data for youths aged 12 to 17 are presented separately from data for adults aged 18 or older. In this section, terms such as "larger," "smaller," "lower," or "higher" are used to indicate the relative magnitude of the estimates. Unlike other sections of the report, however, these terms do not indicate statistical significance. Rather, differences in this section that are statistically significant are explicitly mentioned as such.

Results. In general, the use of 2010 census control totals for the 2010 estimates had only a moderate effect on mental health estimates for both estimated numbers and percentages, especially compared with the effect on substance use estimates; see Section B.4.3 in Appendix B of the 2011 NSDUH national findings report (CBHSQ, 2012b). For mental health estimates, for example, there was a statistically significant 86 percent increase (from 201,000 to 373,000) in the estimated number of adult American Indians or Alaska Natives with any mental illness (AMI) when the estimate for 2011 was compared with 2010 (Old). When this estimate for 2011 was compared with the corresponding estimate for 2010 (New), however, there was a 57 percent increase (from 237,000 to 373,000) that was not statistically significant. Similarly for the same domain of persons, when the estimated percentages for AMI were compared, there was a statistically significant 55 percent increase between 2010 (Old) and 2011 (from 18.7 to 28.9

[27] Some 2010 (Old) estimates may differ from previously published estimates due to updates (see Section B.3 in this appendix).

percent). However, when the 2010 (New) estimate was compared with the estimate in 2011, the increase was by 48 percent (from 19.5 to 28.9 percent) and was not statistically significant.[28]

Table B.8 summarizes the results of 1,057 tests for statistical significance (at the .05 level of significance) for estimated numbers of persons and 1,080 tests for percentages among adults aged 18 or older (i.e., across the 74 tables of estimates mentioned previously). Table B.8 does not include the results of 123 tests (61 for estimated numbers and 62 for percentages) in which some estimates were suppressed because of low precision (see Section B.2.2 in this appendix). Among adults, more than 95 percent of the differences between mental health estimates for 2011 and 2010 (Old) and between estimates for 2011 and 2010 (New) were in agreement for estimated numbers (1,025 out of 1,057 tests) as well as for percentages (1,049 out of 1,080 tests); that is, statistical tests of the difference between 2011 and 2010 (Old) and tests of the difference between 2011 and 2010 (New) both were significant, or both were not significant at the .05 level. For the estimated numbers of persons aged 18 or older, there were 32 tests that were not in agreement, and for the estimated percentages, there were 31 tests that were not in agreement. The majority of these differences involved situations in which the estimates were significantly different between 2011 and 2010 (Old), but the difference between 2011 and 2010 (New) was not significant (28 out of 32 for estimated numbers and 25 out of 31 for percentages). Across the 2,137 tests, only 10 tests (4 for estimated numbers and 6 for percentages) showed a statistically significant difference between the 2011 and 2010 (New) estimates, but there was no statistical difference between the 2011 and 2010 (Old) estimates.

Table B.9 summarizes the results of 250 similar tests for mental health estimates among youths aged 12 to 17. This table does not include the results of 36 tests (18 each for estimated numbers and percentages) in which some estimates were suppressed because of low precision. For the estimated numbers of youths, more than 95 percent of the tests between estimates for 2011 and 2010 (Old) and between estimates for 2011 and 2010 (New) were in agreement (238 out of 250 tests). More than 99 percent of the corresponding tests for percentages were in agreement (248 out of 250 tests). For the estimated numbers, there were 12 tests that were not in agreement; for the estimated percentages, there were only 2 tests that were not in agreement. For the estimated numbers, the majority of these differences involved situations in which the estimates were significantly different between the 2011 and the 2010 (Old) estimates, but the difference between 2011 and 2010 (New) was not significant (10 out of 12). Both of the tests for percentages that were not in agreement also involved situations in which the estimates were significantly different between the 2011 and the 2010 (Old) estimates, but the difference between 2011 and 2010 (New) was not significant. Only 2 of the 500 tests (both for estimated numbers) showed a statistically significant difference between the 2011 and 2010 (New) estimates, but there was no statistical difference between the 2011 and 2010 (Old) estimates.

Tables B.10 to B.13 present comparisons of tests of significance in the differences between 2011 and 2010 (New) and between 2011 and 2010 (Old). These comparisons take into account the direction of the difference between 2011 and 2010: (a) the 2011 estimate decreased significantly from the 2010 estimate; (b) there was no statistical difference between 2011 and 2010; and (c) the 2011 estimate increased significantly from the 2010 estimate.

[28] See Tables 1.1A-MH and 1.1B-MH at http://www.samhsa.gov/data/NSDUH/NSDUHCensusEffects/Index.aspx.

Table B.10 shows the comparisons for estimated numbers among adults aged 18 or older. The majority of the off-diagonal elements (i.e., where there was disagreement between the two differences) occurred in situations where there was a significant decrease from 2010 to 2011 based on the 2010 (Old) estimate, but there was no statistical difference between 2010 and 2011 based on the 2010 (New) estimate (19 tests out of 32). Table B.11 shows the comparisons for estimated numbers among youths aged 12 to 17. Unlike the results for adults, the majority of the disagreements in the two differences for youths occurred when there was a significant increase in estimated numbers from 2010 to 2011 based on the 2010 (Old) estimate, but there was no statistical difference between 2010 and 2011 based on the 2010 (New) estimate (10 tests out of 12).

Table B.12 shows the comparisons for estimated percentages among adults aged 18 or older. As for estimated numbers in Table B.10, the majority of the disagreements between the differences for tests between percentages occurred in situations where there was a significant decrease from 2010 to 2011 based on the 2010 (Old) estimate, but there was no statistical difference between 2010 and 2011 based on 2010 (New) estimate (23 tests out of 31). Table B.13 shows the comparisons for estimated percentages among youths aged 12 to 17. Only 2 out of 250 tests were in disagreement. For those two tests, there was a significant increase in percentages from 2010 to 2011 based on the 2010 (Old) estimate, but there was no statistical difference between 2010 and 2011 based on the 2010 (New) estimate.

For the 37 tables of estimated numbers for adults that were examined for 2010, slightly more than half (57 percent) of the 2010 (New) estimated numbers were lower than the 2010 (Old) estimated numbers for mental health outcomes. A similar pattern was observed in the 37 tables of percentages in 2010 among adults: nearly 65 percent of the 2010 (New) estimated percentages were lower than the 2010 (Old) percentages. Among youths aged 12 to 17, about 62 percent of the estimated percentages in 2010 were lower for 2010 (New) than for 2010 (Old). However, this pattern was reversed for the estimated numbers among youths: about 95 percent of 250 estimated numbers for youths that were examined were larger for 2010 (New) than for 2010 (Old).

Conclusions. Because of changes in population estimates in the 2011 data based on the 2010 census control totals, some caution is advised when comparing differences in mental health estimates between 2011 and prior years. This is especially the case for particular subgroups (e.g., persons who are American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons reporting two or more races) and for estimated numbers for particular mental health measures. Most of the differences between estimates for 2011 and 2010 (Old) and between estimates for 2011 and 2010 (New) were in statistical agreement. There were only 77 instances out of 2,637 where there was a statistical disagreement between the two (about 3 percent). However, it also is important to note that among 33 of these instances involving statistical disagreement in percentages, 24 involved differences between 2010 (Old) and 2010 (New) of one tenth of a percentage point or less. This suggests that the percentages generally were not influenced by the census effect.

The general result regarding the direction of the differences (regardless of statistical significance) is that the 2010 (New) percentages for most estimates were lower than the 2010 (Old) estimates, except for the estimated numbers for youths. The implication is that the

2011 estimates (percentages) may have been higher if weights based on the *2000* census had been used. As a result, downward trends involving 2011 data may be slightly overstated, and upward trends may be slightly understated. Therefore, if affected 2011 data show an upward trend, then in most cases, confidence can be placed in that trend. If the 2011 data show a decreasing trend, then less confidence can be placed in it. Exceptions were for estimated numbers for youths and certain racial groups (e.g., American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, Asians, and persons reporting two or more races), where the opposite result was generally the case.

Thus, although the mental health estimates did not appear to be affected by the changes in the poststratification control total estimation process as much as the substance use estimates were affected, readers and NSDUH data users are advised to consider the potential effects of these changes in control totals. These changes are relevant to an interpretation of estimates and for inferences based on data analysis, especially for the estimated numbers of persons.

Estimates for Youths Aged 12 to 17

For youths aged 12 to 17, the 2010 (New) mental health estimates (numbers) were almost always higher than the 2010 (Old) estimates, although not necessarily significantly higher. There were 10 instances in which the estimated number was significantly different between the 2011 and 2010 (Old) estimates, but the difference for 2011 versus 2010 (New) was not significant. This indicates that if the estimated numbers for youths in 2011 showed an increasing trend, then less confidence can be placed in the trend. For example, the numbers of youths receiving outpatient mental health treatment[29] may be underestimated in the 2010 (Old) estimates, especially for males and for youths aged 16 or 17.[30]

Estimates for Adults Aged 18 or Older

In general among adults aged 18 or older, the 2010 (New) estimated numbers and percentages tended to be lower than the 2010 (Old) estimates, although not necessarily significantly lower. This indicates that for most outcomes and domains, the published 2010 estimates were being overstated. Hence, less confidence might be placed in downward trends among adults. However, this pattern was reversed for certain domains, including females, Hispanics, and for the race categories of American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, Asians, and persons reporting two or more races.[31] For these domains, the published 2010 estimates are potential underestimates. Hence, upward trends for these specific subgroups may be overstated.

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[29] Includes treatment/counseling from a (1) private therapist, psychologist, psychiatrist, social worker, or counselor; (2) mental health clinic or center; (3) partial day hospital or day treatment program; or (4) in-home therapist, counselor, or family preservation worker. Treatment/counseling refers to services for emotional or behavioral problems that were not caused by substance use.

[30] See Table 1.38A-MH at http://www.samhsa.gov/data/NSDUH/NSDUHCensusEffects/Index.aspx.

[31] See Tables 1.1A-MH, 1.1B-MH, 1.18A-MH, and 1.31A-MH at http://www.samhsa.gov/data/NSDUH/NSDUHCensusEffects/Index.aspx.

Estimates for 18 to 25 Year Olds

Overall mental health estimates (numbers and percentages) among young adults aged 18 to 25 were less likely to be affected by the changes in weights based on the new 2010 census controls. There were only seven instances where findings for the 2010 (New) mental health estimates for this age group disagreed with the 2010 (Old) findings. From Table B.7, it also can be noted that the population shift in this age group was minimal (-0.18 percent).

Estimates for 26 to 49 Year Olds

In general, the 2010 (New) estimates were lower than the 2010 (Old) estimates for adults aged 26 to 49, especially for the estimated numbers.[32] Because the 2010 (New) estimates were likely to be lower than the 2010 (Old) estimates, the concern remains of overstating decreases and understating increases between 2011 and previous years. The 2010 (New) estimates of AMI and serious mental illness (SMI) were lower than the 2010 (Old) estimates for most domains, except for certain race categories, such as American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, Asians, and persons reporting two or more races.[33] Among adults in this age group, the estimated percentages and numbers of persons having a co-occurring substance use disorder and AMI seemed to have been affected by the 2010 census control totals across domains, such as insurance, receipt of government assistance, and county type.[34]

Estimates for Persons Aged 50 or Older

Mental illness estimates (numbers and percentages) among adults aged 50 or older appeared to be the least affected by the changes in weights based on the new 2010 census controls. There was only one instance where findings for 2010 (New) mental health estimates for this age group statistically disagreed with the 2010 (Old) findings (for percentages, not numbers).

[32] See Tables 1.6A-MH and 1.8A-MH at http://www.samhsa.gov/data/NSDUH/NSDUHCensusEffects/Index.aspx.

[33] See Tables 1.2A-MH, 1.2B-MH, 1.4A-MH, and 1.4B-MH at http://www.samhsa.gov/data/NSDUH/NSDUHCensusEffects/Index.aspx.

[34] See Tables 1.14A-MH and 1.14B-MH at http://www.samhsa.gov/data/NSDUH/NSDUHCensusEffects/Index.aspx.

Table B.1 Demographic and Geographic Domains Forced to Match Their Respective U.S. Census Bureau Population Estimates through the Weight Calibration Process, 2011

Main Effects	Two-Way Interactions
Age Group 12-17 18-25 26-34 35-49 50-64 65 or Older All Combinations of Groups Listed Above[1]	**Age Group × Gender** (e.g., Males Aged 12 to 17)
Gender Male Female	**Age Group × Hispanic Origin** (e.g., Hispanics or Latinos Aged 18 to 25)
Hispanic Origin Hispanic or Latino Not Hispanic or Latino	**Age Group × Race** (e.g., Whites Aged 26 or Older)
Race[2] White Black or African American	**Age Group × Geographic Region** (e.g., Persons Aged 12 to 25 in the Northeast)
Geographic Region Northeast Midwest South West	**Age Group × Geographic Division** (e.g., Persons Aged 65 or Older in New England)
Geographic Division New England Middle Atlantic East North Central West North Central South Atlantic East South Central West South Central Mountain Pacific	**Gender × Hispanic Origin** (e.g., Not Hispanic or Latino Males) **Hispanic Origin × Race** (e.g., Not Hispanic or Latino Whites)

[1] Combinations of the age groups (including but not limited to 12 or older, 18 or older, 26 or older, 35 or older, and 50 or older) also were forced to match their respective U.S. Census Bureau population estimates through the weight calibration process.

[2] Unlike racial/ethnic groups discussed elsewhere in this report, race domains in this table include Hispanics in addition to persons who were not Hispanic.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2011.

Table B.2 Summary of 2011 NSDUH Suppression Rules

Estimate	Suppress if:
Prevalence Rate, $\hat{p}$, with Nominal Sample Size, *n*, and Design Effect, *deff* $\left(deff = \frac{n[SE(\hat{p})]^2}{\hat{p}(1-\hat{p})} \right)$	(1) The estimated prevalence rate, $\hat{p}$, is < .00005 or ≥ .99995, or (2) $\frac{SE(\hat{p})/\hat{p}}{-\ln(\hat{p})} > .175$ when $\hat{p} \le .5$, or $\frac{SE(\hat{p})/(1-\hat{p})}{-\ln(1-\hat{p})} > .175$ when $\hat{p} > .5$, or (3) *Effective n* < 68, where $Effective\ n = \frac{n}{deff} = \frac{\hat{p}(1-\hat{p})}{[SE(\hat{p})]^2}$, or (4) $n < 100$. Note: The rounding portion of this suppression rule for prevalence rates will produce some estimates that round at one decimal place to 0.0 or 100.0 percent but are not suppressed.
Estimated Number (Numerator of $\hat{p}$)	The estimated prevalence rate, $\hat{p}$, is suppressed. Note: In some instances when $\hat{p}$ is not suppressed, the estimated number may appear as a 0. This means that the estimate is greater than 0 but less than 500 (estimated numbers are shown in thousands).
Mean Age at First Use, $\bar{x}$, with Nominal Sample Size, *n*	(1) $RSE(\bar{x}) > .5$, or (2) $n < 10$.

deff = design effect; RSE = relative standard error; SE = standard error.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2011.

Figure B.1 Required Effective Sample in the 2011 NSDUH as a Function of the Proportion Estimated

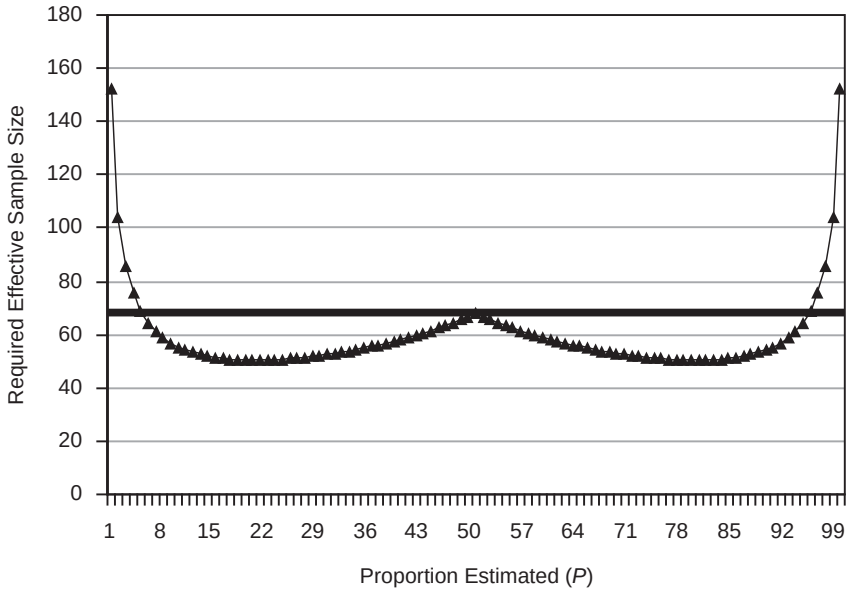


Table B.3 Weighted Percentages and Sample Sizes for 2010 and 2011 NSDUHs, by Final Screening Result Code

Final Screening Result Code	Sample Size 2010	Sample Size 2011	Weighted Percentage 2010	Weighted Percentage 2011
TOTAL SAMPLE	201,865	216,521	100.00	100.00
Ineligible Cases	35,333	37,228	17.20	16.86
Eligible Cases	166,532	179,293	82.80	83.14
INELIGIBLES	35,333	37,228	17.20	16.86
10 - Vacant	19,774	20,585	55.28	54.28
13 - Not a Primary Residence	8,234	8,612	24.20	24.71
18 - Not a Dwelling Unit	2,427	2,730	6.13	6.79
22 - All Military Personnel	323	370	0.88	0.96
Other, Ineligible[1]	4,575	4,931	13.51	13.26
ELIGIBLE CASES	166,532	179,293	82.80	83.14
Screening Complete	147,010	156,048	88.42	86.98
30 - No One Selected	88,085	94,342	52.50	51.82
31 - One Selected	32,322	34,246	19.49	19.37
32 - Two Selected	26,603	27,460	16.43	15.79
Screening Not Complete	19,522	23,245	11.58	13.02
11 - No One Home	3,111	3,124	1.79	1.71
12 - Respondent Unavailable	482	579	0.28	0.32
14 - Physically or Mentally Incompetent	423	513	0.25	0.27
15 - Language Barrier - Hispanic	65	66	0.04	0.04
16 - Language Barrier - Other	504	598	0.33	0.38
17 - Refusal	13,034	15,589	7.82	8.72
21 - Other, Access Denied[2]	1,070	2,080	0.64	1.24
24 - Other, Eligible	16	13	0.01	0.01
27 - Segment Not Accessible	0	0	0.00	0.00
33 - Screener Not Returned	79	87	0.04	0.04
39 - Fraudulent Case	736	595	0.37	0.30
44 - Electronic Screening Problem	2	1	0.00	0.00

NOTE: Some 2010 NSDUH data may differ from previously published data due to updates (see Section B.3 in Appendix B of this report).

[1] Examples of "Other, Ineligible" cases are those in which all residents lived in the dwelling unit for less than half of the calendar quarter and dwelling units that were listed in error.

[2] "Other, Access Denied" includes all dwelling units to which the field interviewer was denied access, including locked or guarded buildings, gated communities, and other controlled access situations.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.4 Weighted Percentages and Sample Sizes for 2010 and 2011 NSDUHs, by Final Interview Code

Final Interview Code	12+ Sample Size 2010	12+ Sample Size 2011	12+ Weighted Percentage 2010	12+ Weighted Percentage 2011	12-17 Sample Size 2010	12-17 Sample Size 2011	12-17 Weighted Percentage 2010	12-17 Weighted Percentage 2011	18+ Sample Size 2010	18+ Sample Size 2011	18+ Weighted Percentage 2010	18+ Weighted Percentage 2011
TOTAL	84,997	88,536	100.00	100.00	25,908	27,911	100.00	100.00	59,089	60,625	100.00	100.00
70 - Interview Complete	67,804	70,109	74.57	74.38	21,992	23,549	84.65	84.95	45,812	46,560	73.49	73.22
71 - No One at Dwelling Unit	1,170	1,159	1.39	1.36	202	227	0.65	0.72	968	932	1.47	1.43
72 - Respondent Unavailable	1,631	1,758	1.94	2.06	313	337	1.22	1.19	1,318	1,421	2.02	2.16
73 - Break-Off	21	31	0.03	0.04	4	6	0.01	0.01	17	25	0.04	0.05
74 - Physically/ Mentally Incompetent	877	1,003	1.81	2.01	210	219	0.95	0.74	667	784	1.91	2.15
75 - Language Barrier - Hispanic	126	114	0.19	0.20	7	7	0.03	0.03	119	107	0.21	0.22
76 - Language Barrier - Other	412	383	1.15	1.12	20	17	0.11	0.08	392	366	1.26	1.24
77 - Refusal	9,922	10,773	17.25	17.25	756	890	2.90	2.81	9,166	9,883	18.79	18.83
78 - Parental Refusal	2,286	2,538	0.87	0.89	2,286	2,538	9.01	9.02	0	0	0.00	0.00
91 - Fraudulent Case	21	29	0.03	0.05	1	7	0.00	0.05	20	22	0.04	0.05
Other[1]	727	639	0.74	0.64	117	114	0.46	0.37	610	525	0.78	0.66

NOTE: Some 2010 NSDUH data may differ from previously published data due to updates (see Section B.3 in Appendix B of this report).

[1] "Other" includes eligible person moved, data not received from field, too dangerous to interview, access to building denied, computer problem, and interviewed wrong household member.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.5 Response Rates and Sample Sizes for 2010 and 2011 NSDUHs, by Demographic Characteristics

Demographic Characteristic	Selected Persons 2010	Selected Persons 2011	Completed Interviews 2010	Completed Interviews 2011	Weighted Response Rate 2010	Weighted Response Rate 2011
TOTAL	84,997	88,536	67,804	70,109	74.57%	74.38%
AGE IN YEARS						
12-17	25,908	27,911	21,992	23,549	84.65%	84.95%
18-25	28,164	28,589	23,026	23,083	81.20%	80.48%
26 or Older	30,925	32,036	22,786	23,477	72.14%	71.96%
GENDER						
Male	41,782	43,436	32,826	33,779	73.11%	72.49%
Female	43,215	45,100	34,978	36,330	75.94%	76.14%
RACE/ETHNICITY						
Hispanic	12,985	13,441	10,699	10,993	78.31%	77.58%
White	55,272	57,389	43,373	44,629	73.52%	73.42%
Black	9,959	10,607	8,475	8,979	80.24%	79.78%
All Other Races	6,781	7,099	5,257	5,508	67.11%	67.74%
REGION						
Northeast	16,782	17,251	13,017	13,090	72.81%	69.86%
Midwest	24,139	24,570	19,301	19,258	74.81%	73.92%
South	25,597	28,122	20,769	22,980	76.24%	76.88%
West	18,479	18,593	14,717	14,781	73.17%	74.41%
COUNTY TYPE						
Large Metropolitan	38,139	38,889	29,828	30,113	73.33%	72.75%
Small Metropolitan	29,570	31,671	23,840	25,457	75.73%	75.84%
Nonmetropolitan	17,288	17,976	14,136	14,539	76.56%	76.98%

NOTE: Estimates are based on demographic information obtained from screener data and are not consistent with estimates on demographic characteristics presented in the 2010 and 2011 sets of detailed tables. Some 2010 NSDUH data may differ from previously published data due to updates (see Section B.3 in Appendix B of this report).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.6 Final WHODAS Model in the 2008 MHSS

	Beta	Beta SE	*T* Statistic	*P* Value	*DF*	Wald *P* Value
Intercept	-4.7500	0.3522	-13.4854	0.0000		
Alt PY K6	0.2098	0.0765	2.7439	0.0072	1	0.0072
Alt WHODAS	0.3839	0.1208	3.1768	0.0020	1	0.0020

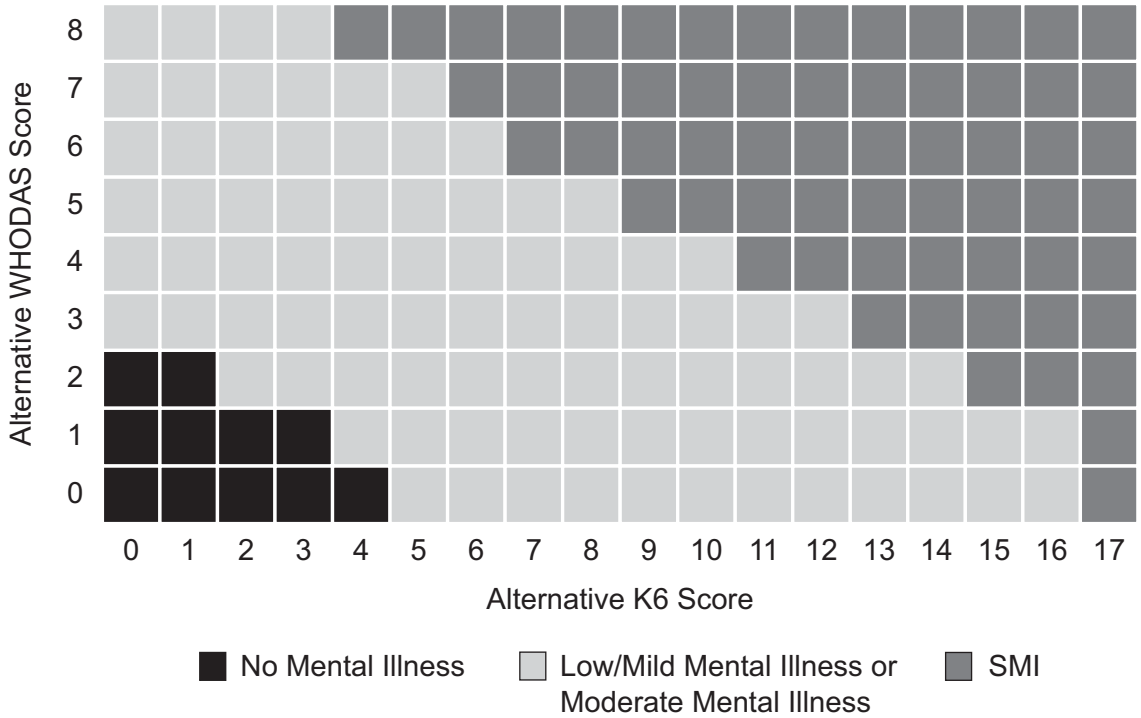
Alt = alternative; *DF* = degrees of freedom; K6 = Kessler-6, a six-item psychological distress scale; MHSS = Mental Health Surveillance Study; PY = past year; SE = standard error; WHODAS = eight-item World Health Organization Disability Assessment Schedule.

NOTE: Alternative past year K6 score: past year K6 score < 8 recoded as 0; past year K6 score 8-24 recoded as 1-17.

NOTE: Alternative WHODAS score: WHODAS item scores < 2 recoded as 0; WHODAS item scores 2-3 recoded as 1, then summed for a score ranging from 0 to 8.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2008.

Figure B.2 AMI and SMI Prediction Based on Alternative K6 and WHODAS Scores



AMI = any mental illness; K6 = Kessler-6, a six-item psychological distress scale; SMI = serious mental illness; WHODAS = eight-item World Health Organization Disability Assessment Schedule.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2008.

Table B.7 Differences between the 2010 Civilian, Noninstitutionalized Population Counts Based on the 2000 Census and the 2010 Census, for Age, Gender, Hispanic Origin, and Race

Domains	2010 Population Based on 2000 Census	2010 Population Based on 2010 Census	Difference in 2010 Population Based on 2010 Census versus 2000 Census[1]	Percent Difference Relative to 2010 Population Based on 2000 Census[2]
TOTAL	253,619,107	255,331,811	1,712,704	0.68%
12 to 17	24,346,528	25,156,348	809,820	3.33%
18 to 25	34,072,349	34,010,012	-62,338	-0.18%
26 to 34	36,523,574	35,840,157	-683,416	-1.87%
35 to 49	62,042,733	62,422,429	379,696	0.61%
50-64	57,695,892	58,701,774	1,005,882	1.74%
65 or Older	38,938,030	39,201,090	263,060	0.68%
Male	123,430,407	123,422,261	-8,146	-0.01%
Female	130,188,700	131,909,550	1,720,850	1.32%
Hispanic	36,769,252	38,346,951	1,577,700	4.29%
Not Hispanic	216,849,855	216,984,859	135,004	0.06%
White[3]	204,032,161	202,851,643	-1,180,518	-0.58%
Black[3]	31,168,385	31,618,096	449,711	1.44%
American Indian or Alaska Native[3]	2,483,390	2,905,990	422,600	17.02%
Asian[3]	11,915,744	12,869,433	953,689	8.00%
Native Hawaiian or Other Pacific Islander[3]	460,327	527,384	67,057	14.57%
Two or More Races[3]	3,559,100	4,559,265	1,000,165	28.10%

NOTE: Population counts are annualized estimates of the 2010 population and reflect the population of the entire year.

[1] Difference between the number of people in the 2010 population overall or in a given subgroup from control totals based on the 2010 census and the corresponding number from control totals based on the 2000 census.

[2] Based on the following formula: {[(*2010 Population Based on 2010 Census*) ─ (*2010 Population Based on 2000 Census*)] ÷ (*2010 Population Based on 2000 Census*)} × 100.

[3] Unlike racial/ethnic groups discussed elsewhere in this report, race domains in this table include Hispanics in addition to persons who were not Hispanic.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010.

Table B.8 Outcomes of Statistical Tests between Estimates in 2011 and Estimates in 2010 According to Census Control Totals Used for 2010 Estimates (Persons Aged 18 or Older)

	2011 versus 2010 (New) Estimated Numbers, Significant	2011 versus 2010 (New) Estimated Numbers, Not Significant	2011 versus 2010 (New) Estimated Percentages, Significant	2011 versus 2010 (New) Estimated Percentages, Not Significant
2011 versus 2010 (Old), Significant	**102**	28	**111**	25
2011 versus 2010 (Old), Not Significant	4	**923**	6	**938**

2010 (Old) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2000 census; 2010 (New) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2010 census.

NOTE: There are 123 tests not included due to suppression, 61 for totals and 62 for percentages. Tests were conducted at the .05 level of significance. Cells with bolded data indicate consistent outcomes between 2011 versus 2010 (New) and between 2011 versus 2010 (Old).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.9 Outcomes of Statistical Tests between Estimates in 2011 and Estimates in 2010 According to Census Control Totals Used for 2010 Estimates (Persons Aged 12 to 17)

	2011 versus 2010 (New) Estimated Numbers, Significant	2011 versus 2010 (New) Estimated Numbers, Not Significant	2011 versus 2010 (New) Estimated Percentages, Significant	2011 versus 2010 (New) Estimated Percentages, Not Significant
2011 versus 2010 (Old), Significant	**6**	10	**8**	2
2011 versus 2010 (Old), Not Significant	2	**232**	0	**240**

2010 (Old) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2000 census; 2010 (New) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2010 census.

NOTE: There are 36 tests not included due to suppression, 18 each for totals and percentages. Tests were conducted at the .05 level of significance. Cells with bolded data indicate consistent outcomes between 2011 versus 2010 (New) and between 2011 versus 2010 (Old).

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.10 Comparison of Differences of Numbers in Thousands between Estimates in 2011 and Estimates in 2010 According to Census Control Totals Used for 2010 Estimates and the Direction of the Statistical Test Outcomes (Persons Aged 18 or Older)

	2011 < 2010 (New), Number (Percent)	No Difference between 2011 and 2010 (New) Number (Percent)	2011 > 2010 (New), Number (Percent)
2011 < 2010 (Old)	**80 (7.6%)**	19 (1.8%)	0 (0.0%)
No Difference between 2011 and 2010 (Old)	4 (0.4%)	**923 (87.3%)**	0 (0.0%)
2011 > 2010 (Old)	0 (0.0%)	9 (0.9%)	**22 (2.1%)**

2010 (Old) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2000 census; 2010 (New) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2010 census.

NOTE: Significance testing is based on a 2-sided test at the .05 level of significance. Cells with bolded data indicate consistent outcomes between 2011 versus 2010 (New) and between 2011 versus 2010 (Old). There are 61 tests not included due to suppression.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.11 Comparison of Differences of Numbers in Thousands between Estimates in 2011 and Estimates in 2010 According to Census Control Totals Used for 2010 Estimates and the Direction of the Statistical Test Outcomes (Persons Aged 12 to 17)

	2011 < 2010 (New), Number (Percent)	No Difference between 2011 and 2010 (New) Number (Percent)	2011 > 2010 (New), Number (Percent)
2011 < 2010 (Old)	**2 (0.8%)**	0 (0.0%)	0 (0.0%)
No Difference between 2011 and 2010 (Old)	2 (0.8%)	**232 (92.8%)**	0 (0.0%)
2011 > 2010 (Old)	0 (0.0%)	10 (4.0%)	**4 (1.6%)**

2010 (Old) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2000 census; 2010 (New) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2010 census.

NOTE: Significance testing is based on a 2-sided test at the .05 level of significance. Cells with bolded data indicate consistent outcomes between 2011 versus 2010 (New) and between 2011 versus 2010 (Old). There are 18 tests not included due to suppression.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.12 Comparison of Differences of Percentages between Estimates in 2011 and Estimates in 2010 According to Census Control Totals Used for 2010 Estimates and the Direction of the Statistical Test Outcomes (Persons Aged 18 or Older)

	2011 < 2010 (New), Number (Percent)	No Difference between 2011 and 2010 (New) Number (Percent)	2011 > 2010 (New), Number (Percent)
2011 < 2010 (Old)	**99 (9.2%)**	23 (2.1%)	0 (0.0%)
No Difference between 2011 and 2010 (Old)	4 (0.4%)	**938 (86.9%)**	2 (0.2%)
2011 > 2010 (Old)	0 (0.0%)	2 (0.2%)	**12 (1.1%)**

2010 (Old) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2000 census; 2010 (New) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2010 census.

NOTE: Significance testing is based on a 2-sided test at the .05 level of significance. Cells with bolded data indicate consistent outcomes between 2011 versus 2010 (New) and between 2011 versus 2010 (Old). There are 62 tests not included due to suppression.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Table B.13 Comparison of Differences of Percentages between Estimates in 2011 and Estimates in 2010 According to Census Control Totals Used for 2010 Estimates and the Direction of the Statistical Test Outcomes (Persons Aged 12 to 17)

	2011 < 2010 (New), Number (Percent)	No Difference between 2011 and 2010 (New) Number (Percent)	2011 > 2010 (New), Number (Percent)
2011 < 2010 (Old)	**3 (1.2%)**	0 (0.0%)	0 (0.0%)
No Difference between 2011 and 2010 (Old)	0 (0.0%)	**240 (96.0%)**	0 (0.0%)
2011 > 2010 (Old)	0 (0.0%)	2 (0.8%)	**5 (2.0%)**

2010 (Old) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2000 census; 2010 (New) = Estimates for 2010 with weights poststratified to 2010 control totals based on the 2010 census.

NOTE: Significance testing is based on a 2-sided test at the .05 level of significance. Cells with bolded data indicate consistent outcomes between 2011 versus 2010 (New) and between 2011 versus 2010 (Old). There are 18 tests not included due to suppression.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2010 and 2011.

Appendix C: Other Sources of Mental Health Data

The National Survey on Drug Use and Health (NSDUH) provides population-based prevalence estimates of mental disorders and related behavior (mental illness, major depressive episode [MDE], and suicidal thoughts and behavior) in the United States. A variety of surveys and data systems other than NSDUH also produce estimates of mental health indicators. Integrating information from national data sources, such as those included in this appendix, can provide useful information about the mental health of the U.S. population. Therefore, it is useful to consider the estimates produced from other data sources when discussing NSDUH estimates. When comparing estimates between surveys, it is important to understand the methodological differences between surveys and the impact that these differences could have on estimates of mental health. That is, the goals and approaches for various sources of mental health data are often different, making comparisons between them difficult. Some methodological differences that may affect comparisons include, but are not limited to, the populations covered, timing of data collection, sample design, mode of data collection, instruments used, operational definitions, and estimation methods.

This appendix briefly describes several data systems that produce estimates of mental health indicators and presents selected comparisons of estimates with 2011 NSDUH estimates. Further information about these and other data systems can be found in a report comparing NSDUH mental health data and methods with those from other data sources (Hedden et al., 2012). This appendix also describes surveys on mental health in populations not covered by NSDUH.

C.1 Definition of Mental Illness

In order to compare estimates of mental illness produced from NSDUH with other surveys, it is useful first to define serious mental illness (SMI) as specified by the Substance Abuse and Mental Health Services Administration (SAMHSA). SMI among persons aged 18 or older is defined as having a diagnosable mental, behavioral, or emotional disorder (excluding developmental and substance use disorders) of sufficient duration to meet diagnostic criteria specified within the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) (American Psychiatric Association [APA], 1994) that has resulted in serious functional impairment, which substantially interferes with or limits one or more major life activities. See the second section of Chapter 2 in this report for the statutory requirement for SAMHSA to develop an operational definition of SMI. Similarly, NSDUH uses the following operational definition for the estimation of any mental illness (AMI) among adults: having (currently or at any time in the past year) a diagnosable mental, behavioral, or emotional disorder (excluding developmental and substance use disorders) of sufficient duration to meet diagnostic criteria specified within the DSM-IV, regardless of functional impairment.

Clinical interview data on psychiatric disorders and impairment in carrying out daily activities due to these disorders were collected from a subset of adult NSDUH respondents. Mental illness among adults in the civilian, noninstitutionalized population was estimated by

prediction models that used screening questions on distress and impairment from the overall adult NSDUH sample and the clinical interview data from the subset of adult NSDUH respondents. See Section B.4.3 in Appendix B of this report and Section B.4.3 in Appendix B of the 2009 mental health findings report (Center for Behavioral Health Statistics and Quality [CBHSQ], 2010) for additional details on the distress and impairment screening scales, model specifications, and specification of levels of impairment for mental illness variables.

C.2 National Surveys Collecting Data on Mental Health in the Civilian, Noninstitutionalized Population

National Comorbidity Survey (NCS)

Conducted by the University of Michigan's Survey Research Center, the National Comorbidity Survey (NCS) was sponsored by the National Institute of Mental Health (NIMH), the National Institute on Drug Abuse (NIDA), and the W.T. Grant Foundation. It was designed to measure in the general population the prevalence, risk factors, and consequences of psychiatric morbidity and comorbidity. The first wave of the NCS was an interviewer-administered household survey of persons in the continental United States (i.e., excluding Alaska and Hawaii) that collected data from 8,098 respondents aged 15 to 54 using paper-and-pencil interviewing (PAPI). These responses were weighted to produce nationally representative estimates. The interviews took place between 1990 and 1992. The NCS used a modified version of the Composite International Diagnostic Interview (the University of Michigan [UM]-CIDI) to estimate the prevalence of mental disorders according to the criteria of the *Diagnostic and Statistical Manual of Mental Disorders*, 3rd revised edition (DSM-III-R) (APA, 1987).

The NCS data allow estimates to be produced from the following classes of disorders: affective disorders, anxiety disorders, substance use disorders, and nonaffective psychosis. A published estimate of the prevalence of having at least one or more of the disorders assessed in the NCS (including substance use disorders) was 29.5 percent in the past 12 months among adults aged 18 to 54 (Kessler et al., 1994). The NSDUH estimate for the prevalence of AMI (excluding substance use disorders) was 19.6 percent in 2011. The estimate of any disorder produced using NCS data included respondents with substance use disorders; as noted previously, the operational definition of AMI in NSDUH excludes substance use disorders. Methodological differences between the two surveys that could affect the estimates include the following: (a) *age ranges of the target populations* (18 or older for NSDUH vs. 18 to 54 for the NCS); (b) *the modes of administration* (audio computer-assisted self-interviewing [ACASI] for NSDUH vs. PAPI for the NCS); and (c) *differences in the instruments and estimation methods* used to estimate the prevalence of mental disorders (clinical interview data from a subset of adult respondents in combination with short screeners on psychological distress and functional impairment in the questionnaire for all adult NSDUH respondents vs. the UM-CIDI for the NCS). Further, given that data from the surveys were collected at different times (2011 for NSDUH vs. 1990 to 1992 for the NCS), differences in estimates could reflect changes in population prevalence.

Uniform Reporting System (URS)

The NCS data have been used by the Uniform Reporting System (URS) of the Center for Mental Health Services (CMHS) to produce State-level SMI estimates (Kessler et al., 2003a, 2003b, 2006). Using data from the NCS and the Baltimore site of the Epidemiologic Catchment Area (ECA) research project, methods were developed to estimate SMI (Kessler et al., 1996, 1998, 2001). The definition of SMI was operationalized as respondents having met the following criteria: (1) presence of a "severe" and persistent mental illness as defined by the National Advisory Mental Health Council of the NIMH (National Advisory Mental Health Council, 1993) or (2) respondents with another past 12-month DSM-III-R mental disorder (excluding "V" codes in the DSM,[35] substance use disorder, and developmental disorders) and a planned suicide, attempted suicide, lack of a productive role, serious role impairment, or serious interpersonal impairment (Kessler et al., 1996, 2001). Impairment was assessed using questions that were included in the NCS and the ECA for other purposes (Kessler et al., 2001; Narrow, Rae, Robins, & Regier, 2002). The SMI prevalence for the total population aged 18 or older based on the NCS and the ECA was 5.4 percent (Kessler et al., 1996).

Specifically, the URS selected a method for estimating State-level SMI prevalence that used the combined NCS data and data from the Baltimore site of the ECA by applying a model that controlled for demographic and geographic characteristics and corresponding census data (Kessler et al., 1998, 2004b). CMHS (1999) announced this methodology in the *Federal Register* as its final procedure for estimating the number of adults with SMI within each State. Through the URS, the CMHS has continued to provide State and national estimates of the prevalence of SMI among the civilian population aged 18 years or older based on this methodology assuming that the overall SMI prevalence is 5.4 percent. Estimates of SMI by State are updated annually by applying updated population characteristics when new population data become available through the U.S. Census Bureau. Notably, this estimation method assumes that the prevalence of SMI in the adult population within the modeled demographic and geographic categories is homogeneous across States and does not change over time.

In contrast to the estimated prevalence of 5.4 percent among adults based on the NCS and the ECA, the estimated prevalence of SMI based on 2011 NSDUH data was 5.0 percent among adults. Several important differences between NSDUH and URS that could affect estimates of mental health warrant discussion. Most importantly, URS assumes a national prevalence of SMI of 5.4 percent that is based on research conducted in the mid-1990s, while NSDUH's estimates are based on in-person interviews conducted in 2011. Further differences between the two surveys that could affect estimates of SMI include the different methods for measuring functional impairment between the NCS/ECA and NSDUH. The NCS/ECA defined impairment according to information about disability and duration associated with individual disorders, planned or attempted suicide, vocational interference (as measured by unemployment or lost time from work due to mental health problems), and impairment of interpersonal relationships (based on self-reports about confiding relationships, frequency of interactions with friends or relatives, or the quality of interpersonal relationships). The 2011 NSDUH used a reduced set of questions based on a standard screening scale for impairment (see Section B.4.3 in Appendix B)

[35] V codes denote conditions that are a focus of clinical attention or treatment but are not attributable to a mental disorder (e.g., marital problems).

that specifically asked about difficulty in carrying out specific tasks or responsibilities because of their emotions, nerves, or mental health, along with clinical interview information on impairment from a subset of adult respondents. In addition, the NCS and the ECA both were designed to estimate the lifetime prevalence of mental disorders; therefore, the emphasis of the diagnosis was on lifetime over past year assessment. The 2011 NSDUH was designed to estimate past year SMI. Also, SMI estimates using the pooled NCS and ECA data used DSM-III and DSM-III-R diagnostic criteria. NSDUH interview data were based on DSM-IV criteria. Furthermore, the mode of survey administration differed for the NCS and the ECA (interviewer administration) versus the NSDUH (ACASI).

National Comorbidity Survey Replication (NCS-R)

There have been several follow-ups to and replications of the original NCS, including a replication study (the National Comorbidity Survey Replication, NCS-R) conducted in 2001 to 2003 with a newly recruited, nationally representative multistage, clustered-area probability sample of 9,282 U.S. respondents aged 18 or older (Kessler et al., 2004a). As in the NCS, the sample for the NCS-R excluded Alaska and Hawaii. Conducted by the University of Michigan's Survey Research Center, the NCS-R was sponsored by the NIMH, with supplemental support from NIDA, SAMHSA, the Robert Wood Johnson Foundation, and the John W. Alden Trust. Interviews were conducted using computer-assisted personal interviewing (CAPI). Unlike the NCS, which used DSM-III-R criteria, the NCS-R used DSM-IV criteria for measuring mental disorders. Specifically, the NCS-R used a modified version of the World Mental Health Version of the Composite International Diagnostic Interview (the WMH-CIDI) (Kessler & Üstün, 2004) to generate diagnoses according to the definitions and criteria of the DSM-IV. Disorders assessed in the NCS-R included anxiety disorders, mood disorders, intermittent explosive disorder, and substance use disorders.

In an analysis of the NCS-R data, the presence of past year SMI was indicated if a respondent with a 12-month mental disorder (excluding substance use disorder) had at least one of the following: bipolar I or nonaffective psychosis, suicide attempt, at least two areas in which severe role impairment occurred as measured by the Sheehan Disability Scale (SDS; Leon et al., 1997), or the presence of functional impairment consistent with a Global Assessment of Functioning (GAF) (Endicott et al., 1976) score of 50 or less (Kessler et al., 2006). This produced an estimate of SMI among adults of 5.8 percent in the past year. Furthermore, 26.2 percent of respondents aged 18 or older were estimated to have any disorder in the past 12 months (including substance use disorders) (Kessler et al., 2006); when substance use disorders were excluded, the estimate of any disorder was 24.8 percent (Druss et al., 2009; Kessler et al., 2006). In addition to the SMI estimate of 5.0 percent among adults, the 2011 NSDUH estimated that 19.6 percent of adults had AMI in the past year (see Chapter 2 in this report).

Differences in estimates of SMI and AMI between the NCS-R and NSDUH could be due in part to various methodological differences between the surveys. In addition to the different years represented in each survey (the NCS-R data were collected in 2001-2002 vs. NSDUH's in 2011), the NCS-R data were collected using interviewer-administered questionnaires, while NSDUH employs self-administration. The NCS-R and NSDUH also used different methods for estimating SMI and AMI. The NSDUH estimates for SMI and AMI were based on prediction models estimated from a subsample of respondents from the 2011 NSDUH. That is, responses to

brief screeners (a measure of psychological distress in combination with a measure of functional impairment) were used as independent variables in a statistical model of mental illness based on in-depth structured clinical interviews conducted by trained clinical interviewers. The model was used to predict estimates of SMI and AMI in the full NSDUH sample (Aldworth et al., 2010). In contrast, the NCS-R measures were directly estimated based on structured, diagnostic interviews by lay interviewers.

The definitions and disorders covered by NSDUH and the NCS-R also differ somewhat. Several published estimates of any disorder that used NCS-R data have included persons with substance use disorders (Kessler et al., 2006), while NSDUH's estimates of AMI exclude persons with substance use disorders. The NCS-R also included mental disorders that were not assessed in the subsample of NSDUH adults who received clinical interviews. In addition, several estimates of SMI have been published with NCS-R data using various operational definitions (Kessler et al., 2006) that differ slightly from those that use NSDUH data for estimates of SMI.

Estimates of past year MDE (7.6 percent), serious thoughts of suicide (2.6 percent), and suicide plans (0.7 percent) and attempts (0.4 percent) among adults also have been produced using the NCS-R data. The estimate of past year MDE was lower for the 2011 NSDUH (6.6 percent) compared with the NCS-R's estimate. NSDUH estimates of suicidal thoughts and suicide plans were 3.7 and 1.0 percent, respectively (see Chapter 2). Although the items used to develop the MDE estimate from NSDUH are based on the items used in the NCS-R, slight revisions to the items were required to maintain the logical processes of the ACASI environment. Also, given that data from the surveys were collected at different times (2011 for NSDUH vs. 2001 to 2002 for the NCS-R), the differences in estimates could reflect changes in population prevalence. The different modes of survey administration (ACASI in NSDUH vs. interviewer administration in the NCS-R) also could affect responses to the MDE items.

In addition, differences existed in the items used in the NCS-R and NSDUH to assess serious thoughts of suicide and suicidal behavior. The NCS-R first required respondents to report lifetime suicidal thoughts, plans, or behavior before they were asked whether these occurred in the past 12 months. In NSDUH, adult respondents are asked directly about suicidal thoughts and behavior in the past 12 months.

For further details, see the NCS Web site at http://www.hcp.med.harvard.edu/ncs/.

National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)

The first wave of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) was conducted in 2001 and 2002 by the U.S. Bureau of the Census for the National Institute on Alcohol Abuse and Alcoholism (NIAAA), using a computerized interviewer-administered interview. The NESARC sample was designed to make inferences for persons aged 18 or older in the civilian, noninstitutionalized population of the United States, including Alaska, Hawaii, and the District of Columbia, and including persons living in noninstitutional group quarters. NESARC is longitudinal in design. The first wave was conducted in 2001 and 2002, with a final sample size of 43,093 respondents aged 18 or older. The second wave was conducted in 2004 and 2005 (Grant & Dawson, 2006). A 1-year data collection period for the next wave of the survey (NESARC-III) began in 2012 with a new sample of approximately 46,500 adults.

The study contains comprehensive assessments of alcohol and illegal drug use, dependence and abuse, and associated mental disorders. NESARC included an extensive set of questions based on DSM-IV criteria (APA, 1994) and was designed to assess the presence of symptoms of alcohol or drug dependence or abuse in persons' lifetimes and during the prior 12 months. In addition, estimates of the prevalence of major mental disorders based on the DSM-IV were generated using the Alcohol Use Disorder and Associated Disabilities Interview Schedule-version 4 (AUDADIS-IV), which is a structured, diagnostic interview that captures major DSM-IV axis I and axis II disorders. Mood disorders assessed in NESARC included major depression, dysthymia, mania, and hypomania. Anxiety disorders that were assessed included panic disorder (with or without agoraphobia), social phobia, specific phobia, and generalized anxiety disorder (Grant et al., 2004).

Based on Wave 1 of the NESARC data, 9.2 percent of adults were estimated to have a DSM-IV mood disorder in the past year, and 11.1 percent were estimated to have a DSM-IV anxiety disorder in that period. However, data for all of the same mental disorders were not collected for NSDUH. Therefore, potential estimates of any disorder produced using the NESARC dataset may not be comparable with estimates of AMI based on NSDUH data. In addition, 7.1 percent of adults were estimated to have had MDE in the past year based on the 2001-2002 NESARC data (Compton, Conway, Stinson, & Grant, 2006; Grant et al., 2004). This estimate in the 2011 NSDUH was 6.6 percent. The NESARC estimate excluded depressive symptoms induced by substance use, a medical illness, or bereavement; these exclusions were not made for the NSDUH estimate of MDE.[36] A number of methodological differences may have contributed to differences in estimates produced by NSDUH and NESARC, including differences in the mode of data collection (questions about sensitive topics in NSDUH are self-administered, while similar questions are interviewer administered in NESARC), mental health instrumentation, and time frames of data collection.

C.3 Surveys of Populations Not Covered by NSDUH

Department of Defense (DoD) Survey of Health Related Behaviors Among Active Duty Military Personnel

The 2008 Department of Defense (DoD) Survey of Health Related Behaviors Among Active Duty Military Personnel was the 10th in a series of studies conducted since 1980. The sample consisted of 28,546 active-duty Armed Forces personnel worldwide who anonymously completed self-administered questionnaires that assessed substance use and other health behaviors. Members of the Coast Guard were included for the first time in the 2008 survey. (Bray et al., 2009). The 2011 survey was fielded in August 2011 and included onsite and Internet survey administrations (Assistant Secretary of Defense for Health Affairs, 2011). The survey provides information about the use of alcohol, illicit drugs, and tobacco and about mental health issues among military personnel.

[36] The NESARC estimate reported by Grant et al. (2004) excluded substance-induced depression, while the estimate reported by Compton et al. (2006) did not. However, Compton et al. noted that the prevalence of substance-induced depression was low and not likely to have a large effect on estimates of MDE.

In 2008, 21 percent of military personnel in all services (including the Coast Guard) reported symptoms that suggested the need for further depression evaluation, 5 percent reported having seriously considered suicide, and 2 percent reported having attempted suicide (Bray et al., 2009). In addition, 17 percent of military personnel had received mental health counseling in the past year.

Survey of Inmates in State and Federal Correctional Facilities (SISCF, SIFCF)

The Survey of Inmates in State Correctional Facilities (SISCF) and the Survey of Inmates in Federal Correctional Facilities (SIFCF) have provided nationally representative data on State prison inmates and sentenced Federal inmates held in federally owned and operated facilities. The Survey of State Inmates was conducted in 1974, 1979, 1986, 1991, 1997, and 2004, and the Survey of Federal Inmates in 1991, 1997, and 2004. The SISCF was conducted for the Bureau of Justice Statistics (BJS) by the U.S. Census Bureau, which also conducted the SIFCF for the BJS and the Federal Bureau of Prisons. Both surveys provide information about current offense and criminal history, family background and personal characteristics, prior drug and alcohol use and treatment, gun possession, and prison treatment, programs, and services. The surveys are the only national source of detailed information on criminal offenders, particularly special populations such as drug and alcohol users and offenders who have mental health problems. Systematic random sampling was used to select the inmates, and the 2004 surveys of State and Federal inmates were administered through CAPI. In 2004, 14,499 State prisoners in 287 State prisons and 3,686 Federal prisoners in 39 Federal prisons were interviewed.

In 2004, 56 percent of inmates in State prisons and 45 percent of inmates in Federal prisons had a mental health problem in the past year. More than two fifths of State prisoners (43 percent) reported symptoms of mania disorder, 24 percent reported symptoms of major depression, and 15 percent reported symptoms of a psychotic disorder. Comparable percentages for inmates in Federal prisons were 35, 16, and 10 percent, respectively (James & Glaze, 2006). However, these inmate surveys asked about depression symptoms only for the past 12 months and did not assess the duration of symptoms. Therefore, measures of depression from these surveys are not strictly comparable with measures of MDE in NSDUH.

For further details, see BJS's "All Data Collections" Web page at http://bjs.ojp.usdoj.gov/index.cfm?ty=dca.

Appendix D: References

Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) Reorganization Act, Pub. L. No. 102-321 (1992).

Aldworth, J., Barnett-Walker, K., Chromy, J., Karg, R., Morton, K., Novak, S., & Spagnola, K. (2009, June). Measuring serious mental illness with the NSDUH: Results of 2008 12-month analysis. In *2008 National Survey on Drug Use and Health: Methodological resource book* (Section 16, prepared for the Substance Abuse and Mental Health Services Administration under Contract No. 283-2004-00022, Mental Health Surveillance Survey Deliverable 5, RTI/0209009.423.006.008). Research Triangle Park, NC: RTI International.

Aldworth, J., Colpe, L. J., Gfroerer, J. C., Novak, S. P., Chromy, J. R., Barker, P. R., Barnett-Walker, K., Karg, R. S., Morton, K. B., & Spagnola, K. (2010). The National Survey on Drug Use and Health Mental Health Surveillance Study: Calibration analysis. *International Journal of Methods in Psychiatric Research, 19*(Suppl. 1), 61-87. doi: 10.1002/mpr.312.

Aldworth, J., Kott, P., Yu, F., Mosquin, P., & Barnett-Walker, K. (2012). Analysis of effects of 2008 NSDUH questionnaire changes: Methods to adjust adult MDE and SPD estimates and to estimate SMI in the 2005-2009 surveys. In *2010 National Survey on Drug Use and Health: Methodological resource book* (Section 16b, prepared for the Substance Abuse and Mental Health Services Administration under Contract No. HHSS283200800004C, Deliverable No. 39, RTI/0211838.108.005). Research Triangle Park, NC: RTI International.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (DSM-III-R) (3rd rev. ed.). Washington, DC: Author.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (DSM-IV) (4th ed.). Washington, DC: Author.

Assistant Secretary of Defense for Health Affairs. (2011, August). *2011 Health Related Behaviors Survey to be launched in August: 300,000 service members to be asked to participate;1st time on-line* [news release]. Washington, DC: Office of the Secretary of Defense.

Bray, R. M., Pemberton, M. R., Hourani, L. L., Witt, M., Rae Olmsted, K. L., Brown, J. M., Weimer, B. J., Lane, M. E., Marsden, M. E., Scheffler, S. A., Vandermaas-Peeler, R., Aspinwall, K. R., Anderson, E. M., Spagnola, K., Close, K. L., Gratton, J. L., Calvin, S. L., & Bradshaw, M. R. (2009, September). *2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel: A component of the Defense Lifestyle Assessment Program (DLAP)* (RTI/10940-FR, prepared under Contract No. GS-10F-0097L, Task Order No. W81XWH-07-F-0538, for the Assistant Secretary of Defense (Health Affairs) and Task Order No. HSCG23-07-F-PMD047 for the U.S. Coast Guard). Research Triangle Park, NC: RTI International.

Center for Behavioral Health Statistics and Quality. (2010). *Results from the 2009 National Survey on Drug Use and Health: Mental health findings* (HHS Publication No. SMA 10-4609, NSDUH Series H-39). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. (2011). *National Survey on Drug Use and Health: 2010 public use file and codebook*. Retrieved from http://dx.doi.org/10.3886/ICPSR32722.v1

Center for Behavioral Health Statistics and Quality. (2012a). *Results from the 2010 National Survey on Drug Use and Health: Mental health findings* (HHS Publication No. SMA 11-4667, NSDUH Series H-42). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Center for Behavioral Health Statistics and Quality. (2012b). *Results from the 2011 National Survey on Drug Use and Health: Summary of national findings* (HHS Publication No. SMA 12-4713, NSDUH Series H-44). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Center for Mental Health Services, Substance Abuse and Mental Health Services Administration. (1999, June 24). Estimation methodology for adults with serious mental illness (SMI): Final notice. *Federal Register, 64*(121), 33890-33897.

Chromy, J. R., Feder, M., Gfroerer, J., Hirsch, E., Kennet, J., Morton, K. B., Piper, L., Riggsbee, B. H., Snodgrass, J. A., Virag, T. G., & Yu, F. (2010). *Reliability of key measures in the National Survey on Drug Use and Health* (HHS Publication No. SMA 09-4425, Methodology Series M-8). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*, 37-46.

Compton, W. M., Conway, K. P., Stinson, F. S., & Grant, B. F. (2006). Changes in the prevalence of major depression and comorbid substance use disorders in the United States between 1991-1992 and 2001-2002. *American Journal of Psychiatry, 163*, 2141-2147.

Deville, J. C., & Särndal, C. E. (1992). Calibration estimators in survey sampling. *Journal of the American Statistical Association, 87*, 376-382.

Druss, B. G., Hwang, I., Petukhova, M., Sampson, N. A., Wang, P. S., & Kessler, R. C. (2009). Impairment in role functioning in mental and chronic medical disorders in the United States: Results from the National Comorbidity Survey Replication. *Molecular Psychiatry, 14*, 728-737.

Endicott, J., Spitzer, R. L., Fleiss, J. L., & Cohen, J. (1976). The Global Assessment Scale: A procedure for measuring overall severity of psychiatric disturbance. *Archives of General Psychiatry, 33*, 766-771.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (2002). *Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Non-patient Edition (SCID-I/NP)*. New York, NY: New York State Psychiatric Institute, Biometrics Research.

Folsom, R. E., & Singh, A. C. (2000). The generalized exponential model for sampling weight calibration for extreme values, nonresponse, and poststratification. In *Proceedings of the 2000 Joint Statistical Meetings, American Statistical Association, Survey Research Methods Section, Indianapolis, IN* (pp. 598-603). Alexandria, VA: American Statistical Association.

Gfroerer, J., Lessler, J., & Parsley, T. (1997). Studies of nonresponse and measurement error in the National Household Survey on Drug Abuse. In L. Harrison & A. Hughes (Eds.), *The validity of self-reported drug use: Improving the accuracy of survey estimates* (NIH Publication No. 97-4147, NIDA Research Monograph 167, pp. 273-295). Rockville, MD: National Institute on Drug Abuse.

Grant, B. F., & Dawson, D. A. (2006). Introduction to the National Epidemiologic Survey on Alcohol and Related Conditions. *Alcohol Research & Health, 29*, 74-78.

Grant, B. F., Stinson, F. S., Dawson, D. A., Chou, S. P., Dufour, M. C., Compton, W., Pickering, R. P., & Kaplan, K. (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry, 61*, 807-816.

Hedden, S., Gfroerer, J., Barker, P., Smith, S., Pemberton, M. R., Saavedra, L. M., Forman-Hoffman, V. L., Ringeisen, H., & Novak, S. P. (2012, March). *CBHSQ Data Review: Comparison of NSDUH mental health data and methods with other data sources*. Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality.

Hughes, A., Muhuri, P., Sathe, N., & Spagnola, K. (2012). *State estimates of substance use and mental disorders from the 2009-2010 National Surveys on Drug Use and Health* (HHS Publication No. SMA 12-4703, NSDUH Series H-43). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality.

James, D. J., & Glaze, L. E. (2006, September [revised December 14, 2006]). *Mental health problems of prison and jail inmates* (NCJ 213600, BJS Special Report). Washington, DC: U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.

Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., Howes, M. J., Normand, S. L., Manderscheid, R. W., Walters, E. E., & Zaslavsky, A. M. (2003a). Screening for serious mental illness in the general population. *Archives of General Psychiatry, 60*, 184-189.

Kessler, R. C., Berglund, P., Chiu, W. T., Demler, O., Heeringa, S., Hiripi, E., Jin, R., Pennell, B. E., Walters, E. E., Zaslavsky, A, & Zheng, H. (2004a). The US National Comorbidity Survey Replication (NCS-R): Design and field procedures. *International Journal of Methods in Psychiatric Research, 13*(2), 69-92.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Koretz, D., Merikangas, K. R., Rush, A. J., Walters, E. E., & Wang, P. S. (2003b). The epidemiology of major depressive disorder: Results from the National Comorbidity Survey Replication (NCS-R). *Journal of the American Medical Association, 289*, 3095-3105.

Kessler, R. C., Berglund, P. A., Bruce, M. L., Koch, J. R., Laska, E. M., Leaf, P. J., Manderscheid, R. W., Rosenheck, R. A., Walters, E. E., & Wang, P. S. (2001). The prevalence and correlates of untreated serious mental illness. *Health Services Research, 36*, 987-1007.

Kessler, R. C., Berglund, P. A., Glantz, M. D., Koretz, D. S., Merikangas, K. R., Walters, E. E., & Zaslavsky, A. M. (2004b). Estimating the prevalence and correlates of serious mental illness in community epidemiological surveys. In R.W. Manderscheid & M. J. Henderson (Eds.), *Mental health, United States, 2002* (HHS Publication No. SMA 04-3938, pp. 155-164). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Mental Health Services.

Kessler, R. C., Berglund, P. A., Walters, E. E., Leaf, P. J., Kouzis, A. C., Bruce, M. L., Friedman, R. M., Grosser, R. C., Kennedy, C., Kuehnel, T. G., Laska, E. M., Manderscheid, R. W., Narrow, W. E., Rosenheck, R. A., & Schneier, M. (1998). A methodology for estimating the 12-month prevalence of serious mental illness. In R. W. Manderscheid & M. J. Henderson (Eds.), *Mental health, United States, 1998* (HHS Publication No. SMA 99-3285, pp. 99-109). Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Mental Health Services.

Kessler, R. C., Berglund, P. A., Zhao, S., Leaf, P. J., Kouzis, A. C., Bruce, M. L., Friedman, R. M., Grosser, R. C., Kennedy, C., Narrow, W. E., Kuehnel, T. G., Laska, E. M., Manderscheid, R. W., Rosenheck, R. A., Santoni, T. W., & Schneier, M. (1996). The 12-month prevalence and correlates of serious mental illness (SMI). In R. W. Manderscheid & M. A. Sonnenschein (Eds.), *Mental health, United States, 1996* (HHS Publication No. SMA 96-3098, pp. 59-70). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Kessler, R. C., Chiu, W. T., Colpe, L., Demler, O., Merikangas, K. R., Walters, E. E., & Wang, P. S. (2006). The prevalence and correlates of serious mental illness (SMI) in the National Comorbidity Survey Replication (NCS-R). In R. W. Manderscheid & J. T. Berry (Eds.), *Mental health, United States*, *2004* (pp. 134-148). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., Wittchen, H. U., & Kendler, K. S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry, 51*, 8-19.

Kessler, R. C., & Üstün, T. B. (2004). The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). *International Journal of Methods in Psychiatric Research, 13*, 93-121.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*, 159-174.

Leon, A. C., Olfson, M., Portera, L., Farber, L., & Sheehan, D. V. (1997). Assessing psychiatric impairment in primary care with the Sheehan Disability Scale. *International Journal of Psychiatry in Medicine, 27*(2), 93-105.

Manly, B. F. J. (1986). *Multivariate statistical methods: A primer*. London, England: Chapman and Hall.

Morton, K. B., Martin, P. C., Shook-Sa, B. E., Chromy, J. R., & Hirsch, E. L. (2012, June). Sample design report. In *2011 National Survey on Drug Use and Health: Methodological resource book* (Section 2, prepared for the Substance Abuse and Mental Health Services Administration under Contract No. HHSS283200800004C, Phase II, Deliverable No. 8, RTI/0211838.203.004). Research Triangle Park, NC: RTI International.

Narrow, W. E., Rae, D. S., Robins, L. N., & Regier, D. A. (2002). Revised prevalence estimates of mental disorders in the United States: Using a clinical significance criterion to reconcile 2 surveys' estimates. *Archives of General Psychiatry, 59*, 115-123.

National Advisory Mental Health Council. (1993). Health care reform for Americans with severe mental illnesses: Report of the National Advisory Mental Health Council. *American Journal of Psychiatry, 150*, 1447-1465.

Novak, S. (2007, October). *An item response analysis of the World Health Organization Disability Assessment Schedule (WHODAS) items in the 2002-2004 NSDUH* (prepared for the Substance Abuse and Mental Health Services Administration under Contract No. 283-03-9028, RTI/8726). Research Triangle Park, NC: RTI International.

Office of Applied Studies. (2005). *Results from the 2004 National Survey on Drug Use and Health: National findings* (HHS Publication No. SMA 05-4062, NSDUH Series H-28). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Office of Applied Studies. (2009). *Results from the 2008 National Survey on Drug Use and Health: National findings* (HHS Publication No. SMA 09-4434, NSDUH Series H-36). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Office of Management and Budget. (1997). Revisions to the standards for the classification of federal data on race and ethnicity. *Federal Register, 62*(210), 58781-58790.

RTI International. (2008). *SUDAAN®, Release 10.0 [computer software]*. Research Triangle Park, NC: Author.

RTI International. (2012). *2010 National Survey on Drug Use and Health: Methodological resource book* (prepared for the Substance Abuse and Mental Health Services Administration, Office of Applied Studies, under Contract No. HHSS283200800004C, Deliverable No. 39). Research Triangle Park, NC: Author.

Rubin, D. B. (1986). Statistical matching using file concatenation with adjusted weights and multiple imputations. *Journal of Business and Economic Statistics, 4*(1), 87-94.

Singh, A., Grau, E., & Folsom, R., Jr. (2002). Predictive mean neighborhood imputation for NHSDA substance use data. In J. Gfroerer, J. Eyerman, & J. Chromy (Eds.), *Redesigning an ongoing national household survey: Methodological issues* (HHS Publication No. SMA 03-3768, pp. 111-133). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

Substance Abuse and Mental Health Services Administration, Center for Mental Health Services. (1993, May 20). Final notice [Final definitions for: (1) Children with a serious emotional disturbance, and (2) adults with a serious mental illness]. *Federal Register, 58*(96), 29422-29425.

Appendix E: List of Contributors

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