

Comparing and Evaluating Youth Substance Use Estimates from the National Survey on Drug Use and Health and Other Surveys

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Table of Contents

Chapter	Page
Executive Summary	1
Comparison of Prevalence Rates	1
Demographic Correlates	1
Trend Measurement	2
Potential Reporting Anomalies for Inhalants and Heroin.....	2
School Dropouts.....	3
Absentees	4
Time of Year of Data Collection	5
Privacy during NSDUH Interviews	5
Conclusions: Impact of Survey Designs on Estimates	6
1. Introduction.....	9
1.1. Background.....	9
1.2. General Information about NSDUH	10
1.3. General Information about Other Surveys of Adolescents.....	11
1.4. Measures of Substance Use	12
1.5. Measures of Demographic Characteristics	13
1.6. Organization of This Report	14
2. Adolescent Substance Use Estimates from NSDUH and Other Surveys.....	17
2.1. Tobacco.....	18
2.2. Alcohol.....	24
2.3. Marijuana	31
2.4. Other Substance Use.....	37
2.5. Summary	43
3. Effects of Dropouts, Absentees, and Seasonality on Adolescent Substance Use Estimates in NSDUH.....	47
3.1. Effects of Dropouts	47
3.2. Effects of Absentees	64
3.3. Effects of Seasonality for 12th Graders	82
3.4. Summary.....	87
4. Privacy of NSDUH Interviews for Adolescents.....	93
4.1. Privacy Levels.....	93
4.2. Privacy and Substance Use.....	95
4.3. Summary	109
5. Discussion.....	113
5.1. Highlights from Chapters 2 through 4	113
5.2. Contributions of NSDUH, MTF, and YRBS toward Understanding Adolescent Substance Use	115
5.3. Evaluating the Accuracy of Substance Use Estimates.....	116
5.4. Implications for Policymakers and Other Data Users.....	125

5.5.	Topics for Further Investigation	127
6.	References.....	133
Appendix A:	Description of the Surveys.....	139
A.1	Purpose of the Surveys.....	140
A.2	Sample Design	141
A.3	Data Collection Procedures and Questionnaires.....	143
A.4	Data Processing.....	145
Appendix B:	Statistical Methods and Measurement	157
B.1	Data Sources	157
B.2	Estimation Procedures	157
B.3	Measurement Issues	164
Appendix C:	Estimate and Standard Error Tables for Chapters 2, 3, and 4	173
Appendix D:	List of Contributors	467

Executive Summary

This report describes the results of an effort to gain a better understanding of substance use data provided by adolescents on three Federal surveys. The report examines estimates from the National Survey on Drug Use and Health (NSDUH), a survey covering persons aged 12 or older in the civilian noninstitutionalized population of the United States, and two school-based surveys: Monitoring the Future (MTF), which surveys 8th, 10th, and 12th graders, and the Youth Risk Behavior Survey (YRBS), which covers the 9th through 12th grades. Except where noted, estimates for NSDUH and MTF are based on combined data from the respective 2002 through 2008 surveys. YRBS estimates are based on combined data from the 2003, 2005, and 2007 surveys.

Comparison of Prevalence Rates

In most instances, NSDUH estimates of substance use for students in school were lower than corresponding estimates from MTF and YRBS. In addition, YRBS estimates for 10th and 12th graders tended to be higher than MTF estimates. Examples include the following:

- Among 12th graders, the prevalence of current (i.e., past month) alcohol use was 53.9 percent for YRBS, 46.3 percent for MTF, and 38.8 percent for NSDUH. The prevalence of current marijuana use among 12th graders was 24.6 percent for YRBS, 19.9 percent for MTF, and 15.7 percent for NSDUH.
- An exception to this general pattern was observed for current cigarette use. NSDUH estimates of current cigarette use were lower than corresponding MTF or YRBS estimates for 8th and 9th graders. However, the NSDUH estimate of current cigarette use in the 12th grade (25.5 percent) was comparable to the YRBS estimate (26.7 percent) and was higher than the MTF estimate (23.2 percent).

Demographic Correlates

In general, these three surveys show similar findings on which subgroups of adolescents have relatively higher or lower substance use estimates. Examples include the following:

- In all three surveys, males in the 12th grade were more likely than females in this grade to be current users of cigarettes, marijuana, and cocaine. For example, the 12th grade prevalence of current marijuana use in NSDUH was 18.7 percent for males and 12.4 percent for females. In MTF, it was 22.9 percent for males and 16.4 percent for females. In YRBS, it was 28.0 percent for males and 21.2 percent for females.
- In two of the three surveys (NSDUH and MTF but not YRBS), males in the 12th grade were more likely than their female counterparts to be current alcohol users (NSDUH: 42.1 vs. 35.2 percent; MTF: 49.3 vs. 43.3 percent; YRBS: 54.5 vs. 53.1 percent).

- In all three surveys, whites in the 12th grade were more likely than blacks in this grade to be current cigarette users, current alcohol users, or current cocaine users. In all three surveys, whites in the 12th grade also were more likely than 12th grade Hispanics to be current cigarette users. For example, the prevalence of current cigarette use in NSDUH among 12th graders was 29.3 percent for whites, 22.0 percent for Hispanics, and 15.1 percent for blacks. In MTF, 26.9 percent of 12th grade whites, 15.4 percent of 12th grade Hispanics, and 10.4 percent of blacks in this grade were current cigarette users. Among 12th graders in YRBS, 30.5 percent of whites, 23.4 percent of Hispanics, and 14.4 percent of blacks were current cigarette users.
- Two of the three surveys (NSDUH and MTF) indicated that whites in the 12th grade were more likely than Hispanics to be current marijuana users. In NSDUH, the prevalence of current marijuana use among 12th graders was 17.1 percent for whites and 13.5 percent for Hispanics. For 12th graders in MTF, 21.3 percent of whites and 15.6 percent of Hispanics were current marijuana users. The YRBS estimates were 24.5 percent for whites and 24.9 percent for Hispanics.

Trend Measurement

NSDUH and MTF, which are conducted annually, generally provide similar findings about changes over time (i.e., trends) in the prevalence of use of cigarettes, alcohol, and marijuana among 12th graders. Examples include the following:

- Both surveys indicated that a lower percentage of 12th graders in 2008 had ever tried a cigarette (NSDUH: 45.2 percent; MTF: 44.7 percent) than in 2002 (NSDUH: 61.3 percent; MTF: 57.2 percent). The surveys also showed that the prevalence of current cigarette use among 12th graders was lower in 2008 (NSDUH: 23.4 percent; MTF: 20.4 percent) than in 2002 (NSDUH: 28.2 percent; MTF: 26.7 percent).
- The prevalence of current alcohol use among 12th graders in NSDUH decreased from 38.7 percent in 2002 to 36.6 percent in 2008. For MTF, the prevalence decreased from 48.6 percent in 2002 to 43.1 percent in 2008.
- In NSDUH, the prevalence of current marijuana use decreased from 18.2 percent in 2002 to 13.6 percent in 2008. However, the prevalence did not decrease significantly for MTF over this period (21.5 percent in 2002 and 19.4 percent in 2008).

Potential Reporting Anomalies for Inhalants and Heroin

Another characteristic common to these surveys is that all three of them identified the same counterintuitive phenomenon of *decreasing* prevalence of lifetime inhalant use from the lowest to the highest grades. Because the cohort of youths who used a substance in an earlier grade remains lifetime users in subsequent grades, the lifetime prevalence of use is expected to increase as grade increases. This expected pattern is evident in the data for most other substances, but a lower prevalence of lifetime inhalant use among 12th graders than among students in the lowest grades is found in all three of these surveys.

In NSDUH, the pattern for lifetime heroin use among students was in the expected direction, with youths in higher grades being more likely than those in lower grades to be lifetime users. Specifically, the prevalence of lifetime heroin use in NSDUH was higher among 12th graders (0.6 percent) than among 8th or 9th graders (0.1 and 0.3 percent, respectively). In contrast, the school-based surveys did not show this pattern of increasing lifetime prevalence of heroin use as the grade increased. For MTF, the estimated lifetime prevalence of heroin use was 1.5 percent among students in the 8th, 10th, and 12th grades. In YRBS, the estimate of lifetime heroin use among 11th graders was lower than the estimate for 9th graders (2.2 vs. 3.0 percent).

These apparent anomalies require further study to provide clearer explanations of the reporting biases associated with these two substances. However, these findings suggest potential underreporting of prior inhalant use by older teens, and overreporting of heroin use by younger teens in the school-based surveys. Until these issues can be analyzed more extensively, caution is warranted for the interpretation of patterns of use of inhalants and heroin among youths based on self-report data.

School Dropouts

School-based surveys such as MTF and YRBS are designed to make inferences for the population of adolescents who are in school. However, policymakers and others may use data from school-based surveys to make inferences about all adolescents in the United States. The accuracy of inferences about adolescents as a whole based on school-based survey data will depend on the contribution of school dropouts to measurement of adolescent substance use; dropouts generally have a higher prevalence of substance use than youths who are in school.

To assess the effects of dropouts on estimates of adolescent substance use, analyses were conducted on combined 2002 to 2008 NSDUH data for persons aged 12 to 20. For these analyses, dropouts were assumed to be at a particular grade level (i.e., if they had remained in school) based on their current age, the highest school grade they completed, and the age at which they left school. Rates of substance use were generally much higher for dropouts than students at each grade level and for all substances. At each grade level, estimates that included dropouts and youths who were in school also were compared with estimates from only the youths who were in school. Examples include the following:

- Because there were so few dropouts at the 8th or 9th grade levels, dropouts had a relatively small effect on the overall percentages of 8th and 9th grade level youths who are estimated to be substance users. At the 8th grade level, for example, inclusion of data from dropouts in addition to data from those who were in school had no effect on estimates to the nearest tenth of a percent for current use of cigarettes (4.9 percent with dropouts or without dropouts), past year use of marijuana (5.7 percent for both estimates), or past year use of cocaine (0.4 percent for both estimates).

- At the 12th grade level, where dropout rates are highest, inclusion of data from dropouts increased overall estimates of substance use by varying degrees. For example, the estimate of lifetime Ecstasy use that included dropouts was about 1.4 times the estimate without dropouts. Estimates that included dropouts were about 1.3 times the estimates without dropouts for past year cocaine use and current cigarette use. For current use of cigars, binge alcohol use, and current marijuana use, the rates were about 1.1 times the estimates without dropouts. The impact was smaller for current alcohol use. For heroin, the estimate of lifetime use with dropouts was about 1.7 times the estimate without dropouts.
- Inclusion of data from dropouts at the 12th grade level had a more notable impact on estimates of the numbers of substance users; information on numbers of substance users is important for estimating the size of the adolescent population needing early intervention or treatment services. Specifically, exclusion of dropouts at the 12th grade level would miss about 40 percent of the current cigarette users, about 25 percent of the current alcohol users, about 30 percent of the current binge alcohol users, about 30 percent of the current marijuana users, about 40 percent of the past year cocaine users, and about 45 percent of the lifetime Ecstasy users at this grade level.

Absentees

In addition, school-based surveys may miss students who were absent from school on the day of survey administration; if make-up administrations are scheduled, these surveys are likely to miss students who frequently are absent. Students who often are absent from school may be at increased risk of substance use. Therefore, NSDUH data on substance use among youths in school were compared according to the number of days that youths reported being absent from school in the past 30 days to determine whether the exclusion of chronic absentees affected adolescent substance use estimates.

Frequent absentees were more likely to be past year or current substance users than their peers who were not absent from school in the past 30 days. Examples include the following:

- At each grade, students who missed 6 or more days of school for any reason were more likely than those who did not miss any days of school to be current alcohol users, current binge alcohol users, or current marijuana users. For example, 26.7 percent of 12th graders who missed school on 6 or more days for any reason and 10.9 percent of those who did not miss any days of school were current marijuana users.
- Students in each grade who missed school on 6 or more days for any reason were more likely than those who did not miss any days of school to be past year cocaine users or lifetime Ecstasy users. Among 12th graders, for example, 10.7 percent of those who were absent on 6 or more days for any reason and 3.3 percent for those who did not miss any days of school were lifetime Ecstasy users.

To assess the impact of excluding absentees on school-based substance use estimates, NSDUH data were reweighted to adjust for absentees. Essentially, a student's analysis weight (and therefore contribution to an overall estimate) was decreased according to the number of days that the student reported being absent in the past 30 days. Comparisons of adjusted to

unadjusted estimates showed that the sizes of the differences were small. Examples include the following:

- Among 12th graders overall, the unadjusted and adjusted estimates were 23.3 and 22.2 percent for current cigarette use, 37.7 and 36.9 percent for current alcohol use, 25.5 and 24.7 percent for current binge alcohol use, and 14.7 and 14.0 percent for current marijuana use, respectively.
- For past year cocaine use, the estimate among 12th graders that was not adjusted for absences was 4.0 percent, and the adjusted estimate was 3.7 percent.

Time of Year of Data Collection

Another issue for school-based surveys concerns the effect of the time of year of data collection on estimates of substance use. This includes effects on trends in substance use over time and differences in point estimates for a given school year according to whether a class cohort is surveyed in the fall or in the spring.

Within a given academic year cohort of 12th graders (i.e., from September in a given calendar year through June in the next calendar year), estimates would be expected to be higher in surveys conducted in the spring than in the fall, because the students would be older in the spring. For most substances, use rates steadily rise as youths progress from ages 12 to 18. In 2008, for example, the rate of past month marijuana use in NSDUH (regardless of school enrollment status) was 7.7 percent among 15-year-olds, 10.9 percent among 16-year-olds, 14.5 percent among 17-year-olds, and 17.8 percent among 18-year-olds (OAS, 2009b). The NSDUH half-year estimates indicate that increases are evident during the school year among 12th grade cohorts. On average, among 12th graders in NSDUH for the 2002 to 2003 school year through the 2007 to 2008 school year, past year alcohol use was about 6 percent higher and past month alcohol use was about 10 percent higher during the spring than in the fall. In addition, the annual average prevalence of lifetime marijuana use among 12th graders was higher in the spring than in the fall (39.2 vs. 37.0 percent).

Factors that could affect estimates for 12th graders between the first and second halves of the school year include aging of the cohort, seasonal differences in substance use behaviors between the fall and spring semesters of the 12th grade, initiation of use after survey data collection in the fall, and students dropping out of school during or before the spring. All but the effect of dropouts could increase the estimates in the spring. As indicated by the analysis of data for dropouts and nondropouts in this study, missing the 12th graders who were in school in the fall but dropped out of school by the spring would be expected to depress the estimates in the spring.

Privacy during NSDUH Interviews

NSDUH estimates of substance use among adolescents were compared according to interviewers' ratings of the level of privacy during of the interviews. Results generally were consistent with the hypothesis that youths who have used tobacco, alcohol, or other substances will tend to underreport their use in household interview settings if their interviews are not private. Based on NSDUH interviewers' ratings of interview privacy, completely private

interviews (i.e., no one else was present during the interview or could overhear) in NSDUH typically yielded the highest prevalence estimates, and those that were least private (i.e., those for which the constant presence of one or more other persons during the interview was reported) typically yielded the lowest estimates.

Because interview privacy is associated with age and other factors (e.g., older youths are more likely to be interviewed in private in NSDUH), logistic regression models were run by age, with statistical controls for several other variables, to test whether privacy was independently associated with reported substance use. Results indicate that even with statistical controls, privacy was still associated with reporting of substance use. Examples include the following:

- Interview privacy was significantly associated with lifetime cigarette use in models for youths aged 12 or 13 and those aged 14 or 15 but not for youths aged 16 or 17. Youths in these two youngest age groups who had someone else constantly present during their interviews were less likely to report lifetime cigarette use than their counterparts with completely private interviews.
- Youths aged 12 or 13, those aged 14 or 15, and those aged 16 or 17 who had the least private interviews were less likely than their counterparts with private interviews to report lifetime alcohol use.
- Youths aged 14 or 15 and those aged 16 or 17 who had the least private interviews were less likely than those with completely private interviews to be identified as lifetime marijuana users.

However, interviewers rated more than three fourths of NSDUH interviews with adolescents as being completely private. Consequently, there was little difference between selected substance use estimates based on completely private interviews and corresponding overall estimates for adolescents or subgroups of adolescents.

Conclusions: Impact of Survey Designs on Estimates

It is possible that conducting an interview in an adolescent's home environment has an inhibitory effect on adolescent substance users' willingness to report use, even if parents or other household members are not in the same room as the adolescent and are not able to see how adolescents are answering the substance use questions. In contrast, youths could perceive that an interview in a classroom at school is more private than an interview at home. In addition, the presence of peers in group classroom settings could lead to some overreporting by youths in school-based surveys.

Factors besides interview privacy also could contribute to lower estimates of adolescent substance use in NSDUH than in MTF or YRBS, and lower estimates in MTF than in YRBS. These other factors include the focus of the survey (e.g., primary focus on substance use or on broader health topics), how prominently substance use is mentioned when a survey is presented to parents and adolescents, procedures for obtaining parental permission for their children to be interviewed, assurances of anonymity or confidentiality, the placement and context of substance use questions in the interview, the survey mode (e.g., computer-assisted interviewing with skip patterns or paper-and-pencil questionnaires), and the question structure and wording.

For example, NSDUH asks filter questions about lifetime use before asking about the most recent use of a substance or the frequency of use. Research has shown that filter questions can depress the reporting of certain behaviors (Hawthorne, 2003; Knäuper, 1998; Von Korff et al., 2008). Some NSDUH respondents also may realize early during their interview that if they answer "no" to the initial filter questions about lifetime substance use, they can avoid having to answer subsequent questions and therefore will finish the interview in less time. The YRBS questionnaire does not have these kinds of skip patterns, and the MTF questionnaire uses skip patterns minimally. In addition, students taking a survey in a classroom administration setting may not be motivated to finish sooner if they otherwise have to stay until the end of the class period.

Different designs also are likely to cause differing levels and patterns of coverage and nonresponse bias, which may or may not be alleviated by weighting adjustments or imputation procedures. Several of these design features vary across NSDUH, MTF, and YRBS, potentially causing substance use prevalence estimates to differ. Although it is necessary to continue efforts to understand the impact of these factors, it is also important to recognize the critical contributions each of the surveys makes in research and policy development. The differences in the survey designs and procedures can be viewed as a strength, because no single survey can adequately cover the full range of issues associated with substance use among adolescents. Thus, when all three surveys show the same general conclusions regarding trends or patterns in adolescent substance use despite their different designs, users of these survey data can be confident about these conclusions. Each survey also contributes to a broader understanding of adolescent substance use and relationships of substance use to other issues of interest.

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1. Introduction

This report describes the results of an effort to gain a better understanding of substance use data provided by adolescents on multiple Federal surveys, including the 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. The goals of this study are (1) to help users understand the reasons for differences in estimates across the different surveys; (2) to facilitate accurate interpretation of results from these surveys; and ultimately (3) to improve the understanding of the true nature and extent of youth substance use in the United States. The report compares NSDUH estimates for adolescents with estimates from two other large-scale surveys: Monitoring the Future (MTF) and the Youth Risk Behavior Survey (YRBS). Where these surveys yield different estimates of substance use, the report examines possible reasons for these differences. Estimates for NSDUH and MTF are based on combined data from the respective 2002 through 2008 surveys. YRBS estimates are based on combined data from the 2003, 2005, and 2007 surveys. Thus, estimates in this report represent annual averages.

1.1. Background

Multiple federally funded surveys—notably NSDUH, MTF, and YRBS—collect data on tobacco, alcohol, and illicit drug use among adolescents. NSDUH is an in-person survey conducted principally in households. The other two surveys are in-school surveys. Seemingly similar measures in these surveys may yield different estimates of substance use among adolescents. In particular, school-based surveys such as MTF and YRBS have typically yielded higher estimates of substance use compared with surveys conducted in household settings (Gfroerer, Wright, & Kopstein, 1997; Kann et al., 2002; Office of Applied Studies [OAS], 2009a). Brener et al. (2006) randomly assigned high school students in grades 9 and 11 to school-based and household survey settings and found that the odds of reporting most substance use behaviors (adjusted for gender, race/ethnicity, and age) were significantly greater for surveys administered in the school settings than for those conducted in home settings; however, significant differences by survey setting were not observed for lifetime or current (i.e., past 30 day) use of cigarettes, current use of cigars, or lifetime use of "Ecstasy" (MDMA). In contrast, Griesler, Kandel, Schaffran, Hu, and Davies (2008) examined data on inconsistent reporting of cigarette use among students in grades 7 through 12 who were initially surveyed in schools between September 1994 and April 1995 and then were followed up in households in Wave I (April to December 1995) of the National Longitudinal Survey of Adolescent Health ("Add Health"). The authors reported that among youths in the school-based interviews who reported smoking cigarettes in the past 12 months, 8.6 percent reported having never smoked cigarettes on follow-up in the household interviews. In particular, younger adolescents were more likely than older adolescents and those who were black or Hispanic were more likely than whites to give these inconsistent reports in the household setting.

It has been suggested that adolescents—particularly younger adolescents and members of racial or ethnic minorities—may underreport sensitive behaviors such as substance use in household surveys out of concerns about privacy and the confidentiality of their answers, especially if a parent may be present nearby (Brener et al., 2006; Fendrich & Johnson, 2001; Gfroerer et al., 1997; Griesler et al., 2008; Johnson & Bowman, 2003; Kann et al., 2002).

However, Fendrich and Johnson (2001) suggested that privacy issues did not completely explain the differences in adolescent substance use estimates between the school-based and household surveys that they compared. Other factors that can contribute to differences in estimates between surveys include differences in procedures for obtaining parental permission and assent from adolescents, question wording and the mode of administration, and procedures for handling missing or inconsistent data.

In addition, the phenomenon that Griesler et al. (2008) referred to as "inconsistent reporting" has been referred to elsewhere as "recanting" in longitudinal studies (Fendrich, 2005; Fendrich & Rosenbaum, 2003). This type of reporting occurs when adolescent respondents report use of a particular substance in an earlier survey wave and then deny having ever used that substance in one or more subsequent waves. This phenomenon is not unique to whether respondents were surveyed in schools in an earlier wave and administered follow-up surveys in household settings in subsequent waves.

With adolescents, two factors may contribute to differences in estimates of substance use within a longitudinal survey at different points in time or between two separate surveys that cover the same period. First, youths may perceive substance use in general or use of a specific substance to be socially undesirable behavior. If youths in "Survey A" who have used a given substance are less comfortable than those in "Survey B" in reporting their use, then Survey A may yield a lower estimate. Underreporting of use also could account for situations in which youths reported use in an earlier interview but subsequently deny use in a later interview because of their recognition that the substance use was socially undesirable behavior.

Second, differences in substance use estimates between longitudinal surveys could occur because of overreporting of use. That is, some youths may report use, or more recent use, even though they never used a substance or did not use it recently (e.g., in the past year or past month). Youths who have not used a substance may report use if they misunderstand the question or if they are motivated to report use because their peers view the behavior as "cool." As they mature, youths may provide more accurate answers (i.e., no use) in a subsequent interview (Fendrich & Rosenbaum, 2003).

As the lead Federal entity with the responsibility for collecting substance use data, the Center for Behavioral Health Statistics and Quality (CBHSQ), formerly OAS, within the Substance Abuse and Mental Health Services Administration (SAMHSA) also has the responsibility to provide appropriate context and information to users of NSDUH and other youth substance use data. Specifically, CBHSQ can provide information on possible reasons for any differences in estimates between the surveys, how to interpret trends and patterns in substance use, and how to best analyze these data. Policymakers need to understand the implications of these differences and potential sources of error or bias when interpreting findings from these surveys. Understanding sources of measurement error or bias also is critical for identifying ways to reduce these sources of error.

1.2. General Information about NSDUH

NSDUH is the primary source of statistical information on the use of illegal drugs by the U.S. population. Conducted by the Federal Government since 1971, the survey collects data by administering questionnaires to a representative sample of the population through face-to-face interviews at the respondent's place of residence. The survey is sponsored by SAMHSA,

U.S. Department of Health and Human Services, and is planned and managed by CBHSQ. Data collection and analysis are conducted under contract with RTI International, Research Triangle Park, North Carolina.¹

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. The 2002 to 2008 NSDUHs used a State-based design with an independent, multistage area probability sample within each State and the District of Columbia. Dwelling units were selected within clusters of census blocks called area segments (for 2002 to 2004) or within census tracts (for 2005 to 2008), and zero, one, or two persons aged 12 or older were selected for the interview within dwelling units. The design oversampled adolescents aged 12 to 17 and young adults aged 18 to 25.

Since 1999, the NSDUH interview has been carried out in English or Spanish using computer-assisted interviewing (CAI). Most of the questions are administered with audio computer-assisted self-interviewing (ACASI). Less sensitive items are administered by interviewers using computer-assisted personal interviewing (CAPI). Since 2002, respondents have been given \$30 for completing the interview.

The 2002 to 2008 NSDUHs contained 220,955 completed interviews from persons aged 12 to 20, including 158,995 interviews from youths aged 12 to 17 and 61,960 interviews from young adults aged 18 to 20.² In addition, the subset of respondents aged 12 to 20 in the 2002 to 2008 NSDUHs who were interviewed in January through June and reported being enrolled in the 8th through 12th grades was relevant for comparison of NSDUH estimates with corresponding estimates from MTF or YRBS, which are administered in schools in the spring (see Section 1.3).

Appendix A includes additional information about the NSDUH methodology. The 2008 report on national findings (OAS, 2009a) also provides further details about NSDUH, including the start of a new baseline in 2002. Appendix B discusses technical details for this study, including statistical methods and measurements. Appendix C contains tables of estimates and standard errors.

1.3. General Information about Other Surveys of Adolescents

MTF

MTF is an ongoing study of substance use trends and related attitudes among America's secondary school students, college students, and adults through the age of 50. The study is conducted annually by the Institute for Social Research at the University of Michigan through grants awarded by the National Institute on Drug Abuse (NIDA). MTF and NSDUH are the Federal Government's largest and primary tools for tracking youth substance use. MTF is composed of three substudies: (1) an annual survey of high school seniors that was initiated in

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

² During regular data collection and processing checks for the 2011 NSDUH, data errors were identified. For the 2002 to 2008 NSDUH data, these errors affected the data for Pennsylvania (2006 to 2008) and Maryland (2008). This report used the dataset prior to the removal of these erroneous cases. However, these errors had minimal impact on national estimates. As a result, these errors also are likely to have a minimal impact on NSDUH estimates in this report, especially for national estimates that used combined data from 2002 to 2008.

1975; (2) ongoing panel studies of representative samples from each graduating class that have been conducted by mail since 1976; and (3) annual surveys of 8th and 10th graders that were initiated in 1991. In the spring, students complete a self-administered, machine-readable paper-and-pencil questionnaire during a regular class period. The survey annually samples an average of about 400 public and private schools and about 50,000 students.

The 2002 to 2008 MTF public use data for 8th, 10th, and 12th graders include a final sample size of 333,837. Because the surveys of 8th, 10th, and 12th graders are school based, MTF does not survey dropouts, a group that NSDUH has shown to have higher rates of illicit drug use (Gfroerer et al., 1997). Appendix A includes information about methodological characteristics of MTF. For additional details about MTF, see the MTF website at <http://www.monitoringthefuture.org/>.

YRBS

YRBS is a component of CDC's Youth Risk Behavior Surveillance System (YRBSS), which measures the prevalence of six priority health risk behavior categories: (1) behaviors that contribute to unintentional injuries and violence; (2) tobacco use; (3) alcohol and other drug use; (4) sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including human immunodeficiency virus infection; (5) unhealthy dietary behaviors; and (6) physical inactivity, plus asthma and obesity. YRBSS includes national, State, territorial, and local school-based surveys of high school students conducted every 2 years. The national school-based survey uses a three-stage cluster sample design to produce a nationally representative sample of students in grades 9 through 12 who attend public and private schools. The State and local surveys use a two-stage cluster sample design to produce representative samples of public school students in grades 9 through 12 in their jurisdictions. YRBS is conducted during the spring, with students completing a self-administered, machine-readable paper-and-pencil questionnaire during a regular class period.

The 2003, 2005, and 2007 YRBS public use data included a final sample of 43,172. Because YRBS is a school-based survey, it does not survey dropouts. Appendix A includes information about methodological characteristics of YRBS. For further details about YRBS, see the CDC website at <http://www.cdc.gov/HealthyYouth/yrbs/>.

1.4. Measures of Substance Use

NSDUH, MTF, and YRBS include questions to measure adolescents' use of cigarettes and other tobacco products, alcohol, and illicit drugs, including marijuana, cocaine, heroin, Ecstasy (MDMA), and inhalants. These surveys measure use in one or more of the following periods: (1) at any point in a person's lifetime, (2) in the 12-month period prior to taking the survey (i.e., past year use), or (3) in the 30-day period prior to taking the survey (i.e., past month use). By definition, respondents who report use of a substance in the past month also are classified as past year and lifetime users. Respondents who report use in the past year but not the past month also are classified as lifetime users.

Table 1.1 compares selected substances and periods of use across these surveys. Although all three surveys may report estimates on a similar measure (e.g., past month cigarette use), the surveys do not measure these behaviors identically. In particular, NSDUH respondents first are asked whether they ever used specific substances in their lifetime. Those who report

lifetime use of a given substance were asked more detailed questions about use of that substance. In NSDUH, past year and past month users are identified through questions on when they last used a substance. Because the computer-assisted logic in NSDUH skips respondents out of additional questions about a given substance if they do not report lifetime use, NSDUH respondents cannot report use of a substance in the past year or past month without also reporting lifetime use. In contrast, the paper-and-pencil administration for MTF and YRBS can allow respondents to leave a question blank for lifetime use but to report more recent use. In addition, MTF and YRBS estimate use of most substances from questions about the number of "occasions" (MTF) or "times" (YRBS) that respondents used a substance in the period of interest; respondents who report use on one or more occasions/times in that period are defined as users.

For NSDUH substance use measures presented in this report, statistical imputation was used to replace missing or ambiguous values (e.g., use at some point in the lifetime but most recent period of use unknown) with appropriate response codes (see Appendix A). Consequently, no NSDUH respondents were excluded from analyses in this report because of missing data for substance use. In contrast, MTF and YRBS could contain missing data for substance use measures of interest. Respondents from these surveys who had missing data for a given substance use measure were excluded from the analysis for that measure.

1.5. Measures of Demographic Characteristics

This section describes key measures of demographic and geographic characteristics that are presented in this report. Subsequent chapters also describe measures of additional characteristics that are relevant to the specific analyses presented in these chapters.

For analyses comparing NSDUH estimates for persons in school with corresponding estimates from MTF or YRBS, NSDUH respondents' current (or upcoming) grade in school was defined according to (1) their report that they were currently enrolled in school (or were on break but intended to return to school when their break was over) and (2) their current grade in school (or the grade they would be in when they returned following their break). NSDUH respondents who had missing data for their school enrollment or current grade were excluded from these analyses. For MTF and YRBS, current grades were based on the sample results and therefore do not contain missing data.

Analyses comparing NSDUH and YRBS estimates and those conducted only with NSDUH data are presented for racial/ethnic groups based on current guidelines for collecting and reporting race and ethnicity data (Office of Management and Budget [OMB], 1997). The "two or more races" category includes persons who reported more than one category among the basic groups listed in the survey question (white, black or African American, American Indian or Alaska Native, Native Hawaiian, other Pacific Islander, Asian, other). Except for the "Hispanic or Latino" group, the racial/ethnic groups discussed in this report for NSDUH and YRBS include only non-Hispanics. The category "Hispanic or Latino" includes Hispanics of any race.

For analyses comparing NSDUH and MTF estimates by race/ethnicity, data are presented for the following groups: white, black, and Hispanic. Because of changes to the MTF questionnaire in 2005, MTF estimates for Hispanics are based on data only from the 2005 through 2008 surveys. MTF estimates for persons classified as white or black in 2002 through 2004 may include persons in these groups who were of Hispanic origin. NSDUH estimates for

persons who were white or black exclude persons who were Hispanic or who reported two or more races. However, overall NSDUH estimates for youths aged 12 to 20 or within a given grade include members of other racial/ethnic groups (see previous paragraph) in addition to persons who were non-Hispanic white, non-Hispanic black, or Hispanic.

As for the substance use measures described previously, statistical imputation procedures were used in NSDUH to replace missing data for the demographic characteristics in this report with nonmissing values (see Appendix A). For MTF and YRBS, respondents with missing data for a demographic characteristic of interest were excluded from that particular analysis.

Geographic comparisons using NSDUH data are based on county type, a variable that reflects different levels of urbanicity and metropolitan area inclusion of counties, based on metropolitan area definitions issued by the OMB in June 2003 (OMB, 2003). For this purpose, counties are grouped based on the 2003 rural-urban continuum codes. These codes were originally developed by the U.S. Department of Agriculture (Butler & Beale, 1994). Each county is either inside or outside a metropolitan statistical area (MSA), as defined by the OMB.

Large metropolitan areas have a population of 1 million or more. Small metropolitan areas have a population of fewer than 1 million. Small metropolitan areas are further classified based on whether they have a population of 250,000 or greater. Non-metropolitan areas are outside of MSAs. Counties in non-metropolitan areas are further classified based on the number of people in the county who live in an urbanized area, as defined by the Census Bureau at the subcounty level. "Urbanized" counties have a population of 20,000 or greater in urbanized areas, "less urbanized" counties have a population of at least 2,500 but less than 20,000 in urbanized areas, and "completely rural" counties have populations of less than 2,500 in urbanized areas.

1.6. Organization of This Report

This report has separate chapters that discuss findings on use of tobacco, alcohol, and illicit drugs among adolescents. Chapter 2 compares estimates of substance use from NSDUH with estimates from MTF and YRBS. Chapters 3 and 4 focus on estimates from NSDUH. Chapter 3 uses NSDUH data to examine the potential effects of data from school dropouts and youths who were absent from school on substance use estimates. Chapter 4 examines relationships between the privacy of NSDUH interviews and substance use estimates. A final chapter summarizes the results and discusses the implications of these findings for estimating substance use among adolescents in large federally funded surveys. The list of references follows this chapter. Technical appendices describe the surveys (Appendix A), provide technical details on the statistical methods and measurement (Appendix B), and present selected tabulations of estimates (Appendix C).

Tables, text, and figures present prevalence measures for persons aged 12 to 20 in terms of the percentage of the population or of selected subgroups. Substance use tables show prevalence estimates for use in the lifetime (i.e., ever used), past year, and past month periods. Use in the past month period also is referred to in this report as "current use."

Statistical tests have been conducted for all statements appearing in the text of the report that compare estimates between surveys (e.g., NSDUH vs. MTF) or between subgroups within a given survey (e.g., by grade within NSDUH). Unless explicitly stated that a difference is not statistically significant, all statements that describe differences are significant at the .05 level.

Differences are described using terms such as "higher," "lower," "more likely," and "less likely." Statements that use terms such as "similar," "no difference," or "same" to describe the relationship between estimates typically denote that a difference is not statistically significant. In addition, a set of estimates for a given survey (or surveys) or for population subgroups may be presented without a statement of comparison; in these instances, a statistically significant difference between these estimates is not implied, and testing may not have been conducted.

An exception to these principles concerns comparison of estimates in Chapter 3 that are not mutually exclusive. When there is considerable overlap between data for two estimates being compared, differences between estimates that appear to be negligible may be statistically significant. This issue is noted, where applicable, in that chapter.

All estimates presented in the report have met the criteria for statistical reliability (see Section B.2.3 in Appendix B). Estimates that do not meet these criteria are suppressed and do not appear in tables, figures, or text. Subgroups with suppressed estimates are not included in statistical tests of comparisons. For example, a statement that "whites had the highest prevalence among 12th graders in NSDUH" means that the NSDUH estimate among whites in grade 12 was higher than the corresponding estimates among all nonsuppressed racial/ethnic subgroups in that grade. If a NSDUH estimate for 12th graders was suppressed for a particular racial/ethnic group, however, the estimate for whites at that grade was not necessarily higher than that for the suppressed estimate.

Table 1.1 Substance Use Measures and Periods of Use in NSDUH, MTF, and YRBS

Substance/Period	NSDUH	MTF ^{1,2}	YRBS ¹
Cigarettes			
Lifetime	Yes	Yes	Yes
Past Year	Yes	No	No
Past Month	Yes	Yes	Yes
Smokeless Tobacco			
Lifetime	Yes	Yes	No
Past Year	Yes	No	No
Past Month	Yes	Yes	Yes
Cigars			
Lifetime	Yes	No	No
Past Year	Yes	No	No
Past Month	Yes	No	Yes
Alcohol			
Lifetime	Yes	Yes	Yes
Past Year	Yes	Yes	No
Past Month			
Any Alcohol Use	Yes	Yes	Yes
Binge Alcohol Use ³	Yes	No ⁴	Yes
Marijuana			
Lifetime	Yes	Yes	Yes
Past Year	Yes	Yes	No
Past Month	Yes	Yes	Yes
Cocaine			
Lifetime	Yes	Yes	Yes
Past Year	Yes	Yes	No
Past Month	Yes	Yes	Yes
Heroin			
Lifetime	Yes	Yes	Yes
Past Year	Yes	Yes	No
Past Month	Yes	Yes	No
Ecstasy			
Lifetime	Yes	Yes	Yes
Past Year	Yes	Yes	No
Past Month	Yes	Yes	No
Inhalants			
Lifetime	Yes	Yes	Yes
Past Year	Yes	Yes	No
Past Month	Yes	Yes	No

NSDUH = National Survey of Drug Use and Health; MTF = Monitoring the Future; YRBS = Youth Risk Behavior Survey.

¹ Except for lifetime cigarette use, source questions in MTF and YRBS ask about the number of occasions (MTF) or number of times (YRBS) that a respondent used the substance in the relevant period. The lifetime cigarette use question in YRBS is in a yes/no format. The lifetime cigarette use question in MTF includes four separate categories for past or current use in addition to a category for respondents to report that they never used.

² MTF respondents receive one of multiple possible questionnaire forms. All respondents receive questions about cigarettes, alcohol, marijuana, cocaine, and heroin. All respondents in grades 8 and 10 also receive questions about inhalants. However, some respondents in the 12th grade do not receive questions about inhalants. Some respondents in each grade do not receive questions about Ecstasy or smokeless tobacco.

³ Defined as having five or more drinks "on the same occasion" (NSDUH) or "in a row" (YRBS) on at least 1 day in the past 30 days. NSDUH and YRBS, ask about the number of days that respondents had five or more drinks.

⁴ MTF asks about the number of times respondents had five or more drinks in a row in the past 2 weeks rather than in the past 30 days.

Sources: SAMHSA, Center for Behavioral Health Statistics and Quality, National Surveys on Drug Use and Health, 2002 to 2008; The Monitoring the Future Study, University of Michigan, 2002 to 2008; Centers for Disease Control and Prevention, Youth Risk Behavior Survey, 2003, 2005, and 2007.

2. Adolescent Substance Use Estimates from NSDUH and Other Surveys

This chapter discusses data on trends in substance use and annual average substance use prevalence estimates among youths in the National Survey on Drug Use and Health (NSDUH) and other surveys. Tables of estimates described in this chapter are included in Section C.2 in Appendix C. Section C.2 also includes links to tables of standard errors of percentages and sample sizes for selected measures.

Trend data are presented for 12th graders in NSDUH and Monitoring the Future (MTF). Trends are compared for NSDUH and MTF because data are available from these two surveys for all years from 2002 to 2008. Prior comparison of trend data for NSDUH and MTF suggests that these surveys show comparable trends in the prevalence of substance use among youths (OAS, 2009a).

Annual average estimates also are presented from the following: (1) 2002 to 2008 NSDUHs; (2) MTF data from 2002 to 2008; and (3) Youth Risk Behavior Survey (YRBS) data from 2003, 2005, and 2007. Two types of annual average comparisons are presented in this chapter: (1) for subgroups *within* surveys and (2) for corresponding estimates and subgroups *between* surveys. Estimates are compared for use of tobacco, alcohol, marijuana, and other substances, when applicable. Comparisons for subgroups within surveys indicate whether these surveys show the same patterns of differences in prevalence estimates across surveys, such as whether certain estimates in a given grade show the same pattern of differences between males and females in both NSDUH and MTF. Comparisons between surveys indicate whether two surveys yield statistically significant differences for a given substance use measure and subgroup, such as whether school-based surveys such as MTF and YRBS yield estimates that are significantly greater from those in household surveys such as NSDUH.

For comparisons between NSDUH and these two school-based surveys, NSDUH data were subset to persons aged 12 to 20 who were enrolled in the grades corresponding to the MTF or YRBS samples and who interviewed in January through June. Subsetting NSDUH data to persons who were enrolled in school controlled for any differences in estimates between NSDUH and either MTF or YRBS because the target population for the latter two surveys consists of adolescents who are in school. NSDUH respondents who had missing data on their current grade were excluded from these analyses. MTF or YRBS respondents who had missing data for gender or race/ethnicity were included in overall estimates for a given grade but were excluded from estimates by gender or race/ethnicity.

In addition, a notable feature of MTF and YRBS is that data are anonymous for 10th graders in both surveys but only for 12th graders in YRBS; MTF collects identifying information for 12th graders but keeps this information separate from their survey responses. Consequently, the opportunity exists to examine whether these two surveys yield comparable estimates at the 10th grade, when both are anonymous, and whether estimates differ at the 12th grade, when YRBS data are anonymous and MTF data are confidential but not anonymous. For these comparisons, estimates from YRBS and MTF at the 10th and 12th grades were compared

directly and were assumed to cover the same populations of school-aged youths. Because comparisons of estimates within MTF and YRBS by gender and race/ethnicity are discussed relative to differences by gender and race/ethnicity within NSDUH, these comparisons are not repeated in sections comparing MTF and YRBS data.

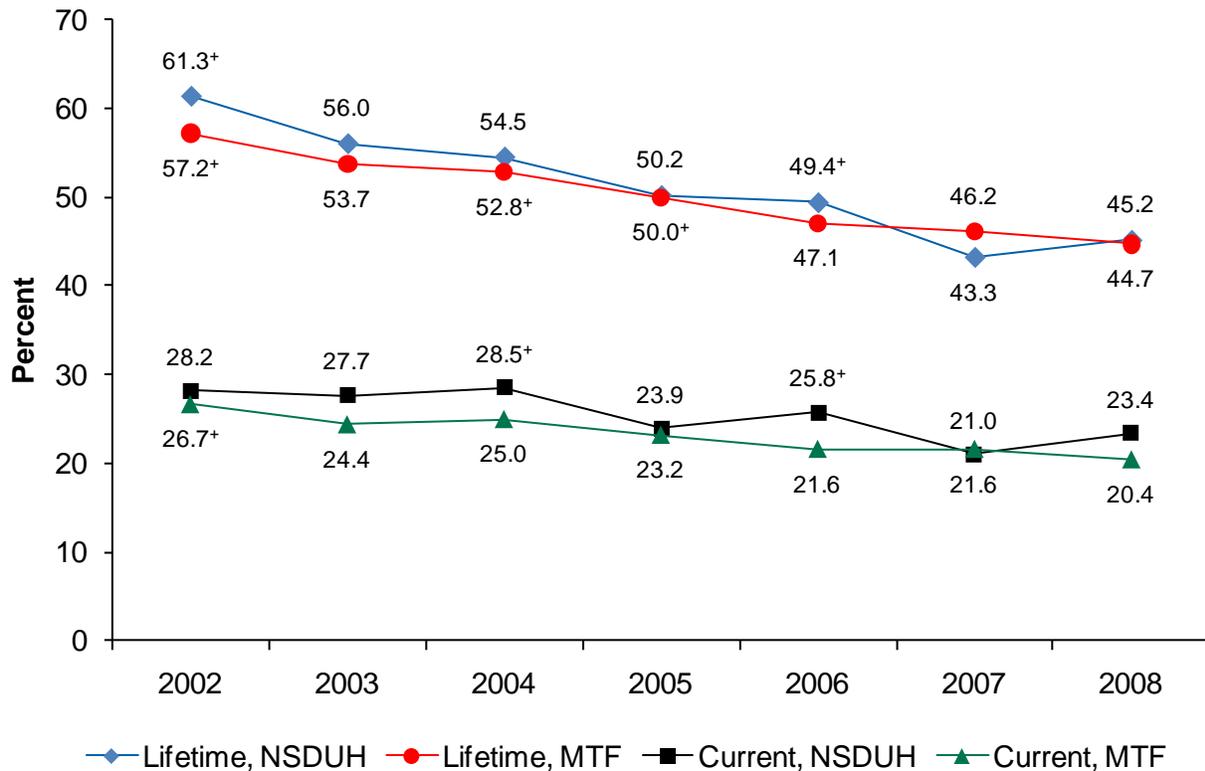
2.1. Tobacco

Comparison of tobacco use estimates in this section focuses on current (i.e., past month) use of cigarettes or other tobacco products, except where noted. As [Table 1.1](#) in Chapter 1 shows, all three surveys estimate the prevalence of current cigarette use among adolescents. Estimates also are discussed for current use of smokeless tobacco (i.e., chewing tobacco or snuff) and cigars in NSDUH and YRBS.

2.1.1 Comparison of Trends

- The prevalence of lifetime cigarette use among 12th graders decreased from 2002 to 2008 for both NSDUH and MTF ([Table C.2.1](#) and [Figure 2.1](#)). NSDUH estimated that the lifetime prevalence decreased from 61.3 percent of 12th graders in 2002 to 45.2 percent in 2008. MTF estimated that the prevalence decreased from 57.2 percent of 12th graders in 2002 to 44.7 percent in 2008. Thus, both surveys indicated that less than half of adolescent students in 2008 had tried a cigarette by the time they reached their senior year in high school.
- NSDUH and MTF also showed decreases in lifetime cigarette use among 12th graders between 2002 and 2003 ([Table C.2.1](#) and [Figure 2.1](#)). For NSDUH, the prevalence decreased from 61.3 percent in 2002 to 56.0 percent in 2003. For MTF, the prevalence decreased from 57.2 percent in 2002 to 53.7 percent in 2003. In addition, the lifetime prevalence decreased in each consecutive year from 2004 (52.8 percent) to 2006 (47.1 percent) for MTF but not for NSDUH. However, NSDUH estimated a decrease in lifetime prevalence from 2006 (49.4 percent) to 2007 (43.3 percent).
- NSDUH and MTF both showed decreases in the prevalence of current cigarette use among 12th graders between 2002 and 2008 ([Table C.2.3](#) and [Figure 2.1](#)). For NSDUH, the prevalence among 12th graders interviewed in January to June decreased from 28.2 percent in 2002 to 23.4 percent in 2008. For MTF, the corresponding prevalence decreased from 26.7 percent in 2002 to 20.4 percent in 2008.
- NSDUH and MTF trend data for 12th graders showed some variation in changes in the prevalence of current cigarette use between consecutive survey years ([Table C.2.3](#) and [Figure 2.1](#)). For NSDUH, the prevalence decreased from 28.5 percent in 2004 to 23.9 percent in 2005 and also showed a decrease from 25.8 percent in 2006 to 21.0 percent in 2007. For MTF, the prevalence between consecutive survey years showed a significant change only between 2002 (26.7 percent) and 2003 (24.4 percent).

Figure 2.1 Trends in Lifetime and Current Cigarette Use among 12th Graders in NSDUH and MTF: Percentages, 2002 to 2008



NSDUH = National Survey of Drug Use and Health; MTF = Monitoring the Future.

NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20 to be more comparable with MTF data.

⁺ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Sources: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

The Monitoring the Future Study, University of Michigan, 2002 to 2008.

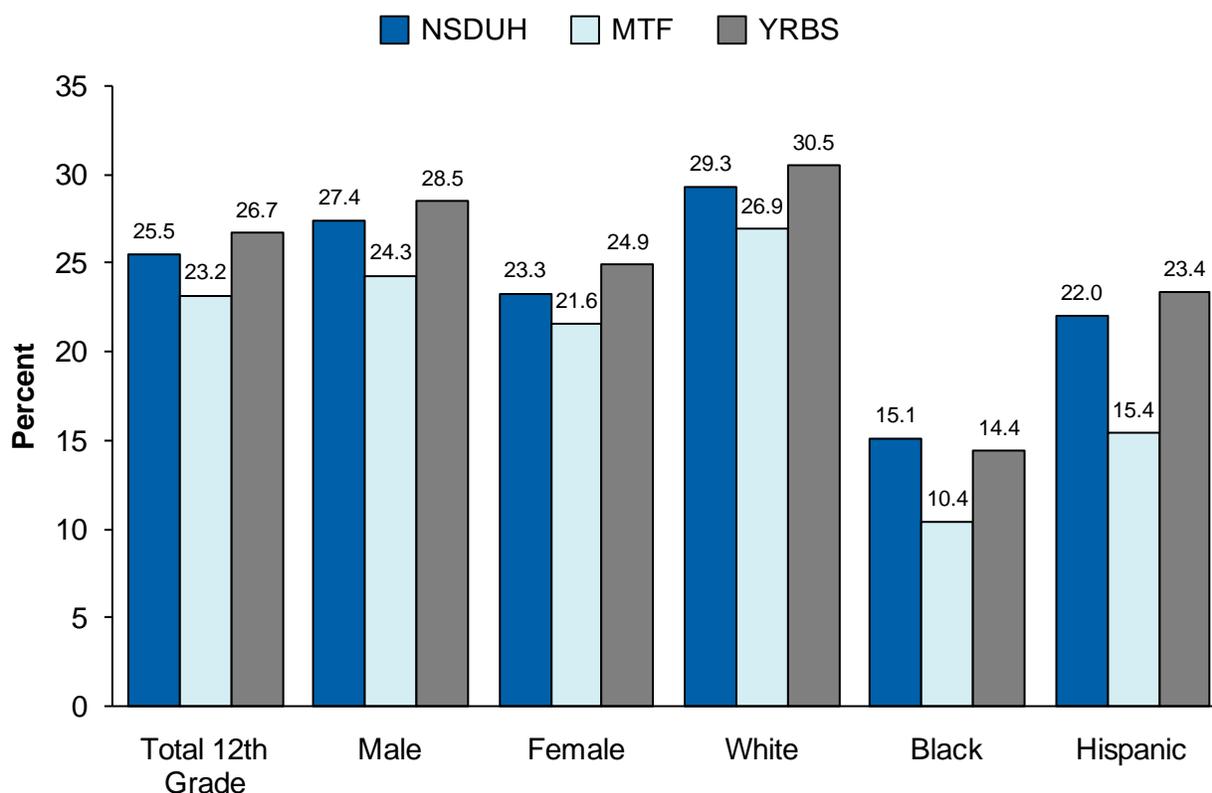
2.1.2 Comparison of Annual Average Estimates

NSDUH and MTF

- For both NSDUH and MTF, the prevalence of current cigarette use among students in the 8th, 10th, and 12th grades increased as grade increased (Table C.2.5). In NSDUH, 5.5 percent of 8th graders were current cigarette users, compared with 15.4 percent of 10th graders and 25.5 percent of 12th graders. In MTF, 8.8 percent of 8th graders were current cigarette users, compared with 15.1 percent of 10th graders and 23.2 percent of 12th graders.

- Both NSDUH and MTF showed comparable rates of current cigarette use between males and females in the 8th and 10th grades (Table C.2.5). In NSDUH, 5.0 percent of males and 6.0 percent of females in the 8th grade were current cigarette users; 15.1 percent of males and 15.8 percent of females in the 10th grade were current cigarette users. In MTF, 8.5 percent of males and 9.0 percent of females in the 8th grade were current cigarette users; 14.8 percent of males and 15.2 percent of females in the 10th grade were current cigarette users.
- In contrast, 12th grade males in both surveys were more likely than their female counterparts to be current cigarette users (NSDUH: 27.4 vs. 23.3 percent; MTF: 24.3 vs. 21.6 percent) (Table C.2.5 and Figure 2.2).

Figure 2.2 Current Cigarette Use among 12th Graders in NSDUH, MTF, and YRBS, by Selected Demographic Characteristics: Annual Average Percentages, 2002 to 2008



NSDUH = National Survey of Drug Use and Health; MTF = Monitoring the Future; YRBS = Youth Risk Behavior Survey.

NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20 to be more comparable with MTF and YRBS data.

Sources: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

The Monitoring the Future Study, University of Michigan, 2002 to 2008.

Centers for Disease Control and Prevention, Youth Risk Behavior Survey, 2003, 2005, and 2007.

- Among youths in the 12th grade, whites in both surveys had the highest prevalence of current cigarette use (29.3 percent in NSDUH and 26.9 percent in MTF), followed by Hispanics (22.0 percent in NSDUH and 15.4 percent in MTF) (Table C.2.5 and Figure 2.2). Blacks had the lowest prevalence (15.1 percent in NSDUH and 10.4 percent in MTF).
- MTF data for 8th graders yielded a higher estimate of current cigarette use (8.8 percent) than NSDUH data did (5.5 percent) (Table C.2.5). The two surveys had comparable estimates of current cigarette use at the 10th grade (NSDUH: 15.4 percent; MTF: 15.1 percent). By the 12th grade, however, the estimate of current cigarette use in NSDUH (25.5 percent) was higher than the estimate in MTF (23.2 percent). In both surveys, similar patterns were observed for males and females in the 8th and 10th grades and for males in the 12th grade. However, estimates of current cigarette use did not differ significantly between NSDUH and MTF for females in the 12th grade (23.3 vs. 21.6 percent).
- These patterns for current cigarette use between NSDUH and MTF in the 8th, 10th, and 12th grades also were observed by race/ethnicity (Table C.2.5). In particular, MTF yielded an estimate of current cigarette use of 6.1 percent among blacks in the 8th grade compared with a corresponding NSDUH estimate of 2.9 percent. By the 12th grade, however, NSDUH estimated that 15.1 percent of blacks were current cigarette users compared with 10.4 percent for MTF (Figure 2.2).

NSDUH and YRBS

- For both NSDUH and YRBS, the prevalence of current cigarette use among students in the 9th through 12th grades increased as grade increased (Table C.2.7). NSDUH estimated that 10.8 percent of 9th graders, 15.4 percent of 10th graders, 20.1 percent of 11th graders, and 25.5 percent of 12th graders were current cigarette users. YRBS estimated that 17.1 percent of 9th graders, 20.9 percent of 10th graders, 23.2 percent of 11th graders, and 26.7 percent of 12th graders were current cigarette users.
- In NSDUH, males in the 12th grade were more likely than their female counterparts to be current cigarette users (27.4 vs. 23.3 percent) (Table C.2.7 and Figure 2.2). In YRBS, males in the 12th grade also were more likely than females at this grade to be current cigarette users (28.5 vs. 24.9 percent).
- Among youths in the 12th grade, non-Hispanic whites in both surveys were more likely than non-Hispanic blacks to be current cigarette users (NSDUH: 29.3 vs. 15.1 percent; YRBS: 30.5 vs. 14.4 percent) (Table C.2.7 and Figure 2.2). Estimates of current cigarette use among Hispanic 12th graders in both surveys (NSDUH: 22.0 percent; YRBS: 23.4 percent) also were lower than those for whites.

- YRBS estimates for current cigarette use were higher in the 9th, 10th, and 11th grades (17.1, 20.9, and 23.2 percent) compared with NSDUH estimates (10.8, 15.4, and 20.1 percent) (Table C.2.7). However, overall estimates of current cigarette use in the 12th grade were not significantly different between NSDUH (25.5 percent) and YRBS (26.7 percent).
- NSDUH estimated that 2.2 percent of youths in the 9th grade, 3.3 percent of those in the 10th grade, 4.1 percent of those in the 11th grade, and 5.3 percent of those in the 12th grade were current users of smokeless tobacco; estimates between consecutive grades were significantly different (Table C.2.8). In YRBS, estimates of current smokeless tobacco use ranged from 6.8 percent in the 9th grade to 8.1 percent in the 12th grade, but estimates between consecutive grades did not differ significantly.
- In both NSDUH and YRBS, males were more likely than females in all grades to be current smokeless tobacco users (Table C.2.8). In NSDUH, 4.0 percent of males in the 9th grade and 0.4 percent of females in this grade were current smokeless tobacco users. By the 12th grade, 9.6 percent of males and 0.6 percent of females were current smokeless tobacco users. In YRBS, 10.4 percent of 9th grade males and 3.1 percent of females in this grade were current smokeless tobacco users. Among 12th graders in YRBS, 14.6 percent of males and 1.6 percent of females were current smokeless tobacco users.
- Whites in both surveys were more likely than blacks or Hispanics in all grades to be current smokeless tobacco users (Table C.2.8). In NSDUH, for example, the prevalence of current smokeless tobacco use at the 12th grade was 7.7 percent for whites, 1.5 percent for Hispanics, and 0.5 percent for blacks. In YRBS, 10.2 percent of whites, 4.9 percent of Hispanics, and 1.6 percent of blacks in the 12th grade were current smokeless tobacco users.
- In all grades, YRBS estimated a higher prevalence of current smokeless tobacco use compared with NSDUH (Table C.2.8). In the 9th grade, the YRBS estimate was 6.8 percent, and the NSDUH estimate was 2.2 percent. By the 12th grade, the YRBS estimate was 8.1 percent, and the NSDUH estimate was 5.3 percent.
- Differences in estimates of current smokeless tobacco use between NSDUH and YRBS for males paralleled the overall patterns for youths by grade (Table C.2.8). In the 9th grade, the 10.4 percent of males in YRBS and 4.0 percent of males in NSDUH were current smokeless tobacco users. By the 12th grade, 14.6 percent of males in YRBS and 9.6 percent of males in NSDUH were current users.
- For females at all grades, YRBS estimated a higher prevalence of current smokeless tobacco use than NSDUH did (Table C.2.8). Estimates in NSDUH ranged from 0.4 percent of 9th grade females to 0.6 percent of 12th grade females. Estimates for females in YRBS ranged from 1.6 percent in the 12th grade to 3.1 percent in the 9th grade.

- The prevalence of current cigar use in NSDUH increased as grade increased. In NSDUH, the prevalence ranged from 4.0 percent of 9th graders to 11.8 percent of 12th graders (Table C.2.9). In YRBS, the prevalence of current cigar use was lower in the 9th grade (11.3 percent) than in the 12th grade (18.1 percent). However, the prevalence in the 10th grade (12.8 percent) was not significantly different from the prevalence in the 9th grade.
- Males were more likely than females in all grades to be current cigar users for both NSDUH and YRBS (Table C.2.9). In NSDUH, 17.5 percent of 12th grade males and 5.6 percent of 12th grade females were current cigar users. In YRBS, the prevalence estimates for 12th graders were 27.4 percent for males and 8.8 percent for females.
- Among 12th graders in NSDUH, the prevalence of current cigar use was higher among whites (14.1 percent) than blacks (7.9 percent) or Hispanics (8.8 percent) (Table C.2.9). Whites in the 12th grade in YRBS also were more likely than blacks to be current cigar users (19.6 vs. 13.7 percent). However, the estimated prevalence for Hispanics (17.2 percent) was not significantly different from that for whites.
- In all grades, YRBS estimated a higher prevalence of current cigar use compared with NSDUH (Table C.2.9). In the 9th grade, the YRBS estimate was 11.3 percent, and the NSDUH estimate was 4.0 percent. By the 12th grade, the YRBS estimate was 18.1 percent, and the NSDUH estimate was 11.8 percent.
- YRBS estimated a higher prevalence of current cigar use than NSDUH did for males and females at all grades (Table C.2.9). Estimates in NSDUH ranged from 5.1 percent of 9th grade males to 17.5 percent of 12th grade males and from 2.9 percent of 9th grade females to 5.6 percent of 12th grade females. Estimates in YRBS ranged from 14.2 percent in the 9th grade to 27.4 percent in the 12th grade for males and from 8.3 to 8.9 percent across all grades for females.
- YRBS estimates of current cigar use among 12th graders were higher than corresponding NSDUH estimates for whites, blacks, and Hispanics (Table C.2.9). In particular, the prevalence estimate of current cigar use among Hispanic 12th graders in YRBS was 17.2 percent compared with the NSDUH estimate of 8.8 percent.

MTF and YRBS

- Although both YRBS and MTF are anonymous for 10th graders, the estimate of current cigarette use in YRBS for 10th graders (20.9 percent) was greater than the corresponding estimate in MTF (15.1 percent) (Tables C.2.5 and C.2.7). YRBS estimates of current cigarette use also were higher than MTF estimates for both males and females in the 10th grade.
- At the 12th grade, the estimates of current cigarette use showed less difference between MTF (23.2 percent) and YRBS (26.7 percent) than the estimates did for 10th graders, despite the MTF data not being anonymous for 12th graders (Tables C.2.5 and C.2.7). However, the YRBS estimate at the 12th grade continued to be greater than the MTF estimate.

- YRBS estimated a higher prevalence of current cigarette use among 12th grade males (28.5 percent) and females (24.9 percent) than MTF did (24.3 and 21.6 percent) (Tables C.2.5 and C.2.7).

2.1.3 Summary of Tobacco Use Estimates

NSDUH and MTF showed very similar trends in the prevalence of lifetime cigarette use among 12th graders from 2002 to 2008, with both surveys indicating a significant decrease in prevalence over this period (Figure 2.1). Both surveys also showed a significant decrease in the prevalence of current cigarette use among 12th graders from 2002 to 2008, although some year-to-year differences in trends also were observed.

Annual average correlates of tobacco use among 12th graders—the group with the highest prevalence—also were similar in NSDUH, MTF, and YRBS (Figure 2.2). In particular, all three surveys indicated that 12th grade males were more likely than their female counterparts to be current cigarette users. In addition, 12th grade whites were more likely than blacks or Hispanics at this grade to be current cigarette users in NSDUH, MTF, and YRBS. For correlates of other tobacco use, NSDUH and YRBS indicated that males were more likely than females in all grades from the 9th through 12th grades to be current users of smokeless tobacco or cigars (Tables C.2.8 and C.2.9). Both NSDUH and YRBS also indicated that whites in the 12th grade were more likely than blacks or Hispanics to be current smokeless tobacco users (Table C.2.8) and that whites were more likely than blacks to be current cigar users (Table C.2.9).

The estimate of current cigarette use among 8th graders in NSDUH was lower than the corresponding MTF estimate, but these two surveys yielded similar estimates for 10th graders (Table C.2.5). NSDUH estimated a higher prevalence of current cigarette use among 12th graders than MTF did. In addition, YRBS yielded higher estimates of current cigarette use for 10th and 12th graders overall than MTF did (Tables C.2.5 and C.2.7). YRBS also yielded higher estimates of current use of smokeless tobacco and cigars than NSDUH did for youths at all grades and higher estimates of current cigarette use for 9th through 11th graders. However, NSDUH and YRBS had similar estimates of current cigarette use for 12th graders.

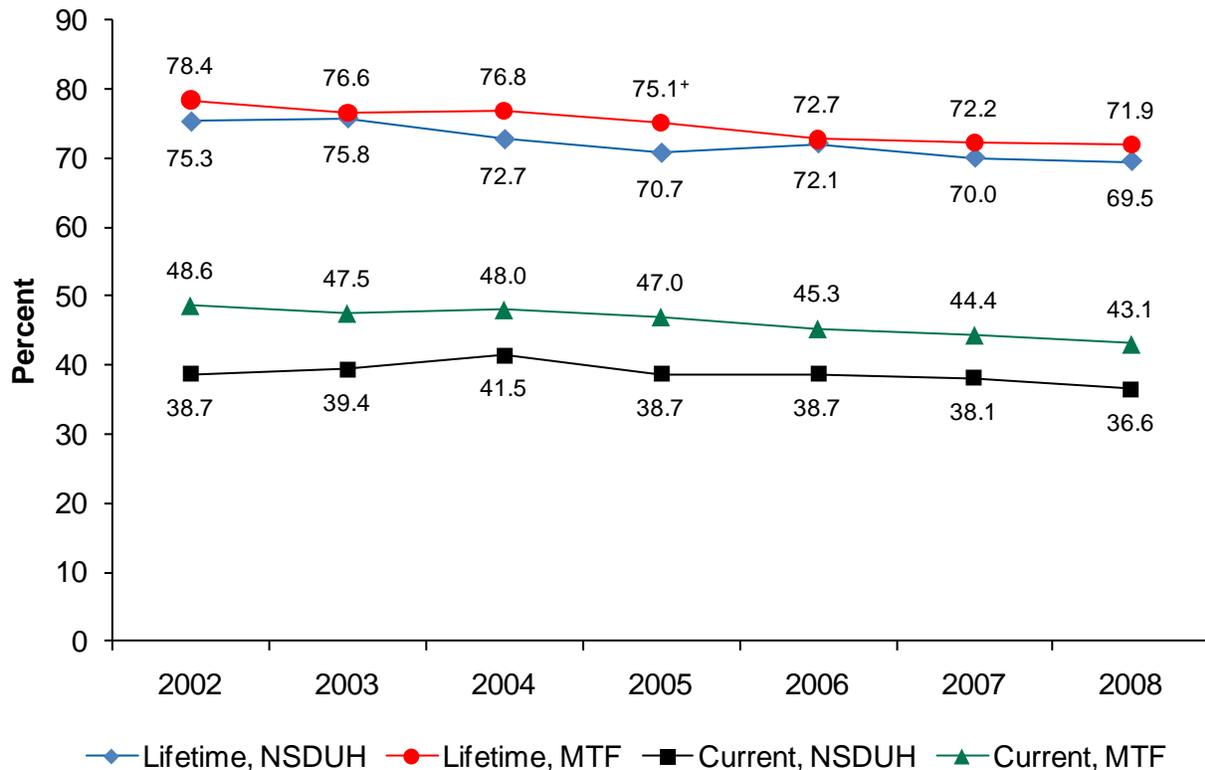
2.2. Alcohol

This section compares lifetime, past year, and past month estimates of alcohol use between NSDUH and MTF. Comparisons of lifetime alcohol use, current use, and current binge alcohol use (i.e., consumption of five or more drinks in the same occasion on at least 1 day in the past 30 days) also are presented for NSDUH and YRBS. In addition, estimates of current alcohol use are compared for MTF and YRBS.

2.2.1 Comparison of Trends

- The prevalence of lifetime alcohol use among 12th graders decreased from 2002 to 2008 according to both NSDUH and MTF data (Table C.2.1 and Figure 2.3). NSDUH estimated that the lifetime prevalence decreased from 75.3 percent of 12th graders in 2002 to 69.5 percent in 2008. MTF estimated that the lifetime prevalence decreased from 78.4 percent of 12th graders in 2002 to 71.9 percent in 2008. Nevertheless, both surveys estimated that 70 percent or more of adolescent students in 2002 to 2008 had used alcohol at least once by the time they reached the 12th grade.

Figure 2.3 Trends in Lifetime and Current Alcohol Use among 12th Graders in NSDUH and MTF: Percentages, 2002 to 2008



NSDUH = National Survey of Drug Use and Health; MTF = Monitoring the Future.

NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20 to be more comparable with MTF data.

⁺ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Sources: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

The Monitoring the Future Study, University of Michigan, 2002 to 2008.

- In NSDUH, 64.1 percent of 12th graders in 2002 and 60.1 percent of those in 2008 used alcohol in the past year (Table C.2.2). Corresponding estimates of past year alcohol use among 12 graders in MTF were 71.5 percent in 2002 and 65.5 percent in 2008. Thus, both surveys estimated that 60 percent or more of 12th graders in 2008 had used alcohol at least once in the past year.

- MTF showed significant decreases in the prevalence of past year alcohol use among 12th graders each year from 2004 (70.6 percent) to 2006 (66.5 percent) and then showed no further change between consecutive years in 2006 to 2008 (Table C.2.2). In contrast, NSDUH did not indicate significant changes in prevalence for 12th graders between consecutive survey years at any point from 2002 to 2008.
- The prevalence of current alcohol use among 12th graders in NSDUH decreased from 2002 (38.7 percent) to 2008 (36.6 percent) (Table C.2.3 and Figure 2.3). For MTF, the prevalence decreased from 48.6 percent in 2002 and 43.1 percent in 2008. Neither survey showed significant changes in prevalence between consecutive survey years.

2.2.2 Comparison of Annual Average Estimates

NSDUH and MTF

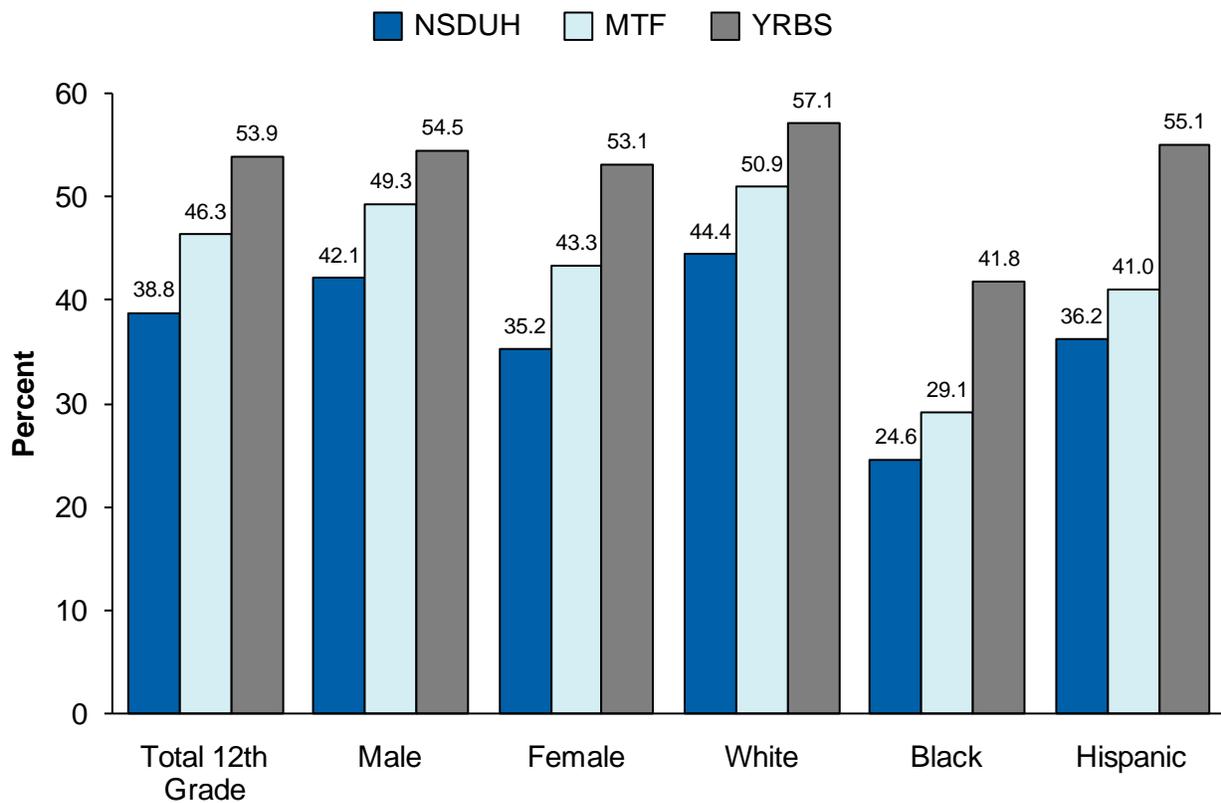
- NSDUH estimated that 29.7 percent of students in the 8th grade had used alcohol at least once in their lifetime (Table C.2.10). The prevalence increased to 56.6 percent at the 10th grade and to 72.3 percent at the 12th grade. MTF estimated that 42.2 percent of 8th graders, 63.2 percent of 10th graders, and 74.8 percent of 12th graders were lifetime alcohol users. Thus, both surveys estimated that the majority of students in the 10th grade and about three fourths of those in the 12th grade had used alcohol at least once.
- Overall MTF estimates of lifetime alcohol use at the 8th, 10th, and 12th grades were higher than corresponding NSDUH estimates (Table C.2.10). The estimates started to converge for 12th graders, although the MTF estimate still was greater than the NSDUH estimate (74.8 vs. 72.3 percent).
- Estimates of lifetime alcohol use among 12th graders in MTF were greater than those in NSDUH for both males (74.5 vs. 72.7 percent) and females (75.0 vs. 71.8 percent) (Table C.2.10).
- Estimates of lifetime alcohol use between NSDUH and MTF at the 12th grade did not differ significantly for whites (76.0 vs. 77.4 percent), blacks (61.3 vs. 64.6 percent), or Hispanics (72.9 vs. 73.1 percent) (Table C.2.10).
- NSDUH estimated that 21.8 percent of 8th graders, 47.2 percent of 10th graders, and 62.8 percent of 12th graders had used alcohol in the past year (Table C.2.11). MTF estimated that the prevalence of past year alcohol use was 34.8 percent for 8th graders, 57.1 percent for 10th graders, and 68.4 percent for 12th graders. Thus, both surveys estimated that about half or more students in the 10th grade and more than three fifths of those in the 12th grade had used alcohol in the past year.
- Overall MTF estimates of past year alcohol use at the 8th, 10th, and 12th grades were higher than corresponding NSDUH estimates (Table C.2.11). The estimates started to converge for 12th graders, but the MTF estimate still was greater than the NSDUH estimate (68.4 vs. 62.8 percent).

- NSDUH estimates of current (i.e., past month) use of alcohol were 8.9 percent of 8th graders, 23.5 percent of 10th graders, and 38.8 percent of 12th graders (Table C.2.12). MTF estimated that the prevalence of current alcohol use was 17.7 percent for 8th graders, 33.8 percent for 10th graders, and 46.3 percent for 12th graders.
- In NSDUH, 8th grade females were more likely than males in this grade to be current alcohol users (10.3 vs. 7.6 percent) (Table C.2.12). By the 12th grade, the prevalence of current alcohol use in NSDUH was greater for males (42.1 percent) than for females (35.2 percent) (Figure 2.4). In comparison, the prevalence of current alcohol use in MTF did not differ significantly between 8th grade females and males (18.1 vs. 17.1 percent). Displaying a pattern similar to that in NSDUH, MTF found that 12th grade males were more likely than their female counterparts to be current alcohol users (49.3 vs. 43.3 percent).
- For NSDUH, among racial or ethnic groups, the prevalence of current alcohol use at the 10th and 12th grades was lowest for blacks (15.0 and 24.6 percent) (Table C.2.12 and Figure 2.4). White and Hispanic 10th graders had comparable rates of current alcohol use (26.1 and 24.4 percent). NSDUH also estimated that the prevalence of current alcohol use among 12th graders was greater for whites (44.4 percent) than for Hispanics (36.2 percent) or blacks (24.6 percent). MTF data for 10th and 12th graders showed similar patterns. An estimated 22.6 percent of blacks in the 10th grade, and 29.1 percent of those in the 12th grade were current alcohol users. In addition, 50.9 percent of whites in the 12th grade and 41.0 percent of Hispanics in this grade were current alcohol users.
- Overall MTF estimates of current alcohol use at the 8th, 10th, and 12th grades were higher than corresponding NSDUH estimates (Table C.2.12). For 8th graders, the MTF estimate was 17.7 percent, and the NSDUH estimate was 8.9 percent. For 12th graders, the MTF estimate was 46.3 percent, and the NSDUH estimate was 38.8 percent. MTF estimates of current alcohol use at the 12th grade also were higher than NSDUH estimates for both males and females.
- MTF estimates of current alcohol use in each grade were higher than NSDUH estimates for whites, blacks, and Hispanics (Table C.2.12). Among 12th graders, for example, higher estimates of current alcohol use were observed in MTF than in NSDUH for whites (50.9 vs. 44.4 percent), blacks (29.1 vs. 24.6 percent), and Hispanics (41.0 vs. 36.2 percent).

NSDUH and YRBS

- NSDUH estimated that 44.7 percent of students in the 9th grade had used alcohol at least once in their lifetime, as had 56.6 percent of those in the 10th grade, 64.5 percent of those in the 11th grade, and 72.3 percent of those in the 12th grade (Table C.2.13). YRBS estimated that the prevalence of lifetime alcohol use was 65.7 percent of 9th graders, 75.0 percent of 10th graders, 78.2 percent of 11th graders, and 82.5 percent of 12th graders.

Figure 2.4 Current Alcohol Use among 12th Graders in NSDUH, MTF, and YRBS, by Selected Demographic Characteristics: Annual Average Percentages, 2002 to 2008



NSDUH = National Survey of Drug Use and Health; MTF = Monitoring the Future; YRBS = Youth Risk Behavior Survey.

NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20 to be more comparable with MTF and YRBS data.

Sources: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

The Monitoring the Future Study, University of Michigan, 2002 to 2008.

Centers for Disease Control and Prevention, Youth Risk Behavior Survey, 2003, 2005, and 2007.

- Overall YRBS estimates of lifetime alcohol use were higher than corresponding NSDUH estimates in each grade, although the estimates started to converge for 12th graders (Table C.2.13). The YRBS estimate of lifetime alcohol use for 9th graders was 65.7 percent, and the NSDUH estimate was 44.7 percent. Although YRBS estimated that more than 80 percent of 12th graders had used alcohol at least once, NSDUH estimated that more than 70 percent of 12th graders were lifetime alcohol users.
- NSDUH estimated that the prevalence of current (i.e., past month) alcohol use was 16.5 percent for 9th graders, 23.5 percent for 10th graders, 30.1 percent for 11th graders, and 38.8 percent for 12th graders (Table C.2.14). YRBS estimated that the prevalence of current alcohol use was 36.1 percent for 9th graders, 42.5 percent for 10th graders, 47.3 percent for 11th graders, and 53.9 percent for 12th graders.

- Females in the 9th grade in NSDUH were more likely than their male counterparts to be current alcohol users (Table C.2.14). The prevalence of current alcohol use in NSDUH was similar for males and females in the 10th grade. In the 11th and 12th grades, however, males were more likely than females to be current alcohol users. Except for 11th graders, estimates of current alcohol use in YRBS did not differ significantly between males and females.
- NSDUH estimated that blacks in the 9th through 12th grades were less likely than their white or Hispanic counterparts to be current alcohol users (Table C.2.14). White and Hispanic students in the 9th and 10th grades had comparable rates of current alcohol use. In the 11th and 12th grades, however, the prevalence of current alcohol use in NSDUH was greater for whites than Hispanics. YRBS data showed similar patterns for whites and blacks. In particular, the prevalence of current alcohol use among blacks increased from 28.6 percent in the 9th grade to 41.8 percent in the 12th grade. Corresponding estimates for whites increased from 37.0 percent in the 9th grade to 57.1 percent in the 12th grade. Unlike NSDUH, however, the prevalence of current alcohol use in YRBS did not differ significantly between whites and Hispanics in any grade.
- Overall YRBS estimates of current alcohol use were greater than corresponding NSDUH estimates at each grade (Table C.2.14). For 9th graders, the YRBS estimate was 36.1 percent, and the NSDUH estimate was 16.5 percent. For 12th graders, the YRBS estimate was 53.9 percent, and the NSDUH estimate was 38.8 percent. YRBS estimates of current alcohol use at the 12th grade also were higher than NSDUH estimates for both males and females.
- YRBS estimates of current alcohol use for whites, blacks, and Hispanics were greater than corresponding NSDUH estimates at each grade (Table C.2.14). At the 12th grade for example, YRBS estimated that more than half of white and Hispanic youths were current alcohol users. In contrast, NSDUH estimated that less than 45 percent of whites and less than 40 percent of Hispanics in the 12th grade were current alcohol users.
- NSDUH estimated that the prevalence of current binge alcohol use was 9.1 percent for 9th graders, 14.7 percent for 10th graders, 19.7 percent for 11th graders, and 26.5 percent for 12th graders (Table C.2.15). Corresponding prevalence estimates in YRBS were 18.7 percent for 9th graders, 25.3 percent for 10th graders, 29.8 percent for 11th graders, and 35.5 percent for 12th graders. Thus, NSDUH estimated that more than one in four 12th graders were binge alcohol users, and YRBS estimated this proportion as more than one in three.
- Males and females in the 9th grade had similar rates of binge alcohol use both in NSDUH (8.9 and 9.4 percent) and YRBS (18.8 and 18.5 percent) (Table C.2.15). Among 12th graders, both surveys indicated that males were more likely than females to be binge alcohol users. NSDUH estimated that 31.5 percent of 12th grade males and 21.2 percent of females were binge alcohol users. The corresponding YRBS estimates in the 12th grade were 38.7 percent for males and 32.2 percent for females.

- In both surveys, non-Hispanic blacks in the 9th grade were less likely than their non-Hispanic white or Hispanic counterparts to be current binge alcohol users (Table C.2.15). In NSDUH, the prevalence of binge alcohol use among blacks in the 9th grade was 5.6 percent compared with 9.9 percent for whites and 10.8 percent for Hispanics. In the 12th grade, NSDUH estimated a higher prevalence of binge alcohol use for whites (31.6 percent) than for blacks (11.3 percent) or Hispanics (25.8 percent). The prevalence of binge alcohol use among whites in the 12th grade for YRBS (40.1 percent) also was greater than that for blacks (17.7 percent) and Hispanics (36.5 percent).
- Overall YRBS estimates of binge alcohol use were greater than corresponding NSDUH estimates at each grade (Table C.2.15). At the 9th grade, the YRBS estimate was 18.7 percent, and the NSDUH estimate was 9.1 percent. At the 12th grade, the YRBS estimate was 35.5 percent, and the NSDUH estimate was 26.5 percent. YRBS estimates of current alcohol use also were higher than NSDUH estimates for both males and females at each grade.
- YRBS estimates of binge alcohol use also were greater than corresponding NSDUH estimates for whites, blacks, and Hispanics at each grade (Table C.2.15).
- NSDUH estimates of binge alcohol use for whites and Hispanics in NSDUH differed more with corresponding YRBS estimates at the 9th grade but also showed more convergence with YRBS estimates by the 12th grade than estimates did for blacks (Table C.2.15). Among blacks in the 9th grade, the YRBS estimate of binge alcohol use was 9.4 percent, and the NSDUH estimate was 5.6 percent). The YRBS estimate for whites in the 9th grade was 21.1 percent, and the NSDUH estimate was 9.9 percent. For Hispanics in the 9th grade, the YRBS and NSDUH estimates were 20.4 and 10.8 percent, respectively. By the 12th grade, the estimates of binge alcohol use in YRBS were 40.1 percent for whites, 36.5 percent for Hispanics, and 17.7 percent for blacks. Corresponding NSDUH estimates were 31.6 percent for whites, 25.8 percent for Hispanics, and 11.3 percent for blacks).

MTF and YRBS

- Among 10th graders, YRBS estimated a higher prevalence of current alcohol use (42.5 percent) than MTF did (33.8 percent) (Tables C.2.12 and C.2.14). YRBS estimates of current alcohol use also were higher than MTF estimates for both males and females in the 10th grade.
- The estimate of current alcohol use among 12th graders continued to be greater for YRBS (53.9 percent) than for MTF (46.3 percent) (Tables C.2.12 and C.2.14). This pattern of higher estimates for YRBS than for MTF at the 12th grade also occurred for both males and females.

2.2.3 Summary of Alcohol Use Estimates

As with the trends for cigarette use, NSDUH and MTF both showed decreases in the prevalence of lifetime alcohol use among 12th graders from 2002 to 2008 (Figure 2.3). Although

both surveys also showed statistically significant decreases in the prevalence of current alcohol use over this same period, NSDUH estimates showed relatively little change.

NSDUH, MTF, and YRBS also showed similar annual average correlates of current alcohol use among 12th graders (Figure 2.4). NSDUH and MTF indicated that the prevalence of current alcohol use was higher among 12th grade males than females; however, this pattern was not observed in YRBS. In addition, 12th grade whites were more likely than blacks at this grade to be current alcohol users in NSDUH, MTF, and YRBS. NSDUH and YRBS also identified similar correlates of current binge alcohol use among 12th graders. Both surveys found that 12th grade males were more likely than 12th grade females to be current binge alcohol users and that whites were more likely than blacks or Hispanics at this grade to be binge alcohol users (Table C.2.15).

YRBS yielded the highest estimates of current alcohol use among 10th and 12th graders relative to corresponding estimates in MTF and NSDUH. MTF also estimated a higher prevalence of current alcohol use among 8th graders than NSDUH did, and YRBS estimates were higher than NSDUH estimates for youths in the 9th and 11th grades.

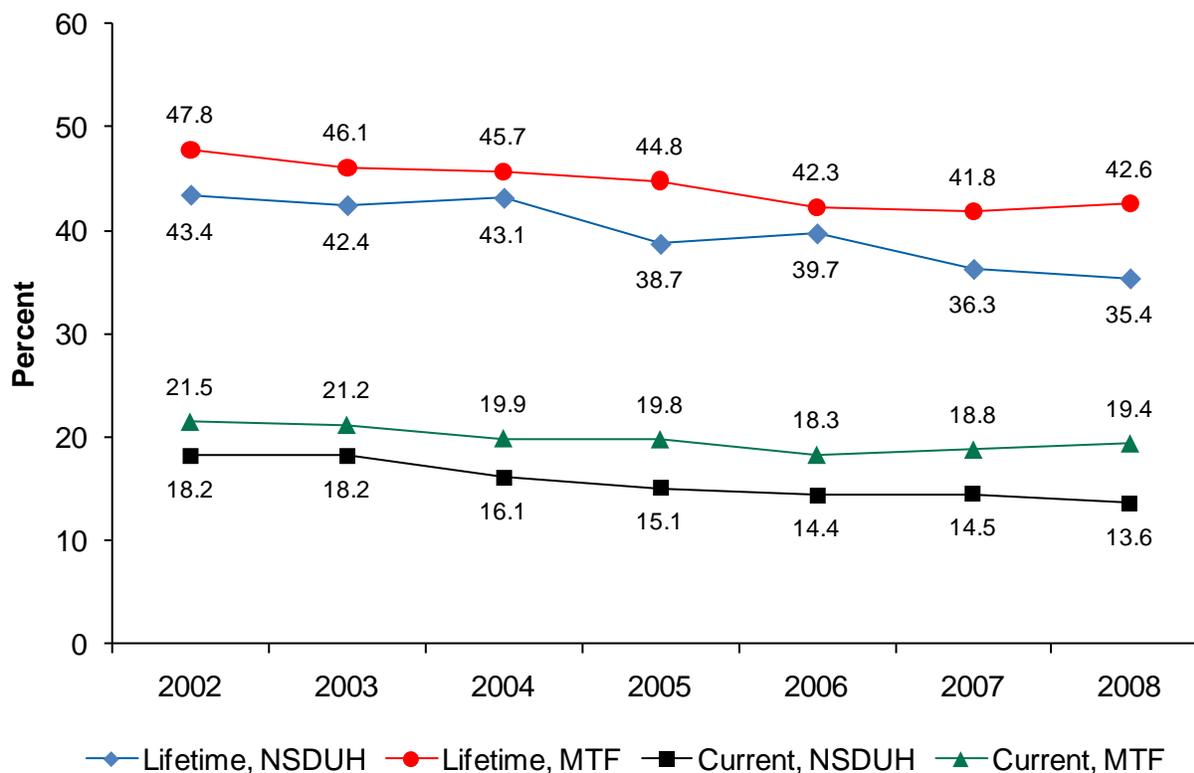
2.3. Marijuana

This section presents estimates of lifetime, past year, and past month marijuana use from NSDUH, MTF, and YRBS.

2.3.1 Comparison of Trends

- The prevalence of lifetime marijuana use among 12th graders decreased from 2002 to 2008 for both NSDUH and MTF (Table C.2.1 and Figure 2.5). NSDUH estimated that the lifetime prevalence decreased from 43.4 percent of 12th graders in 2002 to 35.4 percent in 2008. MTF estimated that the prevalence decreased from 47.8 percent of 12th graders in 2002 to 42.6 percent in 2008. Nevertheless, both surveys estimated that more than one third of adolescent students in 2002 to 2008 had used marijuana at least once by the time they reached the 12th grade.
- In NSDUH, 30.8 percent of 12th graders in 2002 and 27.8 percent of those in 2008 used marijuana in the past year (Table C.2.2). Corresponding estimates of past year marijuana use among 12th graders in MTF were 36.2 percent in 2002 and 32.4 percent in 2008. Thus, both surveys estimated that more than one fourth of 12th graders in 2008 used marijuana at least once in the past year.
- The estimate of past year marijuana use also decreased from 2004 (31.5 percent) to 2005 (26.8 percent) in NSDUH (Table C.2.2). MTF did not show significant changes in prevalence between consecutive survey years at any point from 2002 to 2008 for 12th graders.

Figure 2.5 Trends in Lifetime and Current Marijuana Use among 12th Graders in NSDUH and MTF: Percentages, 2002 to 2008



NSDUH = National Survey of Drug Use and Health; MTF = Monitoring the Future.

NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20 to be more comparable with MTF data.

+ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Sources: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

The Monitoring the Future Study, University of Michigan, 2002 to 2008.

- In NSDUH, the prevalence of current marijuana use among 12th graders decreased from 18.2 percent in 2002 to 13.6 percent in 2008 (Table C.2.3 and Figure 2.5). However, the prevalence did not decrease significantly for MTF over this period. Neither survey showed significant changes in the prevalence of current marijuana use between consecutive survey years.

2.3.2 Comparison of Annual Average Estimates

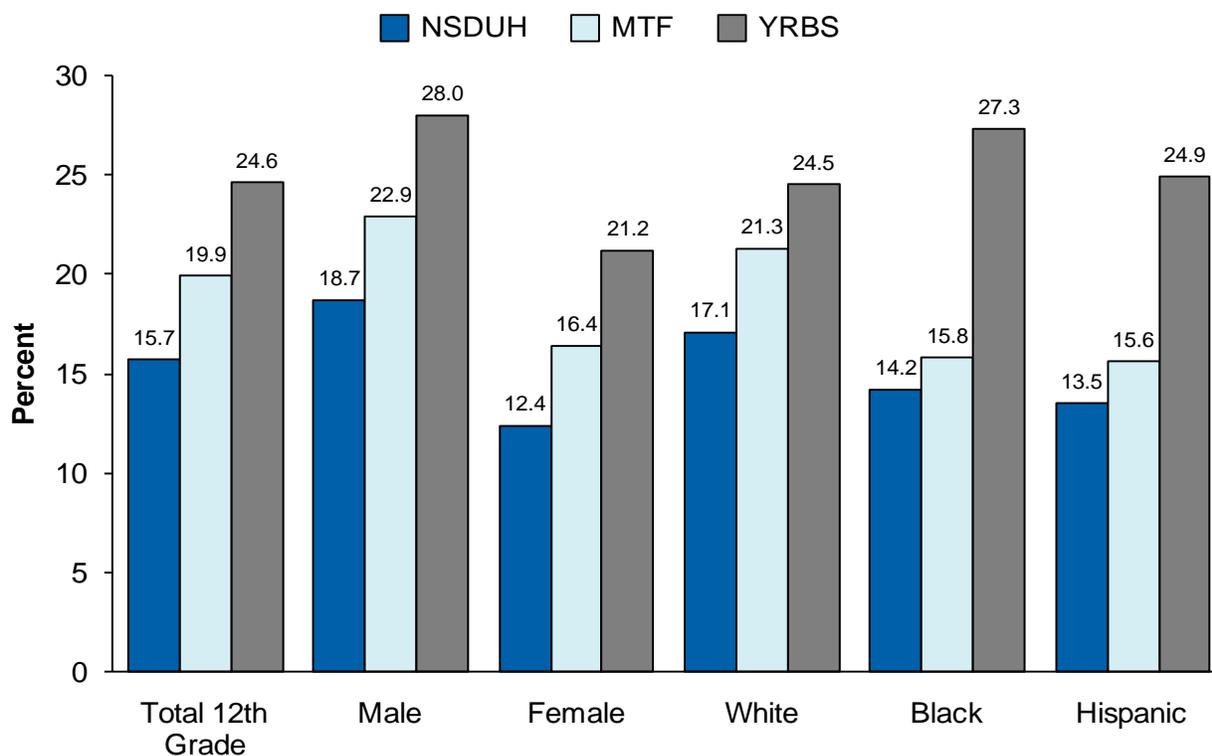
NSDUH and MTF

- NSDUH estimated that 9.0 percent of students in the 8th grade had used marijuana at least once in their lifetime (Table C.2.16). The prevalence increased to 26.4 percent at the 10th grade and to 39.8 percent at the 12th grade. MTF estimated that 16.2 percent of 8th graders, 33.8 percent of 10th graders, and 44.5 percent of 12th graders were lifetime marijuana users. Thus, both surveys estimated that about 40 percent or more of students in the 12th grade had used marijuana at least once.

- Both surveys estimated that males were more likely than females in each grade to be lifetime marijuana users (Table C.2.16). For example, NSDUH estimated that 42.7 percent of 12th grade males and 36.6 percent of females in this grade were lifetime marijuana users. Corresponding MTF estimates of lifetime marijuana use in the 12th grade were 47.4 percent of males and 41.3 percent of females.
- MTF estimated that whites in the 8th grade were less likely than Hispanics to be lifetime marijuana users (14.5 percent for whites vs. 18.6 percent for Hispanics); the estimate of 18.6 percent for blacks was not significantly different from that for whites (Table C.2.16). NSDUH estimates for 8th graders did not differ significantly for these three groups. At the 12th grade, NSDUH found that whites were more likely than blacks to be lifetime marijuana users (41.9 vs. 34.8 percent). However, the MTF estimates for whites and blacks in the 12th grade were not significantly different (46.3 and 38.9 percent).
- Overall MTF estimates of lifetime marijuana use at the 8th, 10th, and 12th grades were higher than corresponding NSDUH estimates (Table C.2.16). The estimates started to converge for 12th graders, although the MTF estimate still was greater than the NSDUH estimate (44.5 vs. 39.8 percent).
- The estimated prevalence of lifetime marijuana use in MTF was higher than the corresponding NSDUH prevalence for whites, blacks, and Hispanics in the 8th and 10th grades (Table C.2.16). In particular, MTF estimated a prevalence of lifetime marijuana use for blacks in the 8th grade of 18.6 percent compared with the NSDUH estimate of 7.8 percent. MTF estimates of lifetime marijuana use in the 12th grade continued to be greater than corresponding NSDUH estimates for whites but not for blacks or Hispanics.
- NSDUH estimates of use of marijuana in the past year were 7.2 percent of 8th graders, 20.9 percent of 10th graders, and 28.5 percent of 12th graders (Table C.2.17). MTF estimated that the prevalence of past year marijuana use was 12.0 percent for 8th graders, 26.6 percent for 10th graders, and 33.5 percent for 12th graders.
- Overall MTF estimates of past year marijuana use at the 8th, 10th, and 12th grades were higher than corresponding NSDUH estimates (Table C.2.17). The estimates started to converge for 12th graders, but the MTF estimate still was greater than the NSDUH estimate (33.5 vs. 28.5 percent).
- As for lifetime marijuana use, the MTF estimate of past year marijuana use among blacks in the 8th grade (12.2 percent) was higher than the NSDUH estimate (5.5 percent) (Table C.2.17). By the 12th grade, however, only the MTF estimate of past year marijuana use for whites (35.8 percent) was significantly different from the NSDUH estimate (30.8 percent). Both surveys estimated that more than one in four black or Hispanic students in the 12th grade used marijuana in the past year.

- NSDUH estimated that the prevalence of current (i.e., past month) marijuana use was 3.3 percent for 8th graders, 10.4 percent for 10th graders, and 15.7 percent for 12th graders (Table C.2.18). MTF estimated that the prevalence of current marijuana use was 6.6 percent for 8th graders, 15.5 percent for 10th graders, and 19.9 percent for 12th graders.
- Both NSDUH and MTF estimated that males were more likely than their female counterparts in the 10th and 12th grades to be current marijuana users (Table C.2.18 and Figure 2.6). NSDUH estimated that 18.7 percent of males and 12.4 percent of females in the 12th grade were current marijuana users. MTF estimated that the prevalence of current marijuana use in the 12th grade was 22.9 percent for males and 16.4 percent for females. MTF also yielded a higher prevalence of current marijuana use for males in the 8th grade than for females (7.3 vs. 5.9 percent). NSDUH did not show a significant difference in current marijuana prevalence for 8th grade males and females (3.4 and 3.1 percent).

Figure 2.6 Current Marijuana Use among 12th Graders in NSDUH, MTF, and YRBS, by Selected Demographic Characteristics: Annual Average Percentages, 2002 to 2008



NSDUH = National Survey of Drug Use and Health; MTF = Monitoring the Future; YRBS = Youth Risk Behavior Survey.

NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20 to be more comparable with MTF and YRBS data.

Sources: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

The Monitoring the Future Study, University of Michigan, 2002 to 2008.

Centers for Disease Control and Prevention, Youth Risk Behavior Survey, 2003, 2005, and 2007.

- Whites were more likely than Hispanics in the 12th grade to be current marijuana users in both NSDUH and MTF (Table C.2.18). Whites in the 12th grade in NSDUH also were more likely than blacks to be current users. In NSDUH, the prevalence of current marijuana use among 12th graders was 17.1 percent for whites, 14.2 percent for blacks, and 13.5 percent for Hispanics. For 12th graders in MTF, 21.3 percent of whites, 15.8 percent of blacks, and 15.6 percent of Hispanics were current marijuana users.
- Overall MTF estimates of current marijuana use at the 8th, 10th, and 12th grades were higher than corresponding NSDUH estimates (Table C.2.18). At the 8th grade, the MTF estimate was 6.6 percent, and the NSDUH estimate was 3.3 percent. At the 12th grade, the MTF estimate was 19.9 percent, and the NSDUH estimate was 15.7 percent. MTF estimates of current marijuana use at the 12th grade also were higher than NSDUH estimates for both males and females.
- MTF estimates of current marijuana use for 8th and 10th graders were higher than NSDUH estimates for whites, blacks, and Hispanics (Table C.2.18). For 12th graders, the MTF estimate of current marijuana use for whites (21.3 percent) was higher than the NSDUH estimate (17.1 percent). However, MTF estimates of current marijuana use in the 12th grade did not differ significantly from corresponding NSDUH estimates for 12th grade blacks (15.8 vs. 14.2 percent) or Hispanics (15.6 vs. 13.5 percent).

NSDUH and YRBS

- NSDUH estimated that 18.3 percent of students in the 9th grade had used marijuana at least once in their lifetime, as had 26.4 percent of those in the 10th grade, 33.6 percent of those in the 11th grade, and 39.8 percent of those in the 12th grade (Table C.2.19). YRBS estimated that the prevalence of lifetime marijuana use was 29.2 percent for 9th graders, 38.3 percent for 10th graders, 43.1 percent for 11th graders, and 48.4 percent for 12th graders.
- Among 12th graders, both NSDUH and YRBS estimated that males were more likely than females to be lifetime marijuana users (NSDUH: 42.7 vs. 36.6 percent; YRBS: 51.4 vs. 45.3 percent) (Table C.2.19). NSDUH also estimated that whites in the 12th grade were more likely than blacks at this grade to be lifetime marijuana users (41.9 vs. 34.8 percent). However, corresponding YRBS estimates were not significantly different (48.3 percent for whites and 51.3 percent for blacks).
- Overall YRBS estimates of lifetime marijuana use were higher than corresponding NSDUH estimates in each grade (Table C.2.19). Among 12th graders, the YRBS estimate was 48.4 percent, and the NSDUH estimate was 39.8 percent.
- NSDUH estimated that the prevalence of current marijuana use was 7.1 percent for 9th graders, 10.4 percent for 10th graders, 13.8 percent for 11th graders, and 15.7 percent for 12th graders (Table C.2.20). YRBS estimated that the prevalence of current marijuana use was 16.9 percent for 9th graders, 20.5 percent for 10th graders, 22.2 percent for 11th graders, and 24.6 percent for 12th graders.

- The prevalence of current marijuana use in NSDUH did not differ significantly between males and females in the 9th grade (Table C.2.20). However, NSDUH estimated that males in the 10th, 11th, and 12th grades were more likely than their female counterparts to be current marijuana users (Figure 2.6). For example, NSDUH estimated that 18.7 percent of males in the 12th grade and 12.4 percent of 12th grade females were current marijuana users. YRBS estimated that males were more likely than females to be current marijuana users in each of the 10th through 12th grades. In particular, 28.0 percent of males and 21.2 percent of females in the 12th grade were current marijuana users.
- Whites in the 12th grade in NSDUH were more likely to be current marijuana users (17.1 percent) than blacks (14.2 percent) or Hispanics (13.5 percent) However, the prevalence of current marijuana use among 12th graders in YRBS did not differ significantly for white, black, or Hispanic students (Table C.2.20).
- Overall YRBS estimates of current marijuana use were greater than corresponding NSDUH estimates at each grade (Table C.2.20). For 9th graders, the YRBS estimate was 16.9 percent, and the NSDUH estimate was 7.1 percent. YRBS estimates for 9th graders also were greater than the corresponding NSDUH estimates for males, females, whites, blacks, and Hispanics. For 12th graders, the YRBS estimate was 24.6 percent, and the NSDUH estimate was 15.7 percent. As for 9th graders, YRBS estimates of current marijuana use at the 12th grade were higher than NSDUH estimates for males, females, whites, blacks, and Hispanics.

MTF and YRBS

- Among 10th graders, YRBS yielded higher prevalence estimates than MTF did for lifetime marijuana use (38.3 vs. 33.8 percent) (Tables C.2.16 and C.2.19) and current use (20.5 vs. 15.5 percent) (Tables C.2.18 and C.2.20).
- This same pattern of higher estimates of lifetime and current marijuana use in YRBS than in MTF also occurred for 12th graders. YRBS estimated that 48.4 percent of 12th graders had used marijuana at least once in their lifetime and that 24.6 percent were current users (Tables C.2.19 and C.2.20). Corresponding estimates from MTF indicated that 44.5 percent of 12th graders were lifetime users and 19.9 percent were current users (Tables C.2.16 and C.2.18).

2.3.3 Summary of Marijuana Use Estimates

NSDUH and MTF both showed decreases in the prevalence of lifetime and current marijuana use among 12th graders from 2002 to 2008 (Figure 2.5). However, neither survey showed significant changes in the prevalence of current marijuana use between consecutive survey years.

NSDUH, MTF, and YRBS found that 12th grade males were more likely than their female counterparts to be current marijuana users (Figure 2.6). NSDUH and MTF estimated a higher prevalence of current marijuana use for 12th grade whites than for Hispanics at this grade.

In contrast, YRBS found no significant difference in the prevalence of current marijuana use among 12th grade whites, blacks, or Hispanics.

As for current alcohol use, YRBS yielded the highest estimates of current marijuana use among 10th and 12th graders relative to corresponding estimates in MTF and NSDUH. MTF also estimated a higher prevalence of current marijuana use among 8th graders than NSDUH, and YRBS estimates were higher than NSDUH estimates for youths in the 9th and 11th grades.

2.4. Other Substance Use

This section presents estimates of use of other substances from NSDUH, MTF, and YRBS. Because these surveys vary in terms of inclusion of questions about specific other substances and use in the time periods of interest, this section is organized by substance rather than by pairs of surveys.

2.4.1 Cocaine

NSDUH and MTF include questions about lifetime, past year, and past month use of cocaine. YRBS asks about lifetime and past month use of cocaine.

- In NSDUH, the prevalence of lifetime cocaine use increased from 0.7 percent of 8th graders to 6.8 percent of 12th graders ([Table C.2.21](#)). For MTF, the lifetime prevalence increased from 3.4 percent of 8th graders to 7.9 percent of 12th graders. YRBS estimated that the lifetime prevalence of cocaine use increased from 5.9 percent of 9th graders to 9.6 percent of 12th graders ([Table C.2.24](#)).
- NSDUH, MTF, and YRBS all estimated a higher prevalence of lifetime cocaine use among 12th grade males than among females in the same grade ([Tables C.2.21](#) and [C.2.24](#)). In NSDUH, 7.9 percent of males and 5.7 percent of females in the 12th grade were lifetime cocaine users. In MTF, 8.8 percent of 12th grade males and 6.8 percent of females in that grade were lifetime cocaine users. YRBS estimated that 11.6 percent of males and 7.6 percent of females in the 12th grade were lifetime cocaine users.
- NSDUH, MTF, and YRBS all estimated that blacks in the 12th grade were less likely than their white or Hispanic counterparts to be lifetime cocaine users ([Tables C.2.21](#) and [C.2.24](#)). NSDUH estimated that 1.1 percent of blacks, 7.7 percent of whites, and 9.8 percent of Hispanics in the 12th grade were lifetime cocaine users. For MTF, the estimated prevalence of lifetime cocaine use among 12th graders was 1.6 percent for blacks, 8.6 percent for whites, and 9.4 percent for Hispanics. For YRBS, 2.4 percent of blacks, 10.0 percent of whites, and 14.5 percent of Hispanics in the 12th grade were estimated to be lifetime cocaine users. The prevalence of lifetime cocaine use among 12th graders was not significantly different between whites and Hispanics for NSDUH or MTF but was significantly different for YRBS.

- MTF estimated a higher prevalence of lifetime cocaine use than NSDUH did at the 8th, 10th, and 12th grades ([Table C.2.21](#)). YRBS also estimated a higher prevalence of lifetime cocaine use than NSDUH did at each grade from the 9th through the 12th grade ([Table C.2.24](#)). By the 12th grade, the estimates of lifetime cocaine use were 9.6 percent for YRBS, 7.9 percent for MTF, and 6.8 percent for NSDUH.
- Among youths in the 12th grade, NSDUH estimates of lifetime cocaine use were comparable with corresponding MTF estimates for whites, blacks, and Hispanics ([Table C.2.21](#)). However, YRBS estimated a higher prevalence of lifetime cocaine use than NSDUH did for 12th graders in each of these groups ([Table C.2.24](#)).
- YRBS estimated a higher prevalence of lifetime cocaine use than MTF did among all 10th graders (7.6 vs. 5.3 percent) and 12th graders (9.6 vs. 7.9 percent) ([Tables C.2.21](#) and [C.2.24](#)). YRBS estimates of lifetime cocaine use also were greater than corresponding MTF estimates for males and females in the 10th grade and for males in the 12th grade. However, estimates of lifetime cocaine use among 12th grade females did not differ significantly for MTF (6.8 percent) and YRBS (7.6 percent).
- NSDUH and MTF both estimated that males were more likely than females in the 12th grade to be past year cocaine users (NSDUH: 5.4 vs. 3.7 percent; MTF: 5.9 vs. 4.2 percent) ([Table C.2.22](#)). NSDUH and MTF also estimated that blacks in the 8th, 10th, and 12th grades were less likely than their white or Hispanic counterparts to be past year cocaine users. For example, NSDUH estimated that 0.6 percent of blacks, 5.2 percent of whites, and 6.8 percent of Hispanics in the 12th grade were past year cocaine users. MTF estimates of past year cocaine use among 12th graders were 1.1 percent for blacks, 5.5 percent for Hispanics, and 5.7 percent for whites.
- MTF estimated a higher prevalence of past year cocaine use than NSDUH did for students in the 8th grade (2.1 vs. 0.5 percent) and the 10th grade (3.5 vs. 2.3 percent) ([Table C.2.22](#)). By the 12th grade, however, the estimated past year prevalence was no longer significantly different between NSDUH (4.6 percent) and MTF (5.1 percent). Among 12th graders, NSDUH estimates of past year cocaine use also did not differ significantly from MTF estimates for corresponding gender and racial/ethnic groups.
- All three surveys showed an increase in the prevalence of current cocaine use from the lowest to the highest grade ([Table C.2.23](#)). In NSDUH, the prevalence of current cocaine use increased from 0.2 percent of 8th graders to 1.3 percent of 12th graders. For MTF, the prevalence of current cocaine use increased from 1.0 percent of 8th graders to 2.2 percent of 12th graders. For YRBS, the prevalence of current cocaine use increased from 3.1 percent of 9th graders to 4.3 percent of 12th graders. ([Table C.2.25](#)).
- NSDUH, MTF, and YRBS all estimated a higher prevalence of current cocaine use in the 12th grade for males than females (NSDUH: 1.6 vs. 1.0 percent; MTF: 2.6 vs. 1.7 percent; YRBS: 5.4 vs. 3.2 percent) ([Tables C.2.23](#) and [C.2.25](#)).

- Similar to the pattern for lifetime use, NSDUH, MTF, and YRBS all estimated that blacks in the 12th grade were less likely than whites or Hispanics to be current cocaine users (Tables C.2.23 and C.2.25). NSDUH estimated that 0.2 percent of blacks, 1.4 percent of Hispanics, and 1.6 percent of whites in the 12th grade were current cocaine users. The estimated prevalence of current cocaine use among 12th graders for MTF was 0.6 percent for blacks, 2.4 percent for whites, and 2.7 percent for Hispanics. For YRBS, 1.5 percent of blacks, 4.2 percent of whites, and 6.5 percent of Hispanics in the 12th grade were estimated to be current cocaine users.
- MTF and YRBS estimates of current cocaine use were greater than corresponding NSDUH estimates at each grade (Tables C.2.23 and C.2.25). Among 12th graders, the estimates of current cocaine use were 4.3 percent for YRBS, 2.2 percent for MTF, and 1.3 percent for NSDUH. MTF and YRBS estimates of current cocaine use also were greater than corresponding NSDUH estimates at each grade for males, females, whites, blacks, and Hispanics.
- The YRBS estimate of current cocaine use among 10th graders was 3.3 percent, and the MTF estimate was 1.5 percent (Tables C.2.23 and C.2.25). Among 12th graders, the YRBS estimate of current cocaine use (4.3 percent) also was greater than the MTF estimate (2.2 percent).

2.4.2 Heroin

NSDUH, MTF, and YRBS include questions about lifetime, use of heroin. NSDUH and MTF also include questions about use of heroin in the past year and past month. However, the highest NSDUH estimate of current heroin use among youths in school was only 0.2 percent for those in the 12th grade (Table C.2.28). Therefore, this section focuses on lifetime and past year estimates of heroin use.

- Estimates of lifetime heroin use in NSDUH were 0.1 percent for 8th graders, 0.3 percent for 9th graders, 0.4 percent for 10th graders, 0.5 percent for 11th graders, and 0.6 percent for 12th graders (Tables C.2.26 and C.2.29). The prevalence of lifetime use in NSDUH for 12th graders was higher than that for 8th and 9th graders. For MTF, the estimated lifetime prevalence of heroin use was 1.5 percent among students in the 8th, 10th, and 12th grades. The YRBS estimate of lifetime heroin use among 11th graders (2.2 percent) was *lower* than the estimate for 9th graders (3.0 percent) (Table C.2.29).
- NSDUH, MTF, and YRBS estimated a higher prevalence of lifetime heroin use for males than for females in the 12th grade (NSDUH: 0.9 vs. 0.4 percent; MTF: 1.8 vs. 1.1 percent; YRBS: 3.7 vs. 1.3 percent) (Tables C.2.26 and C.2.29).
- The MTF prevalence of lifetime heroin use was lower among blacks in the 12th grade (0.8 percent) than among whites (1.5 percent) or Hispanics (1.8 percent) at this grade (Table C.2.26). The prevalence among blacks in NSDUH (0.2 percent) also was lower than the prevalence among whites (0.8 percent). Within YRBS, however, estimates in the 12th grade did not differ significantly for whites, blacks, and Hispanics (Table C.2.29).

- MTF and YRBS estimated a higher prevalence of lifetime heroin use than NSDUH did at each grade (Tables C.2.26 and C.2.29). For 12th graders, the estimates of lifetime heroin use were 2.5 percent in YRBS, 1.5 percent in NSDUH, and 0.6 percent in NSDUH.
- YRBS estimates of lifetime heroin use were significantly greater than corresponding MTF estimates for 10th graders (2.4 vs. 1.5 percent) and 12th graders (2.5 vs. 1.5 percent) (Tables C.2.26 and C.2.29). This pattern of higher lifetime heroin use estimates for YRBS than for MTF also held for males in the 12th grade (3.7 vs. 1.8 percent) but not for females (1.3 and 1.1 percent).
- Estimates of past year heroin use in NSDUH were 0.1 percent for 8th graders and 0.3 percent for 10th and 12th graders (Table C.2.27). For MTF, the estimated past year prevalence of heroin use was 0.9 percent for 8th and 10th graders and 0.8 percent for 12th graders.
- Similar to the pattern observed for lifetime heroin use, MTF estimated a higher prevalence of past year heroin use for males than for females in the 12th grade (1.1 vs. 0.5 percent) (Table C.2.27). The NSDUH estimate of past year heroin use for males in the 12th grade (0.5 percent) was not significantly different from the corresponding estimate for females (0.2 percent).

2.4.3 Ecstasy

NSDUH and YRBS both include questions about lifetime use of "Ecstasy" (3,4-methylenedioxymethamphetamine, or MDMA). MTF also includes questions about Ecstasy, but only for subsamples of respondents in each grade. Therefore, this section discusses estimates of lifetime Ecstasy use among youths based on NSDUH and YRBS. All estimates of lifetime Ecstasy use in NSDUH and YRBS are shown in Table C.2.30.

- Estimates of lifetime Ecstasy use in NSDUH were 2.0 percent for 9th graders, 2.6 percent for 10th graders, 4.5 percent for 11th graders, and 6.0 percent for 12th graders. YRBS estimates of lifetime Ecstasy use were 7.2 percent for 9th graders, 6.8 percent for 10th graders, 7.9 percent for 11th graders, and 9.1 percent for 12th graders. The lifetime prevalence of 7.2 percent for 9th graders in YRBS was not significantly different from the prevalence of 6.8 percent for 10th graders.
- Females in the 9th and 11th grades in NSDUH were more likely than their male counterparts to be lifetime Ecstasy users but the prevalence did not differ by gender for the 10th and 12th grades. In YRBS, females were more likely than males to be lifetime Ecstasy users in each grade.

- Except for 9th graders in YRBS, NSDUH and YRBS found that blacks were less likely than whites or Hispanics in each grade to be lifetime Ecstasy users. Among 12th graders, for example, NSDUH estimated that the prevalence of lifetime Ecstasy use was 2.5 percent for blacks, 4.8 percent for Hispanics, and 7.0 percent for whites. Corresponding YRBS estimates for 12th graders were 5.1 percent for blacks, 8.9 percent for whites, and 11.7 percent for Hispanics. The estimate of lifetime Ecstasy use among 12th graders in NSDUH also was significantly different for whites and Hispanics but not in YRBS.
- YRBS estimated a higher prevalence of lifetime Ecstasy use than NSDUH did at each grade. For 9th graders, the YRBS estimate was 7.2 percent, and the NSDUH estimate was 2.0 percent. For 12th graders, the YRBS estimate was 9.1 percent, and the NSDUH estimate was 6.0 percent. YRBS also estimated a higher prevalence of lifetime Ecstasy use than NSDUH did for both males and females in each grade.
- Among 12th graders, the YRBS estimate of lifetime Ecstasy use for Hispanics and blacks (11.7 and 5.1 percent) were greater than the corresponding NSDUH estimates (4.8 and 2.5 percent). However, estimates of lifetime Ecstasy use among 12th grade whites did not differ significantly between YRBS and NSDUH (8.9 and 7.0 percent).

2.4.4 Inhalants

NSDUH and MTF include questions about lifetime, past year, and past month use of inhalants. Questions about use of inhalants are administered to all youths in NSDUH and to all students in the 8th and 10th grades in MTF but only to a subsample of students in the 12th grade in MTF. YRBS asks only about lifetime use of inhalants.

- Unlike the other substances discussed in this section, NSDUH, MTF, and YRBS all showed a pattern in which the prevalence of lifetime use of inhalants was *higher* among 8th graders in NSDUH and MTF and among 9th graders in YRBS than among 12th graders in each of these surveys (Tables C.2.31 and C.2.34). The lifetime prevalence in NSDUH decreased from 12.0 percent of 8th graders to 10.4 percent of 12th graders. For MTF, the lifetime prevalence decreased from 16.1 percent of 8th graders to 10.9 percent of 12th graders. For YRBS, the lifetime prevalence decreased from 14.2 percent of 9th graders to 10.7 percent of 12th graders. The prevalence of lifetime use among 10th graders in MTF (13.1 percent) also was significantly different from the prevalence among 8th and 12th graders.
- Decreases in the prevalence of lifetime inhalant use between the earliest and latest grades also were observed in NSDUH, MTF, and YRBS for females and in MTF for males (Tables C.2.31 and C.2.34). In MTF, the prevalence of lifetime inhalant use among females also decreased from 17.4 percent of 8th graders to 13.8 percent of 10th graders and then to 9.7 percent of 12th graders.

- The prevalence of lifetime inhalant use in MTF was lower among 12th graders who were white, black, or Hispanic than for their counterparts in the 8th grade (Table C.2.31). The same pattern of significant decreases in the prevalence of lifetime inhalant use between the 9th and 12th grades was observed in YRBS for white, black, and Hispanic students. For NSDUH, however, the lifetime prevalence among 12th graders was lower than that for 8th graders for blacks (10.8 vs. 4.8 percent) but not for whites or Hispanics. The lifetime prevalence among blacks in NSDUH also was lower among 10th graders (6.6 percent) than among 8th graders but did not differ significantly between 10th and 12th graders.
- In NSDUH, females in the 9th grade were more likely than males in this grade to be lifetime inhalant users (13.2 vs. 10.7 percent) (Table C.2.34). However, 12th grade males were more likely than 12th grade females to be lifetime users (11.2 vs. 9.5 percent). In MTF, females in the 8th and 10th grades were more likely than their male counterparts to be lifetime inhalant users (Table C.2.31). In the 12th grade, however, the lifetime prevalence in MTF was higher for males than for females (12.3 vs. 9.7 percent). Similar to the pattern in NSDUH, YRBS estimated a higher prevalence of lifetime inhalant use for females than for males in the 9th grade (16.3 vs. 12.3 percent) and a higher prevalence for males than females in the 12th grade (11.5 vs. 9.8 percent). The prevalence of lifetime inhalant use for 10th grade females in YRBS (13.8 percent) also was greater than the prevalence for males in this grade (12.0 percent).
- NSDUH estimated that blacks in the 8th grade had a prevalence of lifetime inhalant use (10.8 percent) that was comparable to the estimates for whites (12.1 percent) and Hispanics (11.8 percent) in this grade (Table C.2.31). Because the lifetime prevalence in NSDUH remained stable between the 8th and 12th grades for whites and Hispanics but not for blacks, the estimate for blacks in the 12th grade was half or less of the estimate for whites or Hispanics at this grade.
- MTF also showed a decline in the prevalence of lifetime inhalant use among blacks, from 12.0 percent in the 8th grade to 8.0 percent in the 10th grade and then to 5.5 percent in the 12th grade (Table C.2.31). For YRBS, the prevalence of lifetime inhalant use among blacks decreased from 9.6 percent in the 9th grade to 4.3 percent in the 12th grade (Table C.2.34).
- The prevalence of lifetime inhalant use in the 8th grade was higher for MTF (16.1 percent) than for NSDUH (12.0 percent) (Table C.2.31). By the 12th grade, the lifetime prevalence estimates between the two surveys were comparable for students overall (10.4 percent for NSDUH and 10.9 percent for MTF), and by gender and race/ethnicity.

- Estimates of lifetime inhalant use in YRBS in the 9th grade (14.2 percent) and 10th grade (12.9 percent) were higher than the corresponding NSDUH estimates (11.9 and 11.6 percent) (Table C.2.34). This pattern of higher estimates in YRBS than in NSDUH also occurred for females in these two grades. Higher estimates of lifetime use among males in YRBS than in NSDUH were observed for 9th graders but not for 10th graders. Overall estimates of lifetime inhalant use were not significantly different between NSDUH and YRBS in the 11th and 12th grades or for males and females within these two grades.
- According to NSDUH, an estimated 5.5 percent of youths in the 8th grade used inhalants in the past year, and 1.6 percent were current users (Tables C.2.32 and C.2.33). For 10th graders, 4.4 percent of youths used inhalants in the past year and 1.3 percent were current users. For 12th graders, the estimates were 3.1 percent for past year use and 0.5 percent for current use. Rates of current use did not differ significantly between the 8th and 10th grades but were lower in the 12th grade than in the 10th grade.
- MTF estimated that 8.8 percent of youths in the 8th grade used inhalants in the past year, and 4.1 percent were current users (Tables C.2.32 and C.2.33). For 10th graders, 6.1 percent of youths used inhalants in the past year, and 2.3 percent were current users. For 12th graders, the estimates were 4.2 percent for past year use and 1.5 percent for current use. Past year and current use decreased as the grade increased.
- Estimates of past year and current use of inhalants in NSDUH did not differ significantly between males and females in the 8th or 10th grades (Tables C.2.32 and C.2.33). Past year and current inhalant use also was more prevalent among females than males in the 8th grade for MTF. In both NSDUH and MTF, 12th grade males were more likely than females to be past year or current users of inhalants.
- MTF estimated a higher prevalence of past year and current use of inhalants than NSDUH did for all students at each grade (Tables C.2.32 and C.2.33).

2.5. Summary

NSDUH and MTF generally provide similar findings about trends in the prevalence of use of cigarettes, alcohol, and marijuana among 12th graders. In both surveys, the lifetime prevalence of use of cigarettes, alcohol, and marijuana among 12th graders decreased from 2002 to 2008. In addition, NSDUH and MTF indicated that the prevalence of current use of cigarettes and alcohol decreased over this period. Although the change in current marijuana use from 2002 to 2008 was significant for NSDUH, the difference in estimates between these 2 years was not significant for MTF.

To a large extent, also NSDUH, MTF, and YRBS show similar patterns and correlates of substance use within each survey. As summarized in Sections 2.1.3, 2.2.3, and 2.3.3, for example, NSDUH, MTF, and YRBS indicated in each survey or in two of the three surveys that males in the 12th grade were more likely than females in this grade to be current users of cigarettes, alcohol (for NSDUH and MTF but not for YRBS), marijuana, and cocaine. In addition, NSDUH and YRBS both indicated that males were more likely than females in all

grades from the 9th through 12th to be current users of smokeless tobacco and cigars and for males in the 10th through 12th grades to be more likely than females in these grades to have engaged in binge alcohol use in the past 30 days.

Similarly, these surveys showed similar patterns of substance use by race/ethnicity among 12th graders. For example, 12th grade whites were more likely than blacks at this grade to be current cigarette users, current alcohol users, or current cocaine users. All three surveys also found that 12th grade whites were more likely than 12th grade Hispanics to be current cigarette users. In addition, NSDUH and YRBS indicated that 12th grade whites were more likely than 12th grade blacks or Hispanics to be current binge alcohol users. Two of the three surveys (NSDUH and MTF) found that whites were more likely than Hispanics in the 12th grade to be current marijuana users.

These surveys notably differ in the *sizes* of their respective prevalence estimates. When estimates existed for a particular substance use measure in NSDUH, MTF, and YRBS, NSDUH estimates that were subset to students as a general rule were lower than corresponding estimates for the two school-based surveys (MTF and YRBS). In turn, YRBS estimates for 10th and 12th graders tended to be greater than corresponding estimates from MTF. Estimates for NSDUH also converged more closely with or became comparable with estimates from MTF and YRBS by the 12th grade. The lower estimates in NSDUH than in the school-based surveys are consistent with prior research, which suggests that privacy issues in household surveys can reduce youths' reporting of substance use in these surveys (Brenner et al., 2006; Fendrich & Johnson, 2001; Gfroerer et al., 1997; Griesler et al., 2008; Johnson & Bowman, 2003; Kann et al., 2002). The convergence of the household estimates from NSDUH with the school-based estimates from MTF and YRBS by the 12th grade also may support the hypothesis that adolescent substance users may underreport their use in household settings because of privacy issues, if older adolescents are less concerned about the consequences of reporting these behaviors or if they are given greater privacy to take a survey than a younger adolescent might be given. Chapter 4 provides further discussion of the issue of interview privacy and prevalence estimates.

An exception to this general pattern of lower estimates in NSDUH than in MTF and YRBS was observed for current cigarette use. Although NSDUH estimates of current cigarette use were lower than corresponding MTF or YRBS estimates for 8th and 9th graders, NSDUH estimates of current cigarette use in the 11th and 12th grades were comparable with the YRBS estimates and were *higher* than the MTF estimate for 12th graders. One factor that may explain this finding is that cigarette use would not be an illegal behavior for 12th graders who had reached their 18th birthday by the spring of their senior year in high school. However, YRBS continued to yield higher estimates of current use of smokeless tobacco and cigars among 12th graders than NSDUH did.

As noted in Appendix A, factors other than interview privacy are likely to contribute to differences in prevalence estimates between household and school-based surveys, such as procedures for obtaining parental permission for youths to participate in the surveys, interview format and skip logic, and procedures for handling inconsistent or missing data. For example, NSDUH includes features to assist respondents in defining the past 12 month and past 30 day reference periods for reporting substance use. Specifically, NSDUH respondents are shown a calendar at the beginning of the interview to define these reference periods. When respondents who reported lifetime use of a given substance are asked when they last used it, the computer program for the interview also uses the interview date to calculate the beginning date for the past

30 days. The paper-and-pencil questionnaires for MTF and YRBS do not include these kinds of features to assist respondents in defining the starting points for the past 30 days (in the case of both surveys) or the past 12 months (for MTF). Consequently, some "telescoping" could occur in these two surveys, in which respondents whose most recent use was outside of—but close to—the past 12 months or past 30 days misreport their use as having occurred more recently.

As noted in Section 1.4 in Chapter 1, MTF and YRBS respondents also report the number of occasions (in MTF) or days (in YRBS) on which they have used a substance either in their lifetime or during the past year or month. Respondents in these surveys indicate that they have never used a substance in the period of interest by reporting that they used it on "0" occasions or days. In contrast, NSDUH asks about lifetime use as a yes/no question and identifies past year or past month users according to when lifetime users report that they last used the substance. Therefore, differences in estimates may reflect different measurement methods in these surveys.

Findings of higher estimates in YRBS than in MTF also suggest that factors other than interview privacy can affect survey estimates of adolescent substance use. For example, the finding of higher estimates for 10th graders in YRBS than in MTF—despite both surveys being anonymous at this grade—suggests that other factors are operating that affect survey estimates of substance use among youths. In addition to potential differences in the proportions of school districts in each year's MTF and YRBS samples that allowed passive parental permission, youths in YRBS who were absent from school on the day of survey administration may have the opportunity to take the survey on a later date; MTF does not include follow-up efforts for students who were absent from school. Potential effects on prevalence estimates because of students being absent from school are discussed further in Chapter 3.

Additional issues for readers to consider are the weighting and variance estimation procedures in these surveys and the procedures that were used to test for statistically significant differences in estimates between surveys. As noted in Section B.2.1 in Appendix B, the analysis weights for the MTF and YRBS data that are available for public use have been modified to protect school and respondent confidentiality. In addition, publicly available data for MTF did not include the stratification and clustering variables for variance estimation (see Section B.2.2). MTF also has an approximately 50 percent overlap in schools that are sampled for consecutive survey years (see [Table A.1](#) in Appendix A). Therefore, covariances also needed to be computed between the consecutive MTF survey years. Statistical significance of comparisons presented in this chapter may differ based on the weights and design variables in the restricted-use data for MTF and YRBS.

Despite differences in the sizes of prevalence estimates for NSDUH, MTF, and YRBS, all three surveys also identified the same counterintuitive phenomenon of decreasing prevalence of lifetime inhalant use between the lowest and highest grades. In contrast, these surveys find that the lifetime prevalence of use of other substances increases from the lowest to highest grades. All three of these surveys collect data from secondary and high school-aged youths with a cross-sectional design using separate samples rather than a longitudinal design, in which the same sample of youths is followed during their secondary and high school years. Nevertheless, lifetime prevalence would be expected to increase as grade increases; the cohort of youths who used a substance in an earlier grade would remain lifetime users in subsequent grades, and the lifetime prevalence would increase between grades if additional youths initiated use in the interim period. Chapter 5 includes further discussion of the special issue of this finding for the prevalence of lifetime inhalant use and suggests possible explanations for this finding.

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3. Effects of Dropouts, Absentees, and Seasonality on Adolescent Substance Use Estimates in NSDUH

As noted in Chapter 1 and Appendix A, school-based surveys such as Monitoring the Future (MTF) and the Youth Risk Behavior Survey (YRBS) do not include youths who have dropped out of school. MTF also does not include data from youths who were absent on the day of survey administration at the sampled schools. YRBS makes follow-up attempts to obtain data from youths who were absent on the day of survey administration but nevertheless does not obtain complete coverage of these youths. School dropouts and those who often are absent from school are at increased risk of substance use (Bachman, Johnston, & O'Malley, 1981; Gfroerer et al., 1997; Johnston & O'Malley, 1985). Researchers for MTF and YRBS indicate that the surveys allow inferences to be made for secondary school students (for MTF, this includes 8th graders) or high school students (for YRBS) (Brener et al., 2004b; Johnston, O'Malley, Bachman, & Schulenberg, 2009). However, policymakers and others may use these school-based survey data to make inferences about substance use among youths in the United States as a whole. Depending on the effects of the exclusion of dropouts and frequent absentees from school-based surveys, data from these surveys may not generalize to the population of adolescents as a whole.

Therefore, this chapter uses combined data from the 2002 to 2008 National Surveys on Drug Use and Health (NSDUHs) to examine effects of school dropouts and absentees on substance use estimates. The chapter also examines relationships between the seasonality of NSDUH interviews (i.e., whether they were conducted in January through June or in July through December of a given survey year) and estimates of substance use among youths.

3.1. Effects of Dropouts

NSDUH defined persons aged 12 to 25 as being enrolled in school if they reported that (1) they were enrolled in or attending school or (2) they did not report being enrolled in school because they were on vacation or break from school, and they planned to return to school when their vacation was over. Persons who were defined as enrolled in school were asked to report the grade that they were currently in or the grade that they would be in when they returned to school after their vacation.

Conversely, NSDUH defined persons aged 12 to 25 as not being enrolled in school if they reported that (1) they were not enrolled in or attending school and were not on vacation from school or (2) they were on vacation from school and did not plan to return to school when their vacation was over. Persons aged 12 to 25 who were not enrolled in school were asked whether they had received a high school diploma or GED (general educational development) certificate of high school completion. A school dropout was defined to have completed less than the 12th grade, not to be currently enrolled in school, and not to have received either a high school diploma or a GED certificate.

Analyses in this section focus on estimates for youths who were enrolled in a given grade in school and youths who had dropped out of school but *would have* been at that corresponding grade level if they had not dropped out. Estimates for youths at a given grade level were made for the following groups based on interviews conducted in January through December:

(1) nondropouts only; (2) dropouts only (i.e., who were assumed to be at that grade); and (3) both dropouts and nondropouts. Use of the full 12 months of data from a given survey year improved the precision of estimates based only on dropouts. Therefore, estimates excluding dropouts at a given grade may differ from corresponding estimates presented in Chapter 2 for youths who were in school at that grade.

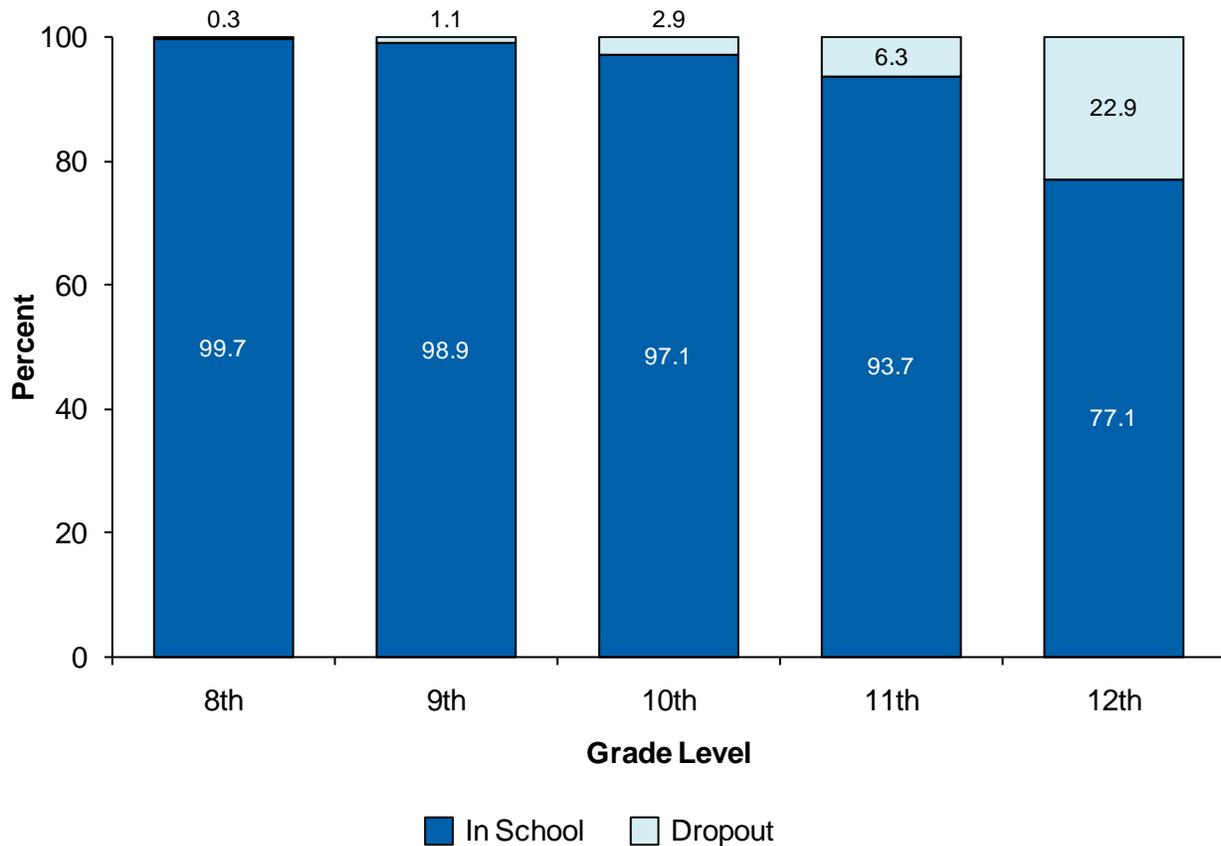
Because dropouts by definition were not asked to report their current grade in school, available NSDUH data were used to assign assumed grade levels to these dropouts. Specifically, NSDUH includes information on dropouts' current ages, the highest school grade they completed, and their age when they left school. Appendix B gives additional details about the assumptions and procedures for assigning grade levels to dropouts.

Dropouts whose ages were within narrowly defined ranges relative to both their highest grade and their expected next highest grade if they had remained in school (see [Table B.2](#) in Appendix B) were considered to have dropped out of school relatively recently. These youths were assigned to be at the next highest grade level in school based on their highest completed grade and current age. For example, if a dropout completed the 10th grade and was aged 15 to 18, the inference was made that the youth would have been at the 11th grade level if he or she were still in school.

If youths had dropped out of school less recently or if they were older than the typical age range for youths who had completed a given grade, their current age, highest grade completed, and age when they left school were used to assign a grade level. The difference between the current age and age when a dropout left school was added to the current grade level, and then the assumed grade level was further incremented by 1 year. For example, if a dropout's last grade was the 9th grade, the base assumption was that the dropout's next grade level would be the 10th grade. Thus, if there was no difference between the dropout's current age and his or her age when the dropout left school, the dropout was assumed to be at the 10th grade level; this procedure allowed for assignment of grade levels to youths who left school at their current age but were older than most youths in that grade when they dropped out. Extending this example, if there was a 1-year difference between the two ages, the dropout was assumed to be at the 11th grade level, and if there was a 2-year difference, the dropout was assumed to be at the 12th grade level. If dropouts were aged 17 or 18 and they did not report an age when they had left school, it was assumed that they would be at the 12th grade level. In addition, the current grade was capped at the 12th grade level if this calculation procedure yielded an assumed grade level past the 12th grade. Dropouts for whom these procedures did not yield an assumed grade level within the 8th through 12th grades (as if they had remained in school) were excluded from further analysis.

Based on these procedures, 97 percent or more of the youths at the 8th, 9th, or 10th grade levels were identified as being in school ([Figure 3.1](#)). In particular, 99.7 percent of youths at the 8th grade level were classified as being in school, and only 0.3 percent were classified as dropouts who would be at this grade level if they were still in school. Dropouts would comprise more than one in five of the older adolescents assigned to the 12th grade level.

Figure 3.1 Student in School and Dropout Composition at the 9th through 12th Grade Levels: 2002 to 2008 NSDUH

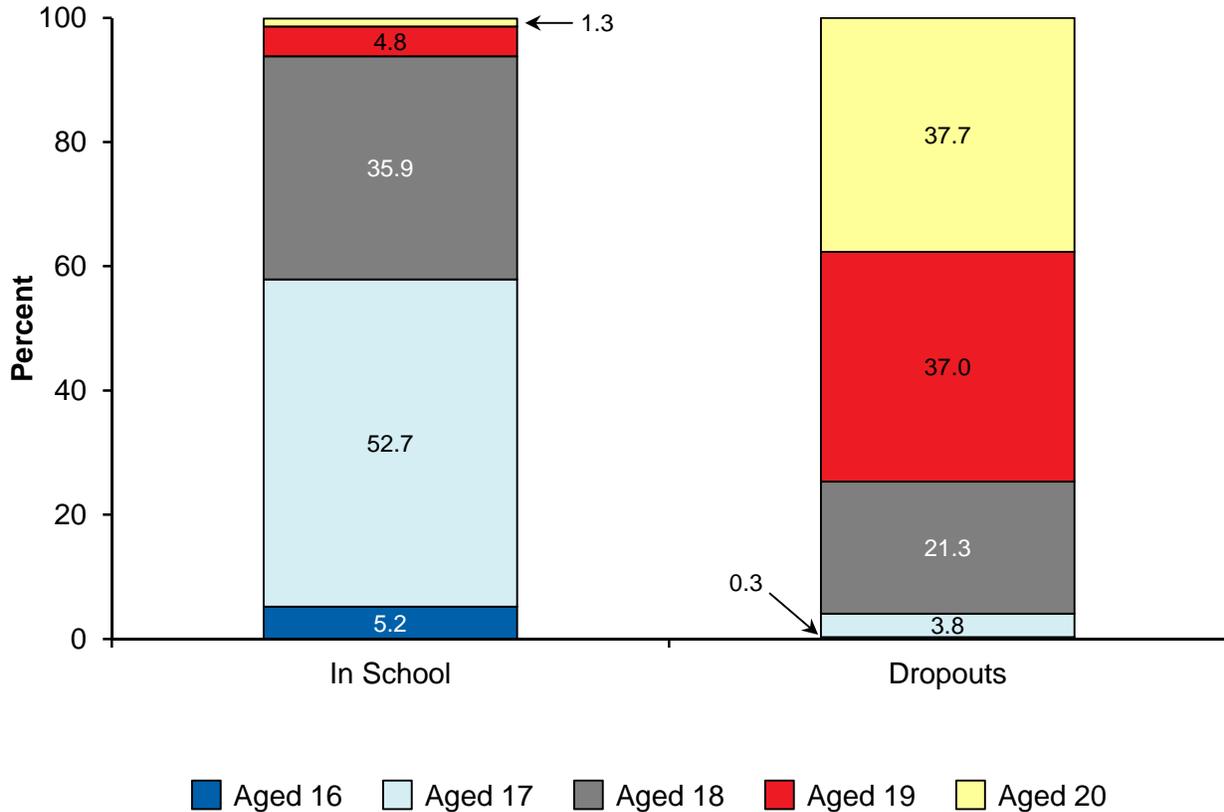


Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008.

Among students in the 12th grade, 52.7 percent were aged 17, 35.9 percent were aged 18, and about 6 percent were aged 19 (4.8 percent) or 20 (1.3 percent) (Figure 3.2). Among dropouts who were assigned to the 12th grade level based on these procedures (i.e., the highest proportion of dropouts assigned to a given grade level), less than 5 percent were aged 17 or younger. More than half were aged 19 (37.0 percent) or 20 (37.7 percent), and 21.3 percent were aged 18.

Two sets of substance use estimates at a given grade were compared when estimates had acceptable precision (see Appendix B): (1) estimates excluding dropouts (shown in tables as "Without Dropouts") versus those for dropouts only; and (2) estimates including both dropouts and youths in school (shown in tables as "With Dropouts") versus those excluding dropouts.

Figure 3.2 Age Distributions among Students in School and Dropouts at the 12th Grade Level: 2002 to 2008 NSDUH



NOTE: Data are not shown for youths aged 15 (0.1 percent of 12th graders in school and 0.0 percent of dropouts assigned to the 12th grade level). Percentages for dropouts assigned to this grade level do not sum to 100 because of rounding.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008.

Elsewhere in this section, dropouts who were assumed to be at a given grade level may simply be referred to as being at that grade level for the sake of brevity. For the first set of comparisons, estimates were mutually exclusive. For the second set of comparisons, estimates were not mutually exclusive; statistical testing took this into account.

3.1.1 Comparison of Substance Use Estimates for Dropouts and Nondropouts

Dropouts who were assigned to a given grade level typically were more likely to be substance users than their counterparts who were in school (i.e., nondropouts). Highlights are presented for comparison of selected substance use estimates among dropouts and nondropouts. Notable exceptions to patterns of higher estimates among dropouts than among nondropouts also are presented.

In addition, for the subgroup consisting only of school dropouts, substance use estimates did not have acceptable precision for dropouts who were assigned to the 8th grade level. Most or all substance use estimates specifically for dropouts also did not have acceptable precision for females who were assigned to the 9th grade level or for several racial/ethnic groups at the 9th

through 12th grade levels. However, estimates for dropouts who were assigned to the 12th grade level often had adequate precision for whites, blacks, and Hispanics.

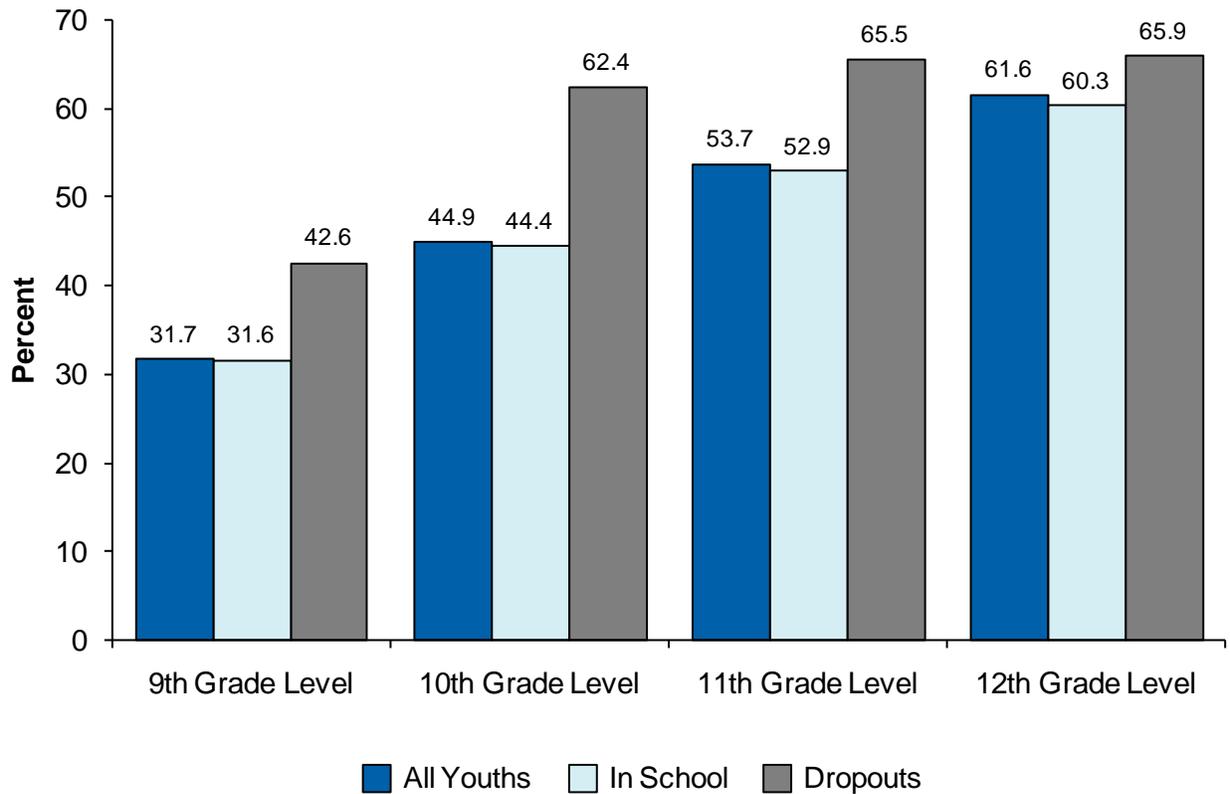
Tobacco

- Dropouts at the 9th or 10th grade levels were almost 3 times as likely to have used cigarettes in the past year as their counterparts who were in school ([Table C.3.1B](#)). For example, 64.6 percent of dropouts at the 10th grade and 22.4 percent of 10th graders who were in school were past year cigarette users. At the 12th grade, an estimated 62.4 percent of dropouts and 34.0 percent of those in school were past year cigarette users.
- More than half of dropouts assigned to the 10th, 11th, or 12th grade levels were current (i.e., past month) cigarette users ([Table C.3.2B](#)). Corresponding estimates of current cigarette use for youths who were in school were 14.1 percent of 10th graders, 19.0 percent of 11th graders, and 24.3 percent of 12th graders.
- Dropouts were more likely than nondropouts to be current cigar users at the 9th through 12th grade levels ([Table C.3.4B](#)). For example, 17.2 percent of dropouts who were assigned to the 12th grade level and 11.2 percent of 12th graders who were in school were current cigar users. For blacks at the 12th grade level, the estimate of current cigar use for dropouts (16.5 percent) was greater than the estimate for those who were in school (8.1 percent).

Alcohol

- Dropouts at the 9th through 11th grade levels were more likely to be past year alcohol users than were their counterparts who were in school ([Table C.3.5B](#) and [Figure 3.3](#)). For example, 65.5 percent of dropouts at the 11th grade level and 52.9 percent of 11th graders who were in school were past year alcohol users. At the 12th grade level, estimates of past year alcohol use started to converge for dropouts (65.9 percent) and those who were in school (60.3 percent), but estimates still were greater for dropouts than for nondropouts at this grade level. However, estimates of past year alcohol use among females were identical for dropouts and nondropouts at the 12th grade level (59.3 percent).
- More than 40 percent of dropouts assigned to the 10th, 11th, or 12th grade levels were current alcohol users ([Table C.3.6B](#)). Corresponding estimates of current alcohol use for youths who were in school were 21.7 percent of 10th graders, 28.7 percent of 11th graders, and 36.7 percent of 12th graders.

Figure 3.3 Past Year Alcohol Use among Students and Dropouts at the 9th through 12th Grade Levels: 2002 to 2008 NSDUH



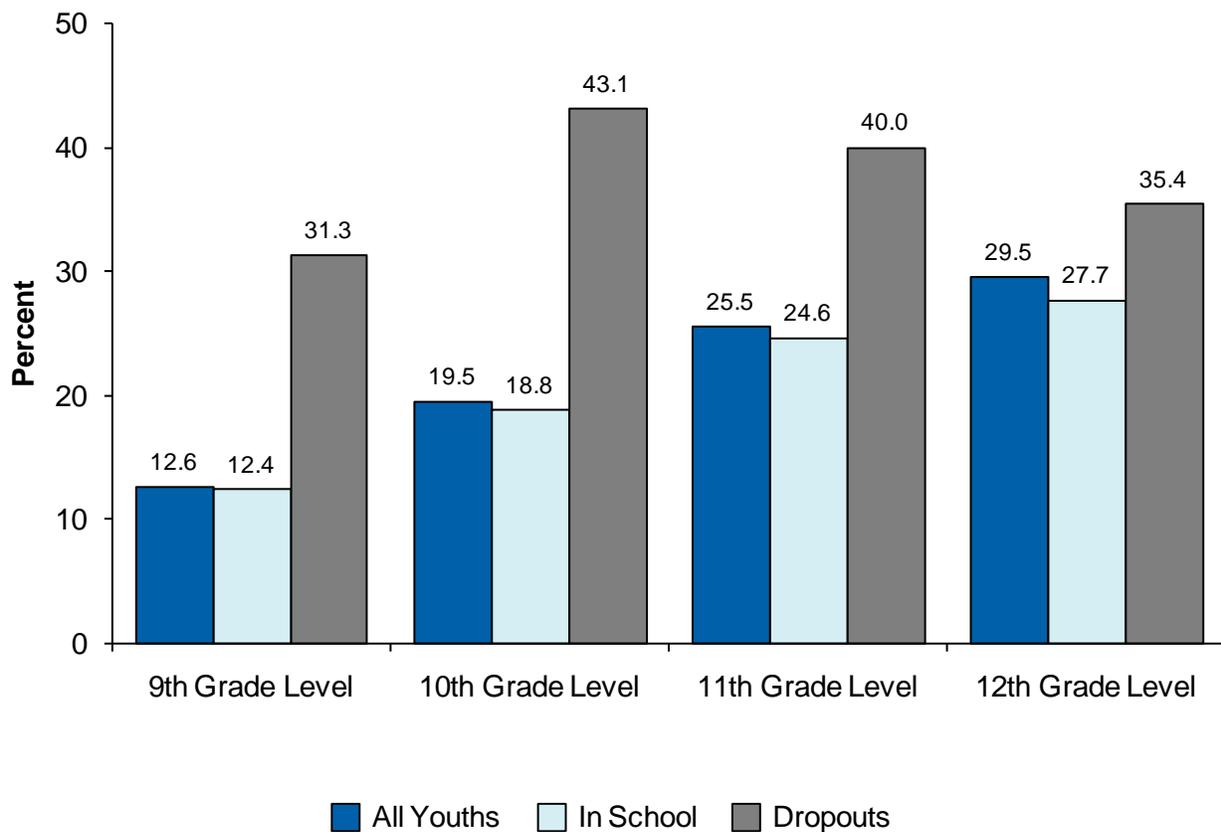
Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008.

- Dropouts assigned to the 9th grade level were about 2.8 times as likely as nondropouts at this grade to be current binge alcohol users (22.1 vs. 7.8 percent) (Table C.3.7B). At the 10th grade level, dropouts were about 2.5 times as likely as nondropouts to be current binge alcohol users (33.1 vs. 13.2 percent). At the 12th grade level, the estimate of current binge alcohol use for dropouts was about 1.4 times the estimate for those who were in school (35.5 vs. 25.0 percent). However, blacks at the 12th grade level who were classified as dropouts were about 2.7 times as likely to be current binge alcohol users as their counterparts who were in school (27.9 vs. 10.3 percent).

Marijuana

- An estimated 31.3 percent of dropouts at the 9th grade level used marijuana in the past year (Table C.3.8B and Figure 3.4). In comparison, 12.4 percent of 9th graders who were in school were past year marijuana users. At the 12th grade level, estimates of past year marijuana use started to converge for dropouts (35.4 percent) and those who were in school (27.7 percent) but still were greater for dropouts than for nondropouts at this grade. Estimates of past year marijuana use at the 12th grade level for whites and blacks who were dropouts (44.4 and 36.6 percent) were about 1.5 to 1.6 times the corresponding estimates for those who were in school (30.4 percent for whites and 23.1 percent for blacks). However, past year marijuana use was not significantly different for Hispanic dropouts (22.8 percent) and their counterparts in school at this grade level (24.9 percent).
- Dropouts assigned to the 9th grade level were more than 3 times as likely as nondropouts at this grade to be current marijuana users (20.6 vs. 6.2 percent) (Table C.3.9B). By the 12th grade level, the estimate of current marijuana use for dropouts (23.4 percent) was about 1.5 times the estimate for youths who were in school (15.2 percent).

Figure 3.4 Past Year Marijuana Use among Students and Dropouts at the 9th through 12th Grade Levels: 2002 to 2008 NSDUH



Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008.

Cocaine

- Dropouts who were assigned to the 9th grade level were about 10 times as likely as 9th graders who were in school to be past year cocaine users (10.1 vs. 1.0 percent) (Table C.3.10B). By the 12th grade level, the estimate of past year cocaine use for dropouts was about 2.3 times the estimate for 12th graders who were in school (9.4 vs. 4.1 percent). Estimates of past year cocaine use for dropouts at the 12th grade level were about 3 times the estimates of those who were in school for whites (13.8 vs. 4.8 percent) and blacks (1.9 vs. 0.6 percent). Among Hispanics at the 12th grade level, however, the estimate of past year cocaine use was not significantly different for dropouts and for those who were in school (7.0 vs. 5.5 percent).
- The estimate of current cocaine use for dropouts who were assigned to the 9th grade level was more than 10 times the estimate for 9th graders who were in school (3.5 vs. 0.3 percent) (Table C.3.11B). By the 12th grade level, the estimate of current cocaine use for dropouts was about 2.8 times the estimate for 12th graders who were in school (3.4 vs. 1.2 percent). Among whites, blacks, and Hispanics at the 12th grade level, dropouts also were more likely than those who were in school to be current cocaine users.

Inhalants

- Unlike the pattern for other substances, the prevalence of past year use of inhalants was *lower* for dropouts (2.8 percent) at the 9th grade level than for 9th graders who were in school (5.0 percent) (Table C.3.12B). The prevalence of past year use of inhalants did not differ significantly between dropouts and students at the 10th through 12th grade levels. At the 10th grade level, for example, 4.5 percent of dropouts and 4.3 percent of those who were in school were past year users of inhalants.
- Estimates of current use of inhalants showed the same pattern as past year use, with 9th graders who were dropouts being less likely to be current users (0.5 percent) than those who were in school (1.4 percent) (Table C.3.13B). The prevalence of current use also did not differ significantly for dropouts who were assigned to the 10th through 12th grade levels and corresponding youths at these grades who were in school.
- Female dropouts at the 9th through 12th grade levels were less likely than their counterparts who were in school to be past year or current users of inhalants (Tables C.3.12B and C.3.13B). For example, 5.6 percent of females who were in school in the 9th grade were past year users of inhalants. However, only 1.9 percent of female dropouts who were assigned to the 9th grade level were past year users.

Ecstasy

- Dropouts who were assigned to the 9th through 12th grade levels were more likely than their counterparts who were in school to be lifetime Ecstasy users (Table C.3.14B). The estimate of lifetime Ecstasy use for dropouts who were assigned to the 10th grade level was 6.3 times the estimate for 10th graders who were in school (14.6 vs. 2.3 percent). At the 12th grade level, the estimate for dropouts was 2.7 times the estimate for those who were in school (14.7 vs. 5.5 percent).
- The estimates of lifetime Ecstasy use for dropouts at the 12th grade level was 2.5 times the corresponding estimate for those who were in school for males (14.6 vs. 5.8 percent) and was 2.8 times the corresponding estimate for those who were in school for females (14.8 vs. 5.3 percent). Among 12th graders who were white, black, or Hispanic, the estimates for dropouts were 3.2 times the estimate for those who were in school for whites (21.2 vs. 6.5 percent), 3.8 times the estimate for those who were in school for blacks (9.6 vs. 2.5 percent), and 1.7 times the estimate for those who were in school for Hispanics (8.2 vs. 4.8 percent) (Table C.3.14B).

Heroin

- Dropouts who were assigned to the 11th or 12th grade levels were more likely than their counterparts who were in school to be lifetime heroin users (Table C.3.15B). For dropouts at both grades, an estimated 2.5 percent were lifetime heroin users. Corresponding estimates for youths who were in school were 0.4 percent for 11th graders and 0.6 percent for 12th graders.
- Dropouts at the 12th grade were more likely than youths who were in school in the 12th grade to be lifetime heroin users for males (2.6 vs. 0.8 percent), females (2.2 vs. 0.3 percent), and whites (4.3 vs. 0.7 percent) (Table C.3.15B).

3.1.2 Effects of Dropouts on Substance Use Estimates

This section discusses the effects on prevalence estimates for youths in the 8th through 12th grade levels when data from dropouts at those grade levels were included along with data from youths who were in school. These estimates that included data from dropouts at a given grade level (subsequently referred to as "with dropouts") are compared with estimates at that grade that excluded dropouts (subsequently referred to as "without dropouts"). Especially at lower grade levels—in which there are very few dropouts, and students in school comprise the large majority of youths at those grade levels (Figure 3.1)—the estimates with and without dropouts were based on almost the same set of respondents. Consequently, statistical test results comparing estimates with and without dropouts could show significant differences despite small differences in the actual percentages.

Although dropouts who were assigned to a given grade level often were more likely to be past year or current substance users than their counterparts who were in school, inclusion of data from dropouts had little effect on estimated percentages of children at the 8th or 9th grade levels who were substance users, even if differences were statistically significant. In contrast, inclusion of data from dropouts showed more notable increases for some estimated percentages of

substance use at the 12th grade level. These general findings are consistent with what Gfroerer and colleagues (1997) hypothesized—that inclusion (or exclusion) of data from dropouts would have the smallest effect on estimates for 8th graders and the greatest effect on estimates for 12th graders. These findings also are consistent with U.S. Department of Education statistics on dropout rates. In the 2007-2008 school year, for example, the dropout rate (defined as the number of dropouts from a given grade divided by the number of students in that grade at the beginning of the school year) among all reporting States was 3.0 percent for the 9th grade, 3.6 percent for the 10th grade, 4.0 percent for the 11th grade, and 6.1 percent for the 12th grade (Stillwell, 2010).

Even if dropouts do not appreciably affect estimates of the *percentages* of youths in a given grade level, data from dropouts may be important for estimating the *sizes* of different populations of substance users (i.e., estimated numbers of users) for youths in at least some age categories. In particular, information about the number of users of different substances at each grade level can be useful to policymakers and planners for developing more effective substance abuse prevention and dropout prevention policies and programs. This type of information also can be useful to practitioners in identifying specific needs for prevention, intervention, or treatment services for adolescents.

Highlights are presented in this section for comparison of selected substance use estimates with and without dropouts. When an estimate that includes data from dropouts who were assigned to a given grade is significantly different from the corresponding estimate without dropouts (i.e., for students who were in school at that grade), the magnitude of the difference is presented; this is done even for statistically significant differences that were relatively small in magnitude. The purpose of presenting this information is to quantify the impact on adolescent substance use estimates when school dropouts are included or excluded.

Effects of Dropouts on Estimates at the 8th and 9th Grade Levels

At the 8th and 9th grade levels, inclusion of dropouts had little or no effect on percentages of youths who were past year or current users of cigarettes (Tables C.3.1B and C.3.2B), smokeless tobacco (only current use compared; Table C.3.3B), cigars (only current use compared; Table C.3.4B), alcohol (Tables C.3.5B and C.3.6B), marijuana (Tables C.3.8B and C.3.9B), or cocaine (Tables C.3.10B and C.3.11B). Estimates with and without dropouts were not significantly different for the following estimates: current use of smokeless tobacco, current use of marijuana, past year and current use of cocaine, past year use of inhalants, and lifetime use of Ecstasy at the 8th grade level, as well as current use of smokeless tobacco and lifetime use of heroin at the 9th grade level. However, differences between estimates with and without dropouts that were significantly different from a statistical standpoint at the 8th and 9th grade levels were small or showed no apparent differences in the estimates.

- Inclusion of dropouts at the 8th grade level had no effect on estimates to the nearest tenth of a percent for current use of cigarettes (4.9 percent with dropouts or without dropouts), past year use of marijuana (5.7 percent for both estimates), or past year use of cocaine (0.4 percent for both estimates).

- At the 9th grade level, inclusion of dropouts had little effect on the percentages of youths at this grade who were past year users of cigarettes (16.9 percent with dropouts and 16.6 percent without), alcohol (31.7 percent with dropouts and 31.6 percent without), marijuana (12.6 percent with dropouts and 12.4 percent without), or cocaine (1.1 percent with dropouts and 1.0 percent without).
- Estimated percentages of current binge alcohol use at the 8th and 9th grade levels showed little change with or without dropouts (8th grade: 3.6 and 3.5 percent; 9th grade: 7.9 and 7.8 percent) despite the differences being statistically significant (Table C.3.7B).
- Inclusion of dropouts did not change the percentages of youths at the 8th grade level who were past year inhalant users (4.9 percent) (Table C.3.12B) or who were lifetime Ecstasy users (0.7 percent) (Table C.3.14B); these differences also were not statistically significant. Similarly, inclusion of dropouts did not appreciably change the estimated percentages of 9th graders who were lifetime Ecstasy users (1.7 percent with dropouts and 1.6 percent without), although this difference was significant.

Consistent with the estimated percentages at the 8th grade level, inclusion of dropouts had little effect on estimates of the numbers of youths at this grade level who were past year or current users of cigarettes (Tables C.3.1A and C.3.2A), current users of smokeless tobacco (Table C.3.3A), current users of cigars (Table C.3.4A), past year or current users of alcohol (Tables C.3.5A and C.3.6A), current binge alcohol users (Table C.3.7A), past year or current users of marijuana (Tables C.3.8A and C.3.9A), or past year or current users of cocaine (Tables C.3.10A and C.3.11A), despite all differences in estimated numbers of users being statistically significant except for past year cocaine use and current use of smokeless tobacco and cocaine. Similar minimal effects on estimated numbers of youths at the 9th grade level who were past year or current users of these substances were observed when data from dropouts were included, although these differences were statistically significant.

- The estimated numbers of youths at the 8th grade level who were current cigarette users were 204,000 without dropouts and 208,000 with dropouts (Table C.3.2A). Inclusion of data from dropouts raised the estimated number of youths at this grade level who used alcohol in the past year by only about 6,000 youths: from 777,000 without dropouts to 783,000 with dropouts (Table C.3.5A). Similarly, the estimated number of current binge alcohol users at this grade level that included data for dropouts (152,000) was only about 3,000 more than the estimate without dropouts (149,000) (Table C.3.7A). At this grade level, an estimated 239,000 youths without dropouts and 241,000 with dropouts were past year marijuana users (Table C.3.8A).
- The estimated numbers of youths at the 9th grade level who were current cigarette users were 434,000 without dropouts and 455,000 with dropouts (Table C.3.2A). An estimated 341,000 youths at this grade level without dropouts and 352,000 with dropouts were current binge alcohol users (Table C.3.7A). Estimated numbers of past year marijuana users at this grade level were 545,000 without dropouts and 561,000 with dropouts (Table C.3.8A).

- Numbers of youths at the 8th grade level who were lifetime Ecstasy users showed little change without dropouts (29,000) or with dropouts (30,000); this difference also was not statistically significant (Table C.3.14A). Similarly, inclusion of dropouts did not appreciably change the estimated numbers of 9th graders who were lifetime Ecstasy users (72,000 without dropouts and 77,000 with dropouts), although this difference was statistically significant.

Effects of Dropouts on Estimates at the 10th and 11th Grade Levels

Inclusion of dropouts had little effect on percentages of youths at the 10th and 11th grade levels who were current users of smokeless tobacco (Table C.3.3B) or cigars (Table C.3.4B), past year or current alcohol users (Tables C.3.5B and C.3.6B), current binge alcohol users (Table C.3.7B), past year or current marijuana users (Tables C.3.8B and C.3.9B), or past year or current users of cocaine (Tables C.3.10B and C.3.11B); except for current smokeless tobacco use, however, differences in these estimated percentages with and without dropouts were statistically significant. Inclusion of data for dropouts had a more appreciable effect on estimated numbers of users at the 11th grade level.

- Percentages of youths at the 10th grade level who were past year users with and without dropouts were 44.9 and 44.4 percent for alcohol (Table C.3.5B); 19.5 and 18.8 percent for marijuana (Table C.3.8B); and 2.3 and 2.0 percent for cocaine (Table C.3.10B). At the 11th grade level, corresponding estimates of past year use with and without dropouts were 53.7 and 52.9 percent for alcohol; 25.5 and 24.6 percent for marijuana; and 3.6 and 3.1 percent for cocaine.
- For 10th and 11th graders, estimates of past year cigarette use that included dropouts (23.6 and 30.7 percent, respectively) were about 1.1 times the estimates without dropouts (22.4 and 28.4 percent, respectively) (Table C.3.1B).
- An estimated 770,000 11th graders who were in school were current cigarette users based on data without dropouts (Table C.3.2A). Inclusion of data from dropouts increased the estimated number of current cigarette users at this grade level to 927,000. Based on an estimate of 927,000 current cigarette users, therefore, 11th graders who were in school would comprise about 83 percent of the current cigarette users at this grade level.
- About 1.2 million 11th graders who were in school were current alcohol users based on data without dropouts (Table C.3.6A). Inclusion of data from dropouts increased the estimate at this grade level to about 1.3 million. Estimates of the number of youths at the 11th grade level who were current binge alcohol users were 748,000 without dropouts and 839,000 with dropouts (Table C.3.7A). Based on the estimated numbers with dropouts, 11th graders who were in school would comprise about 91 percent of the current alcohol users and about 89 percent of the current binge alcohol users at this grade level.

- Without data from dropouts, nearly 1.0 million 11th graders who were in school were estimated to be past year marijuana users (Table C.3.8A), and more than 500,000 were estimated to be current users (Table C.3.9A). When data from dropouts were included, the estimates of past year and current marijuana use increased to about 1.1 million and more than 600,000, respectively. Based on the estimated numbers with dropouts, 11th graders who were in school would comprise about 90 percent of the past year marijuana users and about 87 percent of the current users at this grade level.

Effects of Dropouts on Estimates at the 12th Grade Level Overall

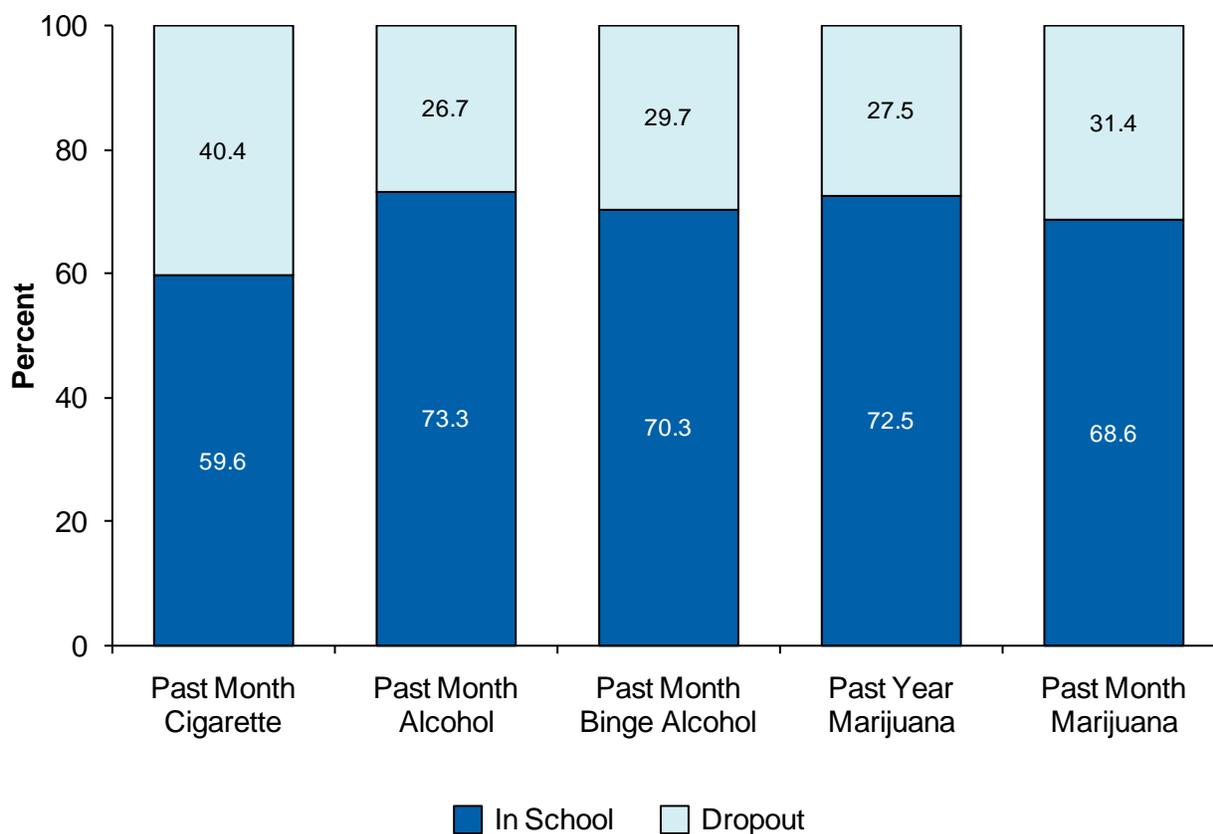
- The estimate of the percentage of persons at the 12th grade level who were past year cigarette users based on data from both dropouts and nondropouts (40.5 percent) was about 1.2 times the estimate without dropouts (34.0 percent) (Table C.3.1B). For current cigarette use at this level, the estimate with dropouts (31.4 percent) was about 1.3 times the estimated percentage without dropouts (24.3 percent) (Table C.3.2B).
- In addition, inclusion of dropouts at the 12th grade level increased the estimated percentages slightly for current cigar use (Table C.3.4B), current alcohol use (Table C.3.6B), current binge alcohol use (Table C.3.7B), past year marijuana use (Table C.3.8B), and current marijuana use (Table C.3.9B). Estimated percentages at the 12th grade level that included dropouts were about 1.1 times the estimates without dropouts for current use of cigars (12.6 vs. 11.2 percent), current binge alcohol use (27.4 vs. 25.0 percent), past year marijuana use (29.5 vs. 27.7 percent), and current marijuana use (17.1 vs. 15.2 percent). The percentage at this level who were current alcohol users based on data that included dropouts (38.6 percent) was less than 1.1 times the estimate without dropouts (36.7 percent).
- Greater effects of dropouts on the estimated percentages of substance users at the 12th grade level were observed for substances other than tobacco, alcohol, or marijuana. In particular, the estimate of past year cocaine use at this grade level that included dropouts was about 1.3 times the estimate without dropouts (5.4 vs. 4.1 percent) (Table C.3.10B). The estimate of lifetime Ecstasy use at the 12th grade level that included dropouts was about 1.4 times the estimate without dropouts (7.6 vs. 5.5 percent) (Table C.3.14B). For heroin, the estimate of lifetime use with dropouts was about 1.7 times the estimate without dropouts (1.0 vs. 0.6 percent) (Table C.3.15B).
- About 1.0 million persons at the 12th grade level were estimated to be current cigarette users based on data without dropouts (Table C.3.2A and Figure 3.5). Inclusion of data from dropouts increased the estimated number of current cigarette users to nearly 1.7 million. Based on the estimated number of current cigarette users with dropouts, 12th graders who were in school would comprise only about 60 percent of those who were current cigarette users, and dropouts would comprise the remaining 40 percent among these older adolescents.

- About 1.5 million 12th graders who were in school were current alcohol users based on data without dropouts (Table C.3.6A and Figure 3.5). Inclusion of data from dropouts increased this estimate to about 2.0 million. Estimates of the number of persons at the 12th grade level who were current binge alcohol users were about 1.0 million without dropouts and 1.5 million with dropouts (Table C.3.7A and Figure 3.5). Based on the estimated numbers with dropouts, 12th graders who were in school would comprise about 73 percent of the current alcohol users and about 70 percent of the current binge alcohol users at this grade level. Stated another way, exclusion of dropouts from school-based surveys might miss more than 25 percent of the current alcohol users and about 30 percent of the binge alcohol users among these older adolescents.
- Without data from dropouts, about 1.1 million 12th graders were estimated to be past year marijuana users (Table C.3.8A), and more than 600,000 were estimated to be current users (Table C.3.9A). When data from dropouts were included, the estimated numbers at this grade level increased to about 1.6 million persons for past year marijuana use and more than 900,000 for current use. Based on the estimated numbers with dropouts, 12th graders who were in school would comprise about 73 percent of the past year marijuana users and about 69 percent of the current users among these older adolescents (Figure 3.5).
- The estimated numbers of past year cocaine users at the 12th grade level were 170,000 based on data without dropouts and 284,000 with dropouts (Table C.3.10A). Thus, 12th graders who were in school would comprise about 60 percent of the past year cocaine users at this grade level (Figure 3.6).
- Estimates of the number of lifetime Ecstasy users at the 12th grade level were 227,000 based on data without dropouts and 405,000 with dropouts (Table C.3.14A). Thus, 12th graders who were in school would comprise about 56 percent of the lifetime Ecstasy users at this grade level, and dropouts would comprise the remaining 44 percent (Figure 3.6).

Effects of Dropouts on Estimates for Subgroups at the 12th Grade Level

- Relative to estimated percentages without dropouts, inclusion of dropouts raised estimates of current cigarette use and current cigar use at the 12th grade level for males, females, whites, blacks, and Hispanics (Table C.3.2B); this effect is consistent with the effect of dropouts on the overall estimate of current cigarette use at the 12th grade level. In particular, an estimated 21.1 percent of blacks at the 12th grade level were current cigarette users when dropouts were included. Without dropouts, the estimate for 12th grade blacks decreased to 14.0 percent.

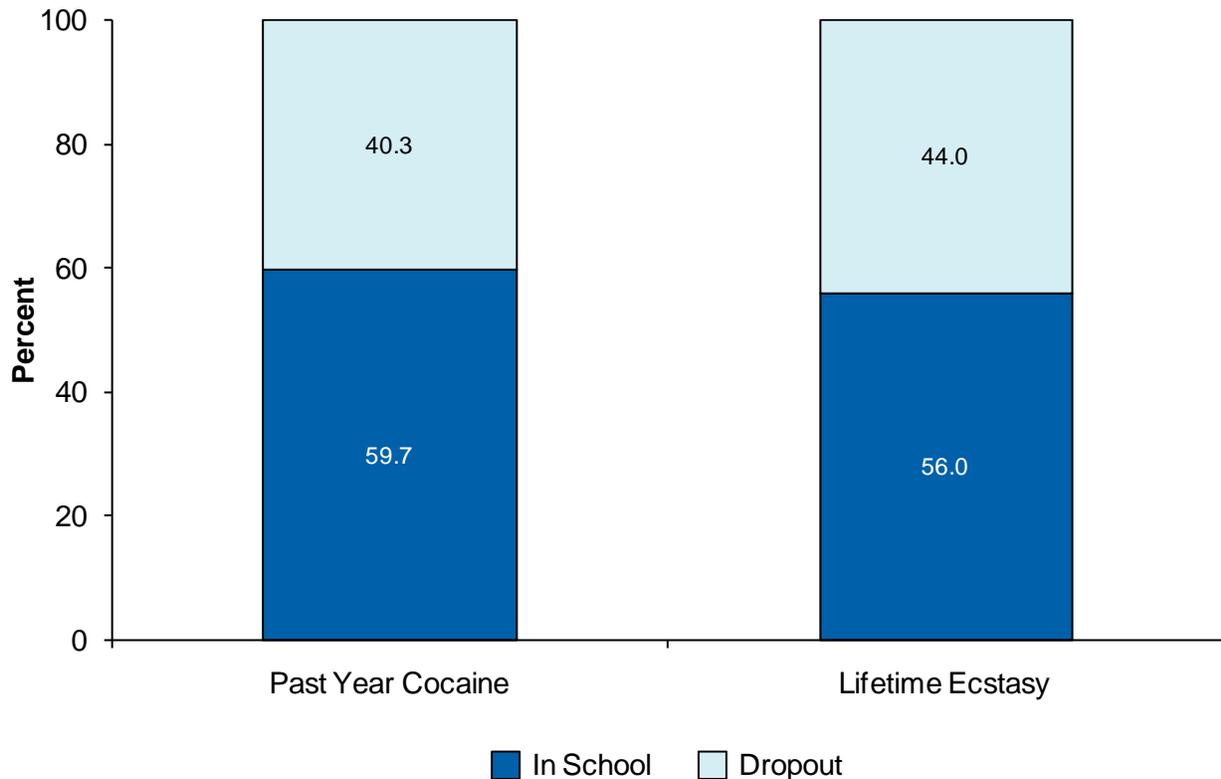
Figure 3.5 Annual Average Percentages of Cigarette, Alcohol, Binge Alcohol, and Marijuana Users Who Were Students in School or Dropouts at the 12th Grade Level: 2002 to 2008 NSDUH



Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008.

- Dropouts affected the estimated percentages of current alcohol users and binge alcohol users at the 12th grade level for males (any use: 42.5 percent with dropouts vs. 39.0 percent without; binge alcohol use: 32.8 percent with dropouts vs. 29.0 percent without) and blacks (any use: 26.1 percent with dropouts vs. 22.6 percent without; binge alcohol use: 14.1 percent with dropouts vs. 10.3 percent without) (Tables C.3.6B and C.3.7B). Inclusion of dropouts also increased the percentage of 12th grade Hispanics who were binge alcohol users (27.1 percent with dropouts vs. 23.7 percent without). Thus, the estimates of current and binge alcohol use for males that included dropouts were about 1.1 times the corresponding estimates without dropouts. Similarly, for Hispanics at the 12th grade level, the binge alcohol use estimate with dropouts was about 1.1 times the estimate without dropouts. However, inclusion of dropouts had somewhat more of an effect on estimates for blacks: the estimate of current alcohol use with dropouts was about 1.2 times the estimate without dropouts, and the estimate of binge alcohol use with dropouts was about 1.4 times the estimate without dropouts.

Figure 3.6 Annual Average Percentages of Cocaine and Ecstasy Users Who Were Students in School or Dropouts at the 12th Grade Level: 2002 to 2008 NSDUH



Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008.

- In contrast to the pattern for males, inclusion of data from dropouts did not significantly affect estimates of the percentages of females at the 12th grade level who were current alcohol users (Table C.3.6B). Estimates of current alcohol use with and without dropouts for females at this grade level were 34.2 and 34.1 percent, respectively.
- Estimated percentages of past year and current marijuana use that included data from dropouts were about 1.1 times the corresponding estimates without dropouts for males and for whites at the 12th grade level (Tables C.3.8B and C.3.9B). For males, estimates of past year marijuana use were 32.9 percent with dropouts and 30.5 percent without; estimates of current marijuana use were 20.3 percent with dropouts and 17.9 percent without. For whites at the 12th grade level, for example, 32.9 percent were past year marijuana users based on data from dropouts and those who were in school. The corresponding estimate for 12th grade whites based only on those who were in school was 30.4 percent. However, inclusion of data from dropouts did not significantly change estimates of past year or current marijuana use for Hispanics at the 12th grade level (past year: 24.1 percent with dropouts and 24.9 percent without; past month: 13.7 percent with dropouts and 12.8 percent without).

- The percentage of males at the 12th grade level who were past year cocaine users based on data from dropouts and nondropouts (6.3 percent) was about 1.3 times the estimate without dropouts (4.7 percent) (Table C.3.10B). In addition, the estimate of past year cocaine use for whites at the 12th grade level that included dropouts (6.4 percent) was about 1.3 times the corresponding estimate without dropouts (4.8 percent). For current cocaine use, the estimate for whites that included dropouts (2.2 percent) was about 1.5 times the estimate that did not include dropouts (1.5 percent) (Table C.3.11B).
- Percentages of persons at the 12th grade level who were lifetime Ecstasy users based on data including dropouts were higher than corresponding estimates without dropouts for males (8.0 vs. 5.8 percent), females (7.3 vs. 5.3 percent), whites (9.1 vs. 6.5 percent), blacks (4.0 vs. 2.5 percent), and Hispanics (6.2 and 4.8 percent) (Table C.3.14B). The estimate with dropouts was about 1.3 times the estimate without dropouts for Hispanics; 1.4 times the estimate without dropouts for males, females, and whites; and about 1.6 times the estimate without dropouts for blacks.
- For lifetime use of heroin, the estimated percentage that included dropouts was 1.5 times the corresponding estimate without dropouts for males (1.2 vs. 0.8 percent), 2.3 times the corresponding estimate for females (0.7 vs. 0.3 percent), and 1.9 times the corresponding estimate for whites (1.3 vs. 0.7 percent) (Table C.15B).
- An estimated 551,000 12th grade males who were in school and 420,000 male dropouts who were assigned to the 12th grade were current cigarette users (Table C.3.2A). Thus, nearly 1.0 million males at the 12th grade level were estimated to be current cigarette users when dropouts were included. In addition, the number of current cigarette users among blacks who were dropouts at this grade level (80,000) was almost as large as the number of current cigarette users who were in school (87,000). Among Hispanics at this grade level, 179,000 dropouts and 133,000 nondropouts were estimated to be current cigarette users.
- Among males at the 12th grade level, 827,000 who were in school and 371,000 who were dropouts were estimated to be current alcohol users (Table C.3.6A). An estimated 614,000 males at this grade level who were in school and 311,000 who were dropouts were current binge alcohol users (Table C.3.7A). Thus, of about 1.2 million males (including dropouts) at this grade level who were current alcohol users, about 69 percent were in school. Of an estimated 925,000 males (including dropouts) at this grade level who were current binge alcohol users, about 66 percent were in school. Among Hispanics at the 12th grade level, 150,000 of those who were in school and 142,000 dropouts were estimated to be current binge alcohol users.
- An estimated 380,000 12th grade males who were in school and 194,000 dropouts at this grade level were current marijuana users (Table C.3.9A). Among Hispanics at the 12th grade level, 81,000 who were in school and 67,000 dropouts were estimated to be current marijuana users.

- Of the estimated 225,000 males at the 12th grade level who were lifetime Ecstasy users based on data from dropouts and nondropouts, 122,000 were in school, and 103,000 were dropouts (Table C.3.14A). Of the estimated 282,000 whites at the 12th grade level who were lifetime Ecstasy users based on data from dropouts and nondropouts, 166,000 were in school, and 116,000 were dropouts. Among Hispanics at this grade level, the overall estimate of lifetime Ecstasy use with dropouts was 67,000, including 30,000 who were in school and 37,000 dropouts.

3.2. Effects of Absentees

As noted previously, school-based surveys are likely to miss absentees, and students who often are absent from school may be at increased risk of substance use. Therefore, this section uses NSDUH data to examine the effects of including or not including absentees in substance use estimates among adolescents who were enrolled in school. NSDUH respondents aged 12 to 25 who reported that they were enrolled in school (see Section 3.1) were asked whether they were full-time or part-time students. Those who reported that they were full-time students first were asked to report the number of days that they missed school in the past 30 days because they were sick. These respondents also had the option to report that school was not in session during the past 30 days. If respondents did not report that school was not in session, they also were asked to report the number of days they missed school in the past 30 days because they skipped or "cut" school.

Defining Days Absent from School

Valid values for reports of the number of days that full-time students were absent because they were sick or because they skipped school in the past 30 days ranged from 0 to 30. These continuous values were recoded into the following categories for days missed from school: (1) 0 days; (2) 1 to 2 days; (3) 3 to 5 days; and (4) 6 or more days.

In principle, days that full-time students missed from school because they were sick or because they skipped school could overlap. For analyses discussed in this section, however, a "composite" variable for overall days missed from school in the past 30 days was created that assumed that the number of days that youths were absent for these different reasons did not overlap; review of the data indicated that students tended to be absent for one reason or another (but not both) or to report small numbers of days that they were absent for each reason (see Section B.3.2 and Table B.5 in Appendix B of this report). To create a measure of overall absences, therefore, the numbers of days that students reported they missed school because they were sick or because they skipped school were treated as additive. The variable for the total number of days that students were absent was top-coded at 30 days for sums greater than 30. The same four categories that were described previously also were created for this overall absence variable.

By definition, this variable for the overall number of days that students were absent from school in the past 30 days for any reason did not include data from respondents who reported that they were part-time students. In creating this overall variable for the number of absences, data also were not included from respondents if (1) they reported that school was not in session in the past 30 days or (2) they had missing data (e.g., responses of "don't know" or "refused") either for the number of days they missed school because they were sick or the number of days they

missed school because they skipped school (or both). Section B.3.2 in Appendix B contains additional information about how the number of days that youths were absent from school was defined for these analyses.

Estimates of substance use were made for 8th through 12th grade full-time students and by gender at these grades according to the categories for the number of days that they were absent from school in the past 30 days. Estimates were made for absences because of sickness, absences because youths skipped school, and absences for either reason in the past 30 days; these latter absences are subsequently referred to as absences for "any" reason. Estimates also were made at each grade for these absence measures regardless of substance use. For consistency with NSDUH estimates presented in Chapter 2 for youths who were school, analyses presented in this section focused on youths who were interviewed in January through June of their survey year. Even with the combined 2002 through 2008 NSDUH data and even when data were run on the full sample (rather than using data only from respondents who were interviewed in January through June), many estimates by race/ethnicity did not meet the precision criteria for publication (see Section B.2.3 in Appendix B). Therefore, absence data are not presented by race/ethnicity.

Adjusting Estimates for Absences from School

The second main analytic approach for investigating the effect of absences on substance use estimates involved evaluating how the inclusion or exclusion of absentees in surveys of students could affect substance use estimates. This was done by comparing standard NSDUH estimates for full-time students with adjusted estimates that accounted for how frequently respondents reported missing school in the past month; the more days that youths reported being absent from school, the greater the likelihood that they would have been absent on the day of a school-based survey. To accomplish this evaluation, the NSDUH analysis weights of respondents who had defined absence data were multiplied by the proportion of days that respondents were inferred to have been *in* school in the past 30 days. These proportions were derived from the number of days that respondents reported being absent from school in that period. Thus, youths' relative weighted contribution to the overall estimate was decreased according to the number of days they reported being absent; the more days that they were absent, the less they contributed to the total estimate.

Although youths could report that they missed school for a total of 30 days in the past 30 days because they were sick or because they skipped school (or both), school was not likely to be in session for every day in that period. Therefore, the number of actual days that school was assumed to be in session in the past 30 days was set at 20 days; this was set as the base for adjustment of the weights. If the total number of days that youths were absent from school because they were sick or because they skipped school was calculated to be greater than 20 days, the total was reset to a maximum of 20 days for this analysis.

Under this approach, an adjustment factor was calculated for the analysis weights for youths aged 12 to 20 who were in the 8th through 12th grades by first subtracting the calculated total number of days that youths were absent from school from 20. This difference then was divided by 20 (i.e., the assumed total number of school days in the past month) to yield a proportion. A youth's analysis weight then was multiplied by this adjustment factor:

$$WGT_{Adj} = WGT_{Orig} \times \left(\left[\frac{20 - (DAYS_{Abs})}{20} \right] \right) \div 20$$

where WGT_{Adj} = adjusted weight for absences, WGT_{Orig} = respondent's original analysis weight, and $DAYS_{Abs}$ = number of days absent from school in the past 30 days (capped at 20 days).

For example, if a youth was not absent for any of the 20 school days in the past month, the adjustment factor was equal to 1, and no adjustment was made to that respondent's analysis weight. At the other extreme, if a youth was absent on 20 out of 20 school days, the adjustment factor was equal to zero, and the youth then had an adjusted weight of zero. At the middle of the range, the weight of a youth who was absent on 10 out of 20 days would have his or her weight reduced by half. Section B.3.2 in Appendix B contains additional information about these adjustment procedures.

New estimates of substance use were generated using these adjusted analysis weights; these are referred to in this section and in tables as "adjusted" estimates. Based on the weight adjustment procedures, the population of inference for these adjusted estimates would be full-time students aged 12 to 20 in the 8th through 12th grades who were likely to be in school on a given school day. These adjusted substance use estimates were compared with estimates in which the analysis weights had not been adjusted for absences; these are referred to in this section and in tables as "unadjusted" estimates.

For consistency with other school-based data in this report, estimates are presented for persons aged 12 to 20 who were interviewed in January through June. Tables present unadjusted and adjusted prevalence estimates. Data were restricted to full-time students, and youths with missing data for the number of days they were absent were excluded from the analysis. Consequently, the unadjusted estimates presented in this section may differ from corresponding estimates at a given grade or for a subgroup within a grade that were presented in Chapter 2 and in Section 3.1. Although these estimates may differ from corresponding estimates elsewhere in the report, these exclusions allowed for statistical testing of differences between the unadjusted and adjusted estimates because the corresponding estimates were based on the same samples.

3.2.1 Overall Absences by Grade

- Percentages of youths in each grade who did not miss any days of school in the past 30 days because they were sick showed little variation (Table C.3.16). More than half of youths in each grade did not miss any days of school in the past 30 days because they were sick. In addition, more than 80 percent of youths in each grade missed no more than 1 or 2 days of school because they were sick, including those who did not miss any days. However, the percentage of 8th graders who missed school on 6 or more days because they were sick (3.3 percent) was less than corresponding percentages for 10th and 11th graders (4.1 and 4.0 percent, respectively). In addition, 9th graders were less likely than 10th graders to be sick on 6 or more days (3.5 vs. 4.1 percent).
- In contrast, the percentage of youths who did not miss any days of school in the past 30 days because they skipped school decreased as the grade increased (Table C.3.16). An estimated 90.6 percent of 8th graders did not miss any school in the past 30 days because they skipped school. The corresponding percentage decreased to 71.6 percent of 12th graders.

- Students in the 12th grade were more likely than 11th graders to skip school on 1 or 2 days (18.4 vs. 13.3 percent) or on 3 to 5 days (7.6 vs. 4.6 percent) but they had a similar likelihood of skipping school on 6 or more days (Table C.3.16). An estimated 1.9 percent of 11th graders and 2.3 percent of 12th graders skipped school on 6 or more days.
- Males in the 12th grade were more likely than their female counterparts to skip school on 6 or more days (2.8 vs. 1.9 percent), although these percentages were relatively low for both males and females (Table C.3.16). Percentages of 12th graders who were absent because they skipped school on 1 or 2 days or on 3 to 5 days did not differ significantly for males and females. An estimated 19.2 percent of males and 17.6 percent of females skipped school on 1 or 2 days. Estimates for 12th grade males and females who skipped school on 3 to 5 days were 7.7 and 7.5 percent, respectively.
- Youths in the 11th or 12th grades were more likely than those in the 8th through 10th grades to miss school for any reason (Table C.3.16). More than half of 8th and 9th graders and almost half of 10th graders missed no days of school for any reason. The 12th grade had the lowest percentage of students who missed no days of school for any reason (42.1 percent). The corresponding percentage for 11th graders (46.2 percent) also was lower than the percentages for 8th through 10th graders. However, more than 70 percent of youths in each grade were absent from school for no more than 1 or 2 days for any reason, including those who missed no days of school.

3.2.2 Substance Use Estimates by Days Absent from School

As noted previously, NSDUH respondents were asked about the number of days they missed school in the past 30 days because they were sick and the number of days they missed school because they skipped school. Therefore, discussion of substance use according to the number of days that students were absent from school focuses on estimates of past year use (which are proximal to the past 30 days) or current use.

Substance Use by Days Absent because of Sickness

Students in a given grade who missed school on 6 or more days in the past 30 days because they were sick often were more likely to be past year or current substance users than their counterparts who did not miss any days of school because they were sick. This association between substance use and missing a high number of school days because of sickness was especially consistent across different substances for 8th and 9th graders but was less consistent by the 12th grade. Highlights are presented in this section for selected estimates of past year and current substance use according to the number of days that youths missed school because they were sick.

- Among 8th and 9th graders, those who were sick on 6 or more days were more likely than those who did not miss any days of school because they were sick to be past year or current cigarette users (Tables C.3.17 and C.3.18), current cigar users (Table C.3.20), past year or current alcohol users (Tables C.3.21 and C.3.22), current binge alcohol users (Table C.3.23), and past year or current marijuana users (Tables C.3.24 and C.3.25). Among 8th graders, for example, those who were sick on 6 or more days were more than 3 times as likely to be current cigarette users as those who did not miss any days of school because they were sick (12.5 vs. 3.7 percent). The estimate of current alcohol use for 8th graders who missed 6 or more days of school because they were sick was almost twice the estimate for those who did not miss any days of school because they were sick (13.4 vs. 6.8 percent). Youths in the 8th grade who missed school because they were sick on 6 or more days were more than 3 times as likely to be current binge alcohol users as those who did not miss any days of school because they were sick (10.2 vs. 2.9 percent).
- Youths in the 10th through 12th grades who missed 6 or more days of school because they were sick also were more likely than their counterparts who did not miss any days of school because they were sick to be past year or current cigarette users (Tables C.3.17 and C.3.18), past year alcohol users (Table C.3.21), or past year or current marijuana users (Tables C.3.24 and C.3.25). Among 12th graders, for example, 34.1 percent of those who missed school on 6 or more days because they were sick and 19.8 percent for those who did not miss any days of school because they were sick were current cigarette users. Estimates of current marijuana use among 12th graders were 24.9 percent for those who missed school on 6 or more days because they were sick and 13.4 percent for those who did not miss any days for this reason. In addition, 12th graders who missed school on 6 or more days because they were sick were more likely to be current binge alcohol users than those who did not miss any days of school because they were sick (32.7 vs. 23.1 percent) (Table C.3.23).
- Among 12th graders, those who missed school on 6 or more days because they were sick were more than 3 times as likely to be past year cocaine users than those who did not miss any days of school for this reason (9.3 vs. 2.9 percent) (Table C.3.26).
- In contrast, estimates of current cigar use among 12th graders did not differ significantly according to the number of days that students missed school because they were sick (Table C.3.20). Estimates of current cigar use were 10.6 percent for those who did not miss any days, 11.9 percent for those who missed 1 or 2 days, 12.7 percent for those who missed 3 to 5 days, and 11.0 percent for those who missed 6 or more days because they were sick.
- In addition, estimates of past year and current alcohol use for 12th graders who missed school on 3 to 5 days because they were sick (67.0 and 41.5 percent) were greater than corresponding estimates for students who did not miss any days because they were sick (59.0 and 34.9 percent) (Tables C.3.21 and C.3.22). However, the estimates of current alcohol use for 12th graders who missed school because they were sick on 6 or more days (40.0 percent) were not significantly different from the estimates for those who did not miss any days of school because they were sick.

- Unlike the patterns for past year and current use of other substances, most estimates of current smokeless tobacco use did not differ significantly according to the number of days that youths missed school in the past 30 days because they were sick ([Table C.3.19](#)). Among 8th graders, for example, those who missed school on 1 or 2 days because they were sick were more likely to be current smokeless tobacco users than those who did not miss any days of school for this reason (1.5 vs. 0.7 percent). The estimate of current smokeless tobacco use among 8th graders who missed 3 to 5 days (2.0 percent) also was greater than the estimate for those who did not miss any days. However, the estimate of smokeless tobacco use among 8th graders who missed 6 or more days because they were sick (0.7 percent) was the same as that for 8th graders who did not miss any days. Among 12th graders, 5.5 percent of those who missed school on 6 or more days because they were sick and 5.0 percent of those who did not miss any days of school because they were sick were current smokeless tobacco users.

Substance Use by Days Absent because of Skipping School

Past year or current substance use also was associated with youths missing school in the past 30 days because they skipped or "cut" school or they just did not want to be there. Among 9th through 12th graders overall, for example, students who missed school on 6 or more days in the past 30 days because they skipped school often were more likely to be past year or current substance users than their counterparts who did not miss any days of school for this reason. This section presents highlights for selected estimates of past year and current substance use according to the number of days that youths missed school because they skipped school.

- Youths in the 9th through 12th grades who skipped school on 6 or more days were more likely than their counterparts who did not skip school on any days to be past year or current cigarette users ([Tables C.3.17](#) and [C.3.18](#)), current cigar users ([Table C.3.20](#)), past year or current alcohol users ([Tables C.3.21](#) and [C.3.22](#)), current binge alcohol users ([Table C.3.23](#)), past year or current marijuana users ([Tables C.3.24](#) and [C.3.25](#)), and past year cocaine users ([Table C.3.26](#)). Among 9th graders, for example, those who skipped school on 6 or more days were more than 3 times as likely as those who did not skip school to be current alcohol users (46.2 vs. 13.9 percent) and were more than 5 times as likely as those who did not skip school to be current binge alcohol users (38.4 vs. 7.1 percent). Among 12th graders, more than half of those who skipped school on 3 to 5 days or on 6 or more days were current alcohol users (54.5 and 50.5 percent). In comparison, 32.7 percent of 12th graders who did not skip school on any days were current alcohol users. The estimate of current binge alcohol use among 12th graders who skipped school on 6 or more days (41.6 percent) was twice the estimate for those who did not skip school on any days (21.0 percent).
- More than 30 percent of students in the 9th through 12th grades who skipped school on 6 or more days were current marijuana users ([Table C.3.25](#)). Corresponding estimates of current marijuana use for students who did not skip school on any days ranged from 5.2 percent in the 9th grade to 11.4 percent in the 12th grade.

- Males in the 12th grade who skipped school on 6 or more days were about 2.5 times as likely as those who did not skip school on any days to be current cigarette users (50.7 vs. 20.1 percent) (Table C.3.18). In addition, more than half of 12th grade males who skipped school on at least 1 day were current alcohol users (1 or 2 days: 52.7 percent; 3 to 5 days: 59.8 percent; 6 or more days: 55.0 percent) (Table C.3.22). In comparison, 35.3 percent of 12th grade males who did not skip school on any days were current alcohol users. The estimate of current binge alcohol use for 12th grade males who skipped school on 3 to 5 days (50.0 percent) also was twice the estimate for those who did not skip school on any days (24.7 percent) (Table C.3.23). Males in the 12th grade who skipped school on 6 or more days also were more than twice as likely to be past year marijuana users as those who did not skip school on any days (55.4 vs. 24.5 percent) (Table C.3.24).
- Among 12th grade females, those who skipped school on 3 to 5 days were more likely than their counterparts who did not skip school to be past year or current cigarette users (Tables C.3.17 and C.3.18), past year or current alcohol users (Tables C.3.21 and C.3.22), current binge alcohol users (Table C.3.23), past year or current marijuana users (Tables C.3.24 and C.3.25), and past year cocaine users (Table C.3.26). For example, 48.5 percent of 12th grade females who skipped school on 3 to 5 days were current alcohol users, 33.9 percent were current binge alcohol users, and 24.3 percent were current marijuana users. Corresponding estimates among 12th grade females who did not skip school on any days were 29.9 percent for current alcohol use, 17.2 percent for current binge alcohol use, and 9.2 percent for current marijuana use.

Substance Use by Total Days Absent

Consistent with findings for absences because students were sick or because they skipped school, students in a given grade who missed school on 6 or more days in the past 30 days for either reason often were more likely to be past year or current substance users than their counterparts who did not miss any days of school for either reason. Highlights are presented in this section for selected estimates of past year and current substance use according to the total number of days that youths missed school for either reason.

- Estimates of current cigarette use for 8th graders who missed 6 or more days of school for any reason (15.4 percent) and for 9th graders who missed this many days of school (26.7 percent) were at least 4 times the estimates for youths who did not miss school for any reason (8th grade: 3.3 percent; 9th grade: 6.7 percent) (Table C.3.18). Among 12th graders, those who missed 6 or more days of school for any reason were more than twice as likely to be current cigarette users as those who did not miss school (39.5 vs. 17.1 percent).
- The prevalence of current cigar use for 8th graders who missed 6 or more days of school for any reason was more than 5 times the estimate for those who did not miss any days of school (6.4 vs. 1.2 percent) (Table C.3.20).

- At each grade, students who missed 6 or more days of school for any reason were more likely to be current alcohol users or binge alcohol users than those who did not miss any days of school (Tables C.3.22 and C.3.23). For example, the estimate of current alcohol use for 8th graders who missed 6 or more days of school for any reason was more than twice the estimate for those who did not miss school for any reason (17.3 vs. 6.3 percent), and the estimate of binge alcohol use for 8th graders who missed 6 or more days of school was more than 5 times the estimate for those who did not miss any days (12.7 vs. 2.5 percent). Among 12th graders, 46.7 percent of those who missed school on 6 or more days for any reason and 31.1 percent of those who did not miss any days of school were current alcohol users. An estimated 37.4 percent of 12th graders who missed school on 6 or more days for any reason and 19.8 percent of those who did not miss any days of school were binge alcohol users.
- Students in each grade who missed 6 or more days of school for any reason were more likely to be current marijuana users than those who did not miss any days of school (Table C.3.25). For example, 26.7 percent of 12th graders who missed school on 6 or more days for any reason and 10.9 percent of those who did not miss any days of school were current marijuana users.
- Students in each grade who missed school on 6 or more days for any reason were more likely to be past year cocaine users than those who did not miss any days of school (Table C.3.26). Among 12th graders, 8.3 percent of those who missed school on 6 or more days for any reason and 2.2 percent of those who did not miss any days of school were past year cocaine users.
- Youths in each grade who were absent on 6 or more days for any reason were more likely to be lifetime users of Ecstasy than those who were not absent on any days (Table C.3.27). Among 12th graders, the prevalence of lifetime Ecstasy use was 10.7 percent for those who were absent on 6 or more days for any reason and 3.3 percent for those who did not miss any days of school.
- In contrast to the general pattern for other substances, estimates of current smokeless tobacco use did not differ significantly between youths in the 8th, 9th, and 12th grades who missed school on 6 or more days for any reason and those who did not miss any days of school (Table C.3.19). However, 10th and 11th graders who missed school on 6 or more days were more likely to be smokeless tobacco users than their counterparts who did not miss any days (10th graders: 5.0 vs. 2.6 percent; 11th graders: 6.1 vs. 3.9 percent). Among 12th graders, 6.5 percent of those who missed school on 6 or more days for any reason and 5.1 percent for those who did not miss any days of school were current smokeless tobacco users.

3.2.3 Effects of Adjusting for Absences on Substance Estimates

As noted in the preceding sections, youths who were absent from school for several days in the past 30 days usually were more likely to be past year or current substance users than their counterparts who did not miss any days of school. The more days that youths are absent from school, the less likely that school-based surveys such as MTF or YRBS will be to capture

information about the substance use characteristics of these youths. However, the effects of excluding absentees on school-based survey estimates will depend on the relative numbers of youths who are likely to be absent from school on a given day and the size of any differences in substance use prevalence between youths who are likely to be in school and those who are likely to be absent. As was the case with estimates for dropouts and nondropouts in the lower grades, for example, even large differences in prevalence between youths who are likely to be in school and those who are likely to be absent could have minimal effects on substance use estimates if the size of the subpopulation of youths that is likely to be in school on a given day is considerably larger than the size of the subpopulation that is likely to be absent.

This section presents the results from an analysis that used adjusted analysis weights to account for the total number of days that full-time students were absent in the past 30 days (i.e., because of sickness or skipping school) in order to replicate the consequences of conducting a school-based study on a single day and not including students who were absent on that day. As discussed previously, these adjustment procedures reduce the contributions of data from youths according to their frequency of being absent from school in estimating of the prevalence of substance use among the school-based population. Given the higher prevalence estimates for youths who are frequently absent from school than for those who are less likely to be absent, therefore, a given substance use estimate for youths based on these adjustment procedures would be expected to be lower than the corresponding unadjusted estimate (which would include data from youths who were interviewed in their homes but frequently were absent from school).

Because youths' analysis weights could be adjusted only if they had fully defined absence data, youths with missing data for the number of days absent were excluded from analysis. This exclusion was necessary to allow statistical testing between the estimates from the unadjusted and adjusted analysis weights to be based on the same samples. In many instances, however, this exclusion also yielded almost a 100 percent overlap between the unadjusted and adjusted data but with different weights.³ As for the previous comparisons between estimates that included dropouts and those that did not include dropouts, high correlations between unadjusted and adjusted estimates resulted in most differences being statistically significant, even if differences were small. Differences between unadjusted and adjusted estimates were not statistically significant only for a limited number of smokeless tobacco, cocaine, and Ecstasy use estimates among males or females in grades earlier than the 12th grade. Therefore, this section discusses the relative differences between unadjusted and adjusted estimates without emphasizing statistical significance of differences.

Highlights of the results are presented in the remainder of the section. Selected annual average estimates are presented in separate sections for (1) 8th and 9th graders, (2) 10th and 11th graders, and (3) 12th graders. Consistent with the findings reported previously for dropouts, the adjustment procedures had less of an effect on estimates for youths in the 8th and 9th grades and had a greater effect on estimates for youths in the 12th grade.

³ Samples for unadjusted and adjusted estimates may not overlap completely because respondents whose adjusted weight was 0 (i.e., absent the entire period) were excluded from the analysis of adjusted estimates but still were included in the unadjusted data.

8th and 9th Graders

- The unadjusted estimate of past year cigarette use for 8th graders overall was 10.8 percent; based on adjustment of the weights for absences, this estimate was 10.3 percent (Table C.3.28). An estimated 17.7 percent of 9th graders were past year cigarette users in the unadjusted data, and 16.8 percent were past year cigarette users based on adjustment. Unadjusted estimates of current cigarette use were 5.4 percent for 8th graders and 10.4 percent for 9th graders. Corresponding adjusted estimates were 5.0 percent for 8th graders and 9.7 percent for 9th graders.
- An estimated 21.7 percent of 8th graders and 35.3 percent of 9th graders were past year alcohol users in the unadjusted data (Table C.3.29). Corresponding adjusted estimates of past year alcohol use were 21.1 percent for 8th graders and 34.4 percent for 9th graders. Unadjusted estimates of current alcohol use were 8.8 percent for 8th graders and 16.1 percent for 9th graders; the adjusted estimates were 8.5 percent for 8th graders and 15.5 percent for 9th graders. Unadjusted and adjusted estimates of current binge alcohol use for 8th graders were 4.1 and 3.9 percent (Table C.3.30). For 9th graders, these estimates were 8.9 and 8.3 percent.
- For use of marijuana in the past year, the unadjusted and adjusted estimates for 8th graders were 7.0 and 6.7 percent (Table C.3.31). For 9th graders, the unadjusted and adjusted estimates were 14.1 and 13.3 percent.

10th and 11th Graders

- Among 10th graders overall, the unadjusted and adjusted estimates of current cigarette use were 15.0 and 14.1 percent (Table C.3.28). For 11th graders overall, the unadjusted and adjusted estimates of current cigarette use were 19.2 and 18.3 percent. Unadjusted and adjusted estimates of current cigarette use were 20.1 and 19.3 percent for 11th grade males and 18.3 and 17.2 percent for 11th grade females.
- Unadjusted estimates of current alcohol use were 23.2 percent for 10th graders and 29.7 percent for 11th graders (Table C.3.29); the adjusted estimates were 22.6 percent for 10th graders and 28.9 percent for 11th graders. Unadjusted and adjusted estimates of current alcohol use were 31.2 and 30.6 percent for 11th grade males; for 11th grade females, these estimates were 28.1 and 27.3 percent.
- Unadjusted and adjusted estimates of current binge alcohol use for 10th graders were 14.4 and 13.8 percent (Table C.3.30). Corresponding estimates were 19.3 and 18.6 percent for 11th graders overall, 21.9 and 21.2 percent for 11th grade males, and 16.7 and 15.9 percent for 11th grade females.
- For use of marijuana in the past year, the unadjusted and adjusted estimates for 10th graders were 20.5 and 19.6 percent (Table C.3.31). For 11th graders, the unadjusted and adjusted estimates were 24.8 and 23.8 percent for 11th graders overall, 26.4 and 25.5 percent for males, and 23.1 and 22.0 percent for females.

12th Graders, Annual Averages

- The unadjusted and adjusted estimates of current cigarette use for 12th graders overall were 23.3 and 22.2 percent (Table C.3.28). Unadjusted and adjusted estimates of current cigarette use were 25.3 and 24.0 percent for 12th grade males and 21.2 and 20.2 percent for 12th grade females.
- Unadjusted and adjusted estimates of current alcohol use were 37.7 and 36.9 percent for 12th graders overall, 41.0 and 40.1 percent for 12th grade males, and 34.1 and 33.5 percent for 12th grade females (Table C.3.29).
- About one in four youths in the 12th grade was a current binge alcohol user (unadjusted: 25.5 percent; adjusted: 24.7 percent) (Table C.3.30). About 30 percent of 12th grade males were current binge alcohol users (unadjusted: 30.4 percent; adjusted: 29.3 percent). For females in the 12th grade, about one in five was a current binge alcohol user (20.3 and 19.6 percent).
- The unadjusted and adjusted estimates of past year marijuana use among 12th graders were 27.0 and 26.0 percent for 12th graders overall, 30.0 and 28.8 percent for males, and 23.7 and 22.8 percent for females (Table C.3.31). For current marijuana use, unadjusted and adjusted estimates were 14.7 and 14.0 percent for 12th graders overall, 17.7 and 16.7 percent for males, and 11.4 and 11.0 percent for females.
- An estimated 4.0 percent of 12th graders were past year cocaine users in the unadjusted data, and the adjusted estimate was 3.7 percent (Table C.3.32). Unadjusted and adjusted estimates of past year cocaine use were 4.7 and 4.4 percent for 12th grade males and 3.3 and 3.0 percent for 12th grade females.
- The unadjusted estimate of lifetime use of Ecstasy among 12th graders was 5.2 percent, and the adjusted estimate was 4.8 percent (Table C.3.33). For 12th grade males, the unadjusted and adjusted estimates were 5.6 and 5.2 percent. For females in the 12th grade, the unadjusted and adjusted estimates were 4.7 and 4.4 percent.

12th Graders, Trend Data

Johnston and colleagues (2009) hypothesized that if rates of absenteeism were comparable across survey years, exclusion of data from absentees would not affect trends in substance use. This assumption would hold true if the trends for frequent absentees were similar to the rest of the student population or if the proportion of absentees was so small that differences in trends for absentees did not affect overall trends. To test this assumption, estimates of lifetime, past year, and current use of cigarettes, alcohol, marijuana, cocaine, and inhalants were run for 12th graders in each year from 2002 to 2008. In each year, estimates were run that were unadjusted or adjusted for absences. For consistency with estimates discussed in preceding sections and with the period in which school-based surveys are administered, estimates in this section focus on interviews conducted in January through June of a given survey year.

Adjusting the weights for 12th graders who were more likely to be absent on a given day within a 30-day period from January to June did not affect differences in estimates between most

consecutive survey years. If an unadjusted estimate was significantly different from the estimate in the next survey year, the difference between the same 2 years also was significant for the adjusted estimate. If an unadjusted estimate did not differ significantly from the estimate in the next survey year, then the adjusted estimates often were not significantly different between the same 2 years.

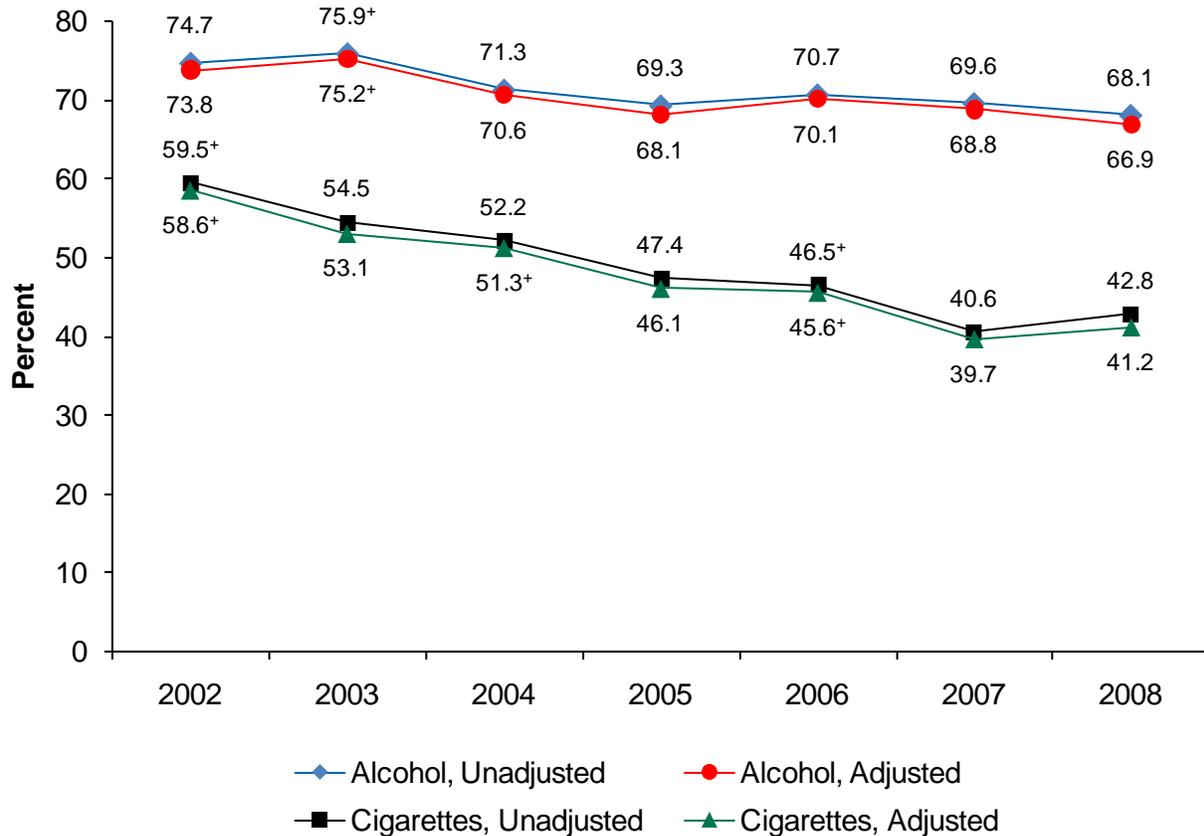
For some estimates, however, the unadjusted estimates for 12th graders who were interviewed in January through June did not differ significantly between consecutive survey years, but the adjusted estimates were significantly different. In addition, one set of unadjusted estimates showed significant differences between a pair of survey years, but the corresponding adjusted estimates did not.

- For lifetime use of cigarettes among 12th graders, the prevalence decreased significantly from 2002 to 2003 for unadjusted (59.5 to 54.5 percent) and adjusted (58.6 to 53.1 percent) estimates (Table C.3.34 and Figure 3.7). The lifetime prevalence also decreased significantly from 2006 to 2007 for the unadjusted (46.5 to 40.6 percent) and adjusted (45.6 to 39.7 percent) estimates. In addition, the unadjusted lifetime prevalence was 52.2 percent in 2004 and 47.4 percent in 2005; these estimates were not significantly different. In contrast, the estimates of lifetime cigarette use among 12th graders that were adjusted for absences showed a significant decrease from 2004 (51.3 percent) to 2005 (46.1 percent).
- Lifetime use of cocaine among 12th graders did not differ significantly between any consecutive survey years for the unadjusted estimates (Table C.3.34 and Figure 3.8). In particular, the unadjusted data yielded estimates of lifetime cocaine use of 5.1 percent in 2002 and 7.3 percent in 2003, but this was not a statistically significant difference. However, the adjusted data showed a significant increase in lifetime cocaine use among 12th graders from 2002 (4.4 percent) to 2003 (6.9 percent).

A decrease in the lifetime prevalence of cigarette use relative to the preceding year could be explained by differences in substance use among cohorts of youths in different grades. Specifically, the lifetime prevalence among 12th graders could decrease between consecutive years as cigarette users in the 12th grade cohort in the earlier year move out of the 12th grade and are replaced with a new cohort of 12th graders with a higher proportion of lifetime nonusers of cigarettes.

Although Section 3.2.2 did not discuss estimates of lifetime substance use, 12th graders who frequently were absent from school were more likely than those who did not miss any school to be lifetime cigarette users. For example, an annual average of 61.9 percent of 12th graders who were absent on 6 or more days because of illness or skipping school were lifetime cigarette users. In comparison, an annual average of 40.9 percent of 12th graders who were not absent on any days were lifetime cigarette users.

Figure 3.7 Trends in Lifetime Alcohol and Cigarette Use among 12th Graders: Percentages Unadjusted and Adjusted for Absences, 2002 to 2008 NSDUH



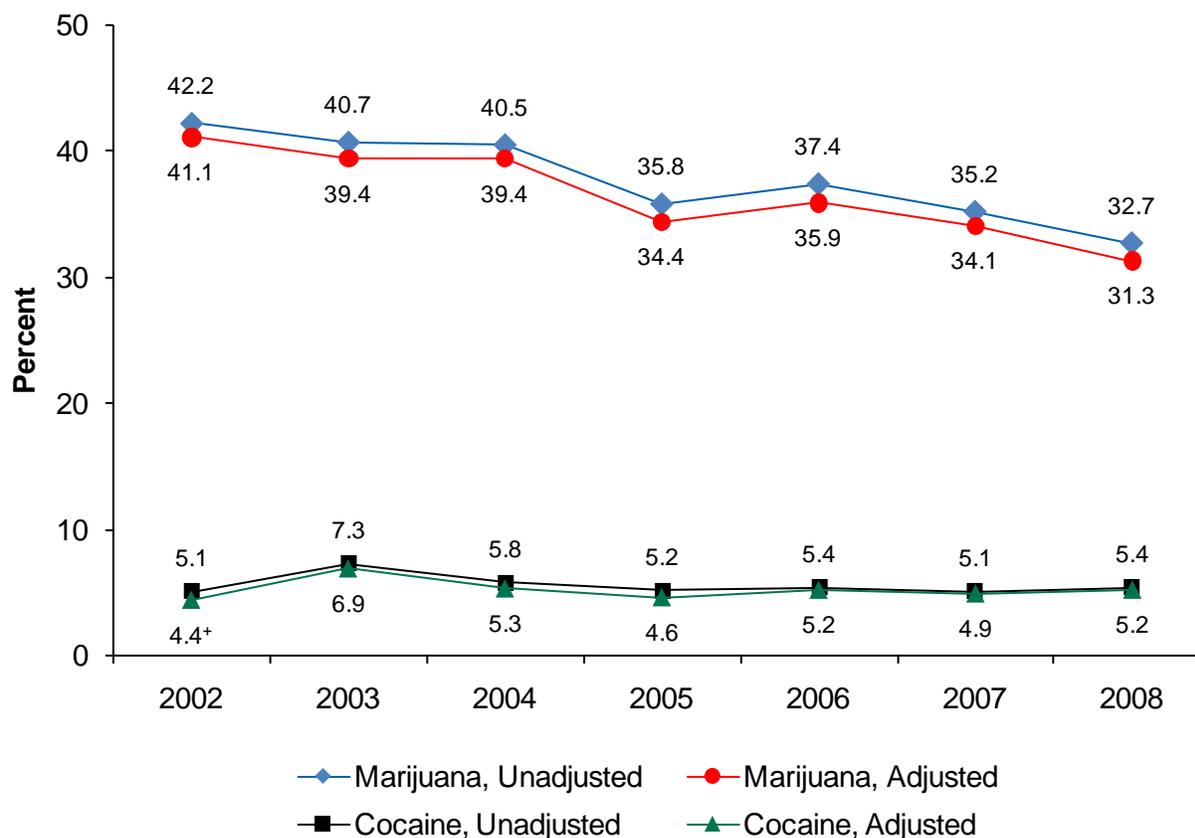
NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20.

⁺ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

Consequently, the greater likelihood that frequent absentees in the 12th grade would be lifetime cigarette users could have contributed to the decrease in the lifetime prevalence from 2004 to 2005 in the adjusted estimates despite the change not being significant for the unadjusted data. Because frequent absentees contributed less to adjusted prevalence estimates than students who missed few or no days of school did, the adjustment procedures yielded a 5.2 percentage point decrease in the lifetime prevalence of cigarette use from 2004 to 2005 (Table C.3.34 and Figure 3.7); the unadjusted estimates showed a 4.8 percentage point decrease over this same period.

Figure 3.8 Trends in Lifetime Marijuana and Cocaine Use among 12th Graders: Percentages Unadjusted and Adjusted for Absences, 2002 to 2008 NSDUH



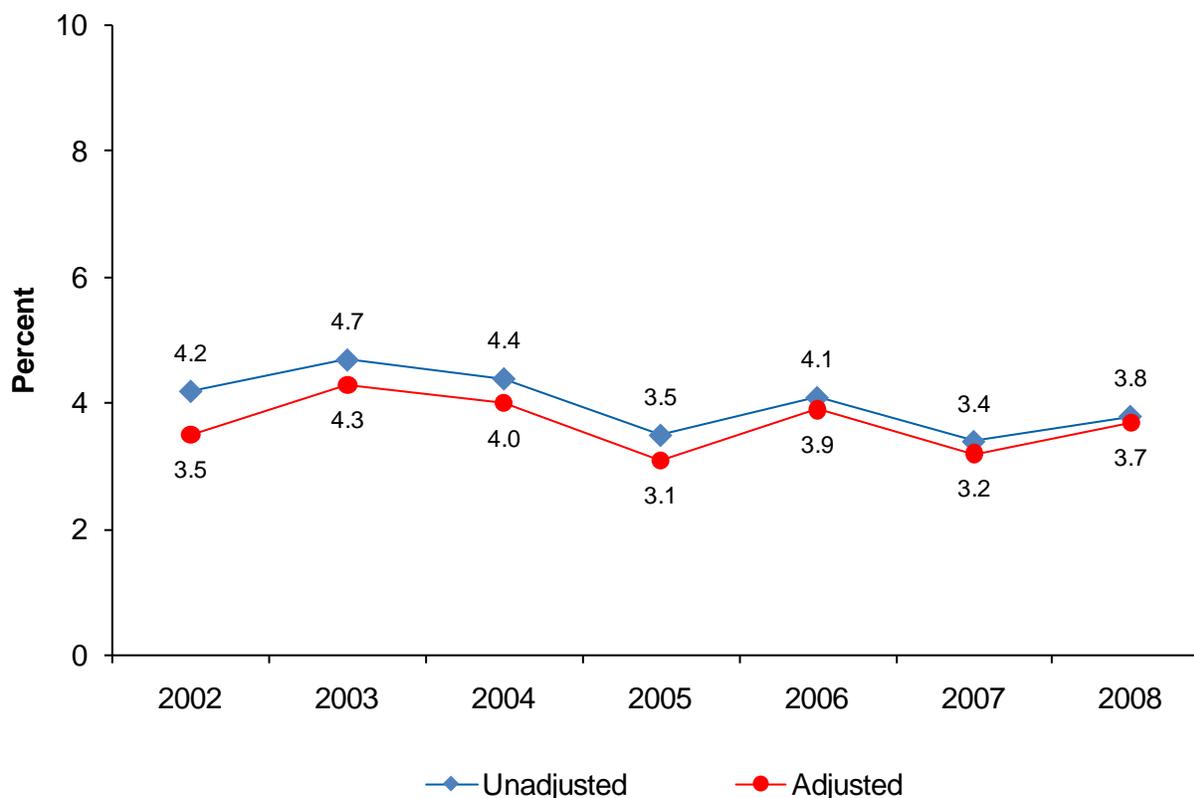
NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20.

⁺ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

For cocaine, if an increase in the lifetime prevalence of use relative to the preceding year can be explained by increases in the initiation of use of that substance in the past year, then a significant increase in the past year prevalence of cocaine use also would be expected. For past year cocaine use in 2002 and 2003, the unadjusted estimates were 4.2 percent in 2002 and 4.7 percent in 2003 (Table C.3.35 and Figure 3.9). The corresponding adjusted estimates were 3.5 percent in 2002 and 4.3 percent in 2003. Although the unadjusted and adjusted estimates of past year cocaine use among 12th graders were in the direction of an increase from 2002 to 2003, neither showed a significant difference in estimates between these 2 years. The lack of a significant difference in past year prevalence of cocaine use between 2002 and 2003 is consistent with the lack of a significant difference in lifetime prevalence between 2002 and 2003 for the unadjusted estimates but the significant increase in lifetime prevalence for the adjusted estimates is inconsistent with this pattern for the past year estimates.

Figure 3.9 Trends in Past Year Cocaine Use among 12th Graders: Percentages Unadjusted and Adjusted for Absences, 2002 to 2008 NSDUH



NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20.

+ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

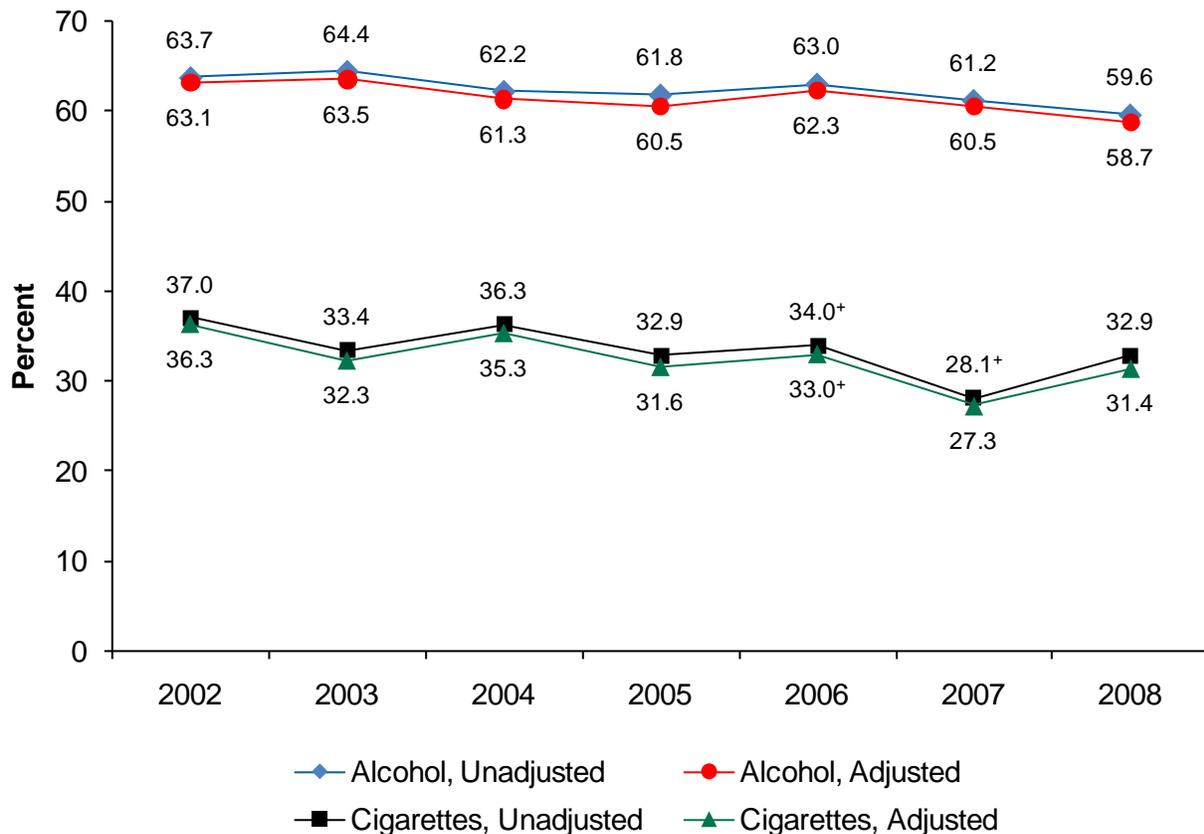
As for lifetime cigarette use, 12th graders who were absent on a total of 6 or more days because of illness or skipping school were more likely to be lifetime cocaine users than those who were not absent on any days (annual averages of 11.1 vs. 3.6 percent). As noted in Section 3.2.2, 8.3 percent of 12th graders who missed school on 6 or more days for any reason and 2.2 percent of those who did not miss any days of school were past year cocaine users.

These data suggest an explanation for the finding of an increase in the adjusted lifetime cocaine prevalence among 12th graders from 2002 to 2003 despite the lack of significant differences in the past year prevalence from 2002 to 2003 for the adjusted and unadjusted estimates. Specifically, adjusting the weights of 12th graders for absences yielded a 2.5 percentage point increase in the lifetime prevalence of cocaine use from 2002 to 2003 (Table C.3.34 and Figure 3.8). In contrast, the lower prevalence of past year cocaine use in the 12th grade yielded only a 0.8 percentage point increase in the adjusted prevalence of past year use from 2002 to 2003 (Table C.3.35 and Figure 3.9). Thus, the samples of 12th graders in 2002 and 2003 may have had sufficient statistical power to detect the 2.5 percentage point increase in lifetime prevalence from 2002 to 2003 for the adjusted estimates but did not have sufficient power to detect a 0.8 percentage point increase for the adjusted past year prevalence estimates.

The remainder of the section presents highlights for the effects of absentees on trends in past year and current use among 12th graders.

- The prevalence of past year cigarette use decreased from 2006 to 2007 for unadjusted (34.0 to 28.1 percent) and adjusted (33.0 to 27.3 percent) estimates (Table C.3.35 and Figure 3.10). The unadjusted prevalence of past year cigarette use also increased from 28.1 percent in 2007 to 32.9 percent in 2008. In contrast, the adjusted prevalence estimates in 2007 and 2008 were not significantly different (27.3 and 31.4 percent).

Figure 3.10 Trends in Past Year Alcohol and Cigarette Use among 12th Graders: Percentages Unadjusted and Adjusted for Absences, 2002 to 2008 NSDUH



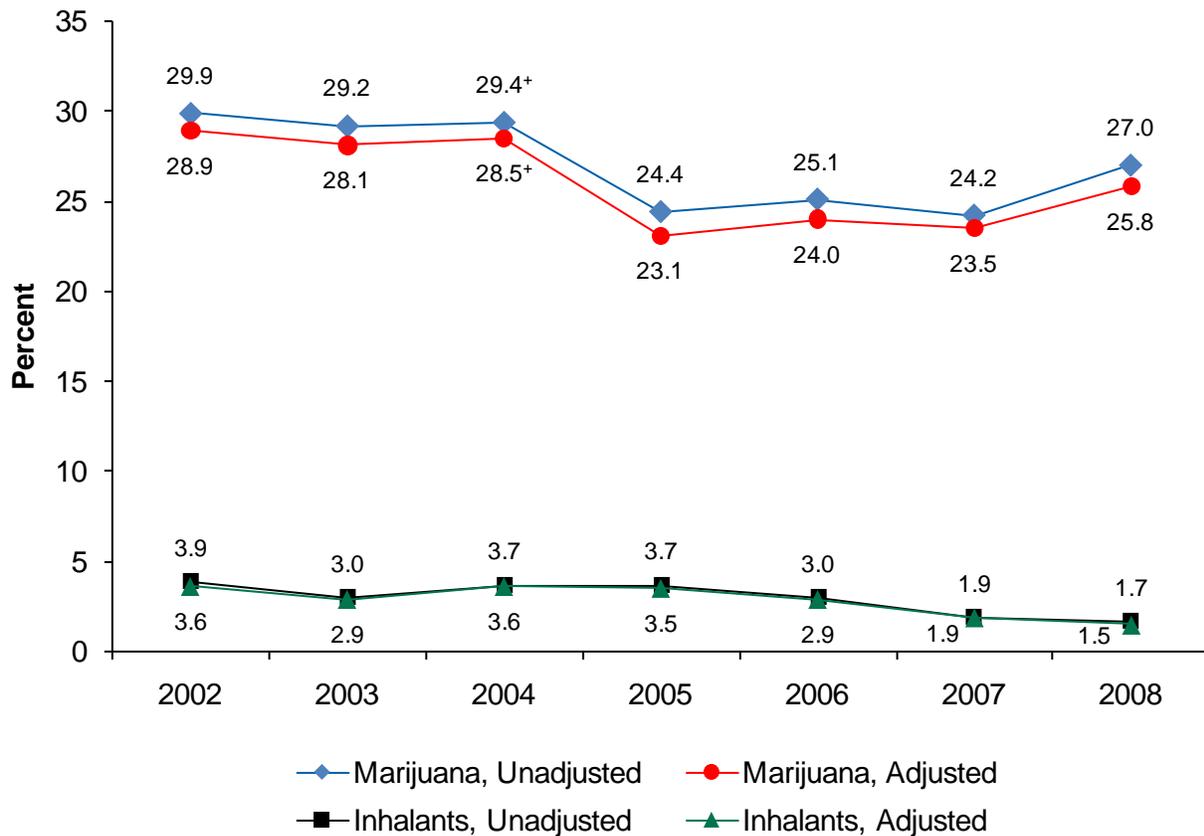
NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20.

⁺ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

- Unadjusted and adjusted data both yielded decreases in the prevalence of past year marijuana use from 2004 to 2005 (unadjusted: 29.4 to 24.4 percent; adjusted: 28.5 to 23.1 percent) (Table C.3.35 and Figure 3.11). There were no other significant changes in the prevalence of past year marijuana use between consecutive survey years for unadjusted or adjusted estimates.

Figure 3.11 Trends in Past Year Marijuana and Inhalant Use among 12th Graders: Percentages Unadjusted and Adjusted for Absences, 2002 to 2008 NSDUH



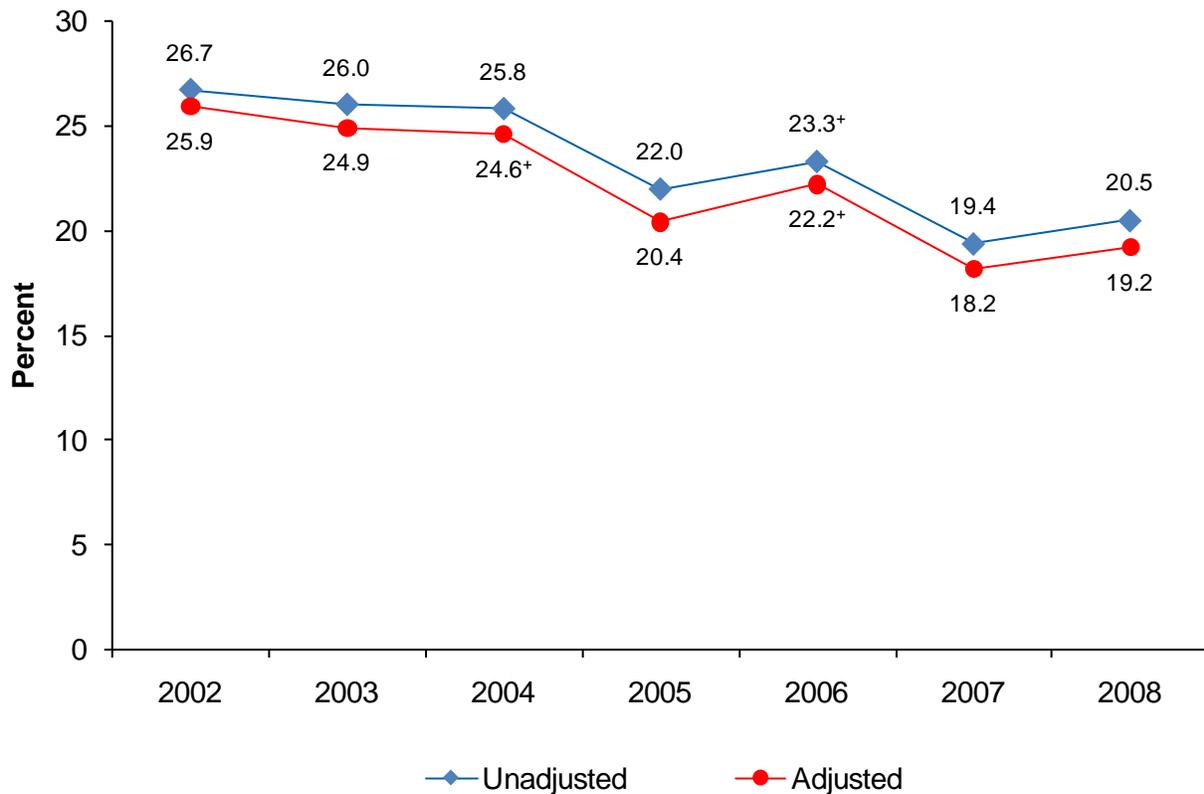
NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20.

⁺ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

- Neither unadjusted nor adjusted data showed significant changes in the prevalence of past year use of alcohol, cocaine, or inhalants between consecutive survey years from 2002 to 2008 (Table C.3.35 and Figures 3.9, 3.10, and 3.11).
- The prevalence of current cigarette use decreased from 2006 to 2007 for unadjusted (23.3 to 19.2 percent) and adjusted (22.2 to 18.2 percent) estimates (Table C.3.36 and Figure 3.12). The unadjusted prevalence estimates of current cigarette use in 2004 (25.8 percent) and 2005 (22.0 percent) were not significantly different. However, the adjusted prevalence of current cigarette use decreased from 2004 to 2005 (24.6 vs. 20.4 percent).

Figure 3.12 Trends in Current Cigarette Use among 12th Graders: Percentages Unadjusted and Adjusted for Absences, 2002 to 2008 NSDUH



NOTE: NSDUH data have been drawn from January to June of each survey year and subset to persons aged 12 to 20.

⁺ Difference between estimate and the estimate for the next survey year is statistically significant at the .05 level.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008 (January through June).

- Unadjusted and adjusted data both yielded increases in the prevalence of current cocaine use from 2002 to 2003 (unadjusted: 0.4 to 1.6 percent; adjusted: 0.4 to 1.3 percent) (Table C.3.36). The unadjusted prevalence estimates of current cocaine use were not significantly different between 2004 and 2005 (1.9 and 0.9 percent). In contrast, the adjusted prevalence of current cocaine use decreased from 2004 to 2005 (1.8 vs. 0.7 percent).
- Neither unadjusted nor adjusted data showed significant changes in the prevalence of current use of alcohol, marijuana, or inhalants between consecutive survey years from 2002 to 2008 (Table C.3.36).

3.3. Effects of Seasonality for 12th Graders

The Monitoring the Future (MTF) and the Youth Risk Behavior Survey (YRBS) survey students in the spring of the school year. If youths who have used different substances vary in their likelihood of using them during different times within a year (i.e., seasonal variation), then estimates of current use among youths could vary depending on whether data collection occurred during or shortly after a period when they were more likely to use a substance or they were interviewed after a month or more had elapsed since their most recent use.

However, estimates for substance use behaviors in which certain youths engage fairly regularly might show less variation depending on when they were interviewed. For example, an older adolescent who has been a daily cigarette user for more than a year might be likely to report current cigarette use regardless of whether he or she was interviewed in the first or second half of a survey year or even regardless of the specific month in which he or she was interviewed. Any seasonal variation that exists also could have a minimal effect on year-to-year trends in estimates of current use, as long as the variation is constant across years, or seasonal variations are small. Similarly, small seasonal variations could have a minimal effect on estimates of current use at a single point in time.

Survey questions about use in the past 12 months, in principle, could compensate for any seasonal variation in adolescents' substance use over the course of a year by including times of the year when adolescents might be more likely to use various substances in addition to times of the year when they may be less likely to use substances. However, accurate recall of substance use in the past 12 months could decay if the data collection period is relatively distant from when the most recent use occurred in the past 12 months. Especially for respondents who are infrequent users of a substance, recall of use in the past year is likely to be easier for use that occurred more recently relative to the interview date. In addition, if youths in a given half of the year are more likely than those in the other half to have used a substance last in the period close to the boundary between the past year and lifetime periods (e.g., in the past 11 months), they may be more likely to misreport their use as not having occurred in the past year.

Therefore, a limited set of estimates were run for 12th graders who were interviewed in the first half of the year (January through June) and for those who were interviewed in the second half of the year (July through December). These estimates were run as part of comparisons of annual trends among 12th graders. Estimates for the first and second halves of the year are presented for individual survey years rather than as annual average estimates based on combined 2002 through 2008 NSDUH data. In addition, estimates for 12th graders that have not been adjusted for absences and estimates that have been adjusted for absences are shown for the first and second halves of each survey year.

This section presents two sets of findings for 12th graders. First, trend data are compared across years, holding the period of data collection constant (i.e., January through June or July through December in each year). For example, estimates in 2002 based on surveys in January through June are compared with estimates in 2003 for that same data collection period. Thus, these comparisons examine whether trend data are comparable, as long as data were consistently collected in the first or second half of each year.

In addition, estimates for 12th graders surveyed in the first or second halves of a given calendar year would be based on different cohorts of youths. For example, 12th graders who

were interviewed in July through December would have been 11th graders if they had been interviewed in January through June; that is, they would represent the cohort of youths who were 11th graders during the first half of the year. In addition, youths in NSDUH who are interviewed during their summer break are asked to report the grade they *will be* in when they return. Therefore, the second set of findings in this section compares estimates for 12th graders in a given year who were interviewed in July through December with estimates for 12th graders who were interviewed in January through June of the next calendar year. For example, estimates for 12th graders who were interviewed in July through December of 2002 were compared with estimates for 12th graders who were interviewed in January through June of 2003 because these groups represent members of the same cohort of 12th graders.

Comparison of Trends

With few exceptions, trends in lifetime use of cigarettes, alcohol, marijuana, and inhalants among 12th graders showed no significant differences between consecutive years regardless of whether estimates were based on interviews conducted in January through June of a given year or in July through December (Table C.3.34). This pattern held both for estimates that were not adjusted for absences and those that were adjusted.

- For cigarettes, unadjusted and adjusted estimates of lifetime use decreased from 2006 to 2007 based on interviews conducted in January through June but did not show a significant change based on interviews conducted in July through December.
- For alcohol, the unadjusted and adjusted lifetime prevalence decreased from 2003 to 2004 based on interviews conducted in the first half of the year but did not change significantly based on interviews conducted in the second half of the year. In turn, the unadjusted and adjusted lifetime prevalence of alcohol use decreased from 2004 to 2005 based on interviews conducted in the second half of the year but not the first.

Trends for lifetime use of cocaine among 12th graders showed more variability depending on whether estimates were based on data from the first or second halves of the year or whether estimates were unadjusted or adjusted for absences (Table C.3.34).

- The lifetime prevalence of cocaine use based on data from the first half of the year that were not adjusted for absences did not change significantly between any consecutive years. In comparison, the unadjusted estimate based on data from the second half of the year decreased from 5.7 percent in 2002 to 2.8 percent in 2003, increased again to 4.8 percent in 2004, and then ranged from 4.0 to 5.6 percent in 2005 to 2008.
- For estimates that were adjusted for absences, the lifetime prevalence based on data from the first half of the year increased from 2002 to 2003 (from 4.4 to 6.9 percent) but *decreased* based on data from the second half of the year (from 5.3 to 2.7 percent).

Past year use of cocaine and inhalants did not show any significant changes between consecutive years regardless of the data collection period (Table C.3.35). Trends in past year use of cigarettes, alcohol, and marijuana among 12th graders showed some variation according to whether data were collected in the first or second halves of the year. For the most part, however,

trends were comparable for past year use of these substances regardless of the data collection period.

- For cigarettes and alcohol, unadjusted and adjusted estimates for January through June did not differ significantly between 2002 and 2003 but showed decreases for July through December ([Table C.3.35](#)).
- Unadjusted and adjusted estimates of past year cigarette use also decreased between 2006 and 2007 for data collected in January through June but not for July through December.
- For marijuana, unadjusted and adjusted estimates of past year use decreased between 2004 and 2005 for the first half of the year but not the second half.

For current use of marijuana, there were no significant differences between consecutive years regardless of whether data were collected in the first or second halves of the year ([Table C.3.36](#)). Except for a decrease from 2007 to 2008 for unadjusted (but not adjusted) estimate for July through December, most data for current alcohol use showed no significant changes between consecutive years. Trends for current use of cigarettes, cocaine, and inhalants among 12th graders showed more variation according to whether data were collected in the first or second halves of the year.

- For current use of cigarettes and cocaine, there were no significant changes in prevalence between consecutive years for data collected in July through December ([Table C.3.36](#)). For data collected in January through June, however, the unadjusted estimate of current cigarette use decreased from 2006 to 2007, and adjusted estimates decreased from 2004 to 2005 and from 2006 to 2007.
- Both the unadjusted and adjusted estimates of current cocaine use based on data collected in January through June increased from 2002 to 2003 ([Table C.3.36](#)); the adjusted estimate for January through June also decreased between 2004 and 2005.
- Unlike the pattern for cigarettes and cocaine, there were no significant differences in current use of inhalants between consecutive years for data collected in the first half of the year, but there were significant differences for data collected in the second half of the year ([Table C.3.36](#)). Unadjusted and adjusted estimates of current use of inhalants based on data from July through December increased from 2002 (0.1 percent for both estimates) to 2003 (1.3 percent for both estimates) and then decreased from 2006 (1.6 percent for both estimates) to 2007 (0.3 percent for both estimates).

Comparisons within Class Cohorts

Most estimates of lifetime use within a cohort of 12th graders did not differ according to whether data were collected in the first or second half of the year ([Table C.3.34](#)). The exceptions were for comparison of lifetime marijuana and cocaine use based on data from 12th graders who were interviewed in July through December 2003 and those who were interviewed in January through June 2004. The unadjusted and adjusted lifetime prevalence estimates were greater for January through June 2004 than for July through December 2003.

- An estimated 40.5 percent of 12th graders (unadjusted for absences) were lifetime marijuana users based on data in January through June 2004, and 35.0 percent were lifetime users based on data from July through December 2003.
- For unadjusted estimates of cocaine use, the lifetime prevalence was 5.8 percent based on data for January through June 2004 and 2.8 percent based on data for July through December 2003.

Except for the cohort of 12th graders in 2003 and 2004 and for the cohort of 12th graders in 2006 and 2007 for one substance (inhalants), estimates of past year use within a cohort of 12th graders did not differ according to whether data were collected in the first or second half of the year ([Table C.3.35](#)).

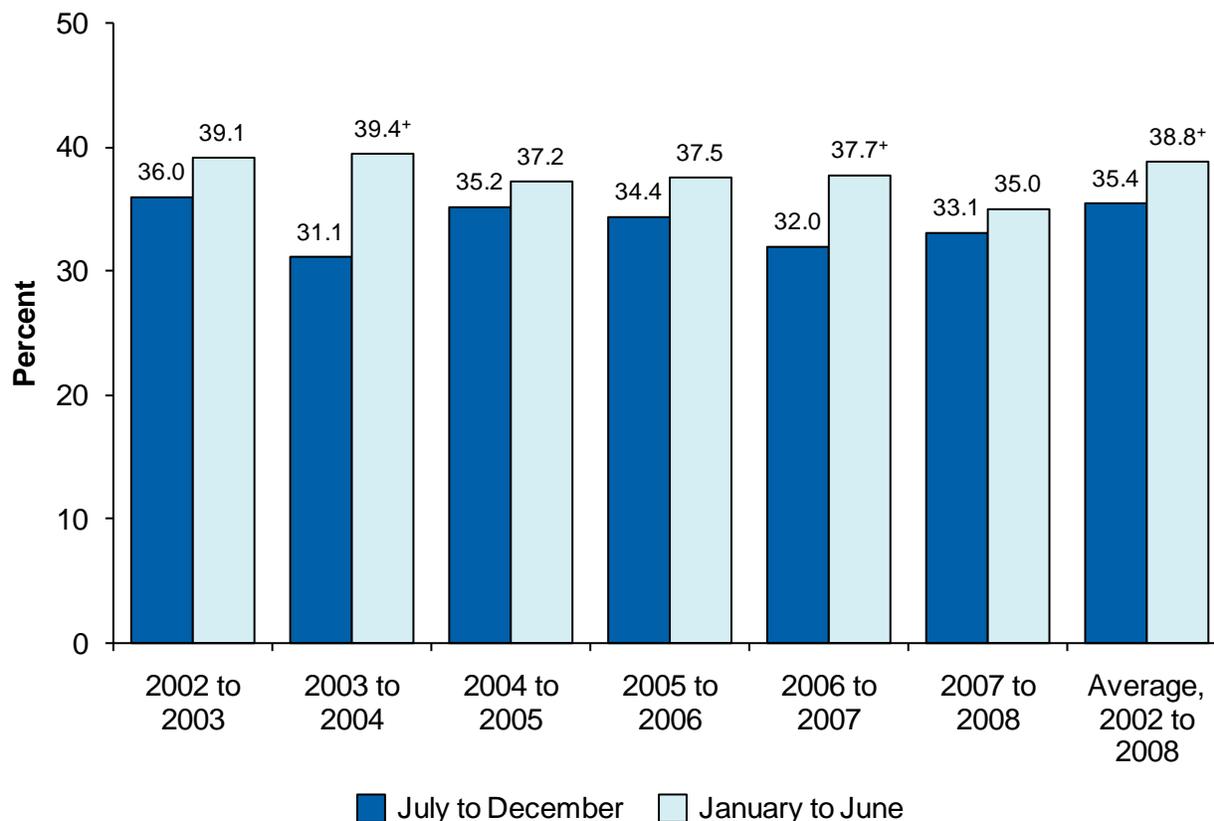
- Unadjusted and adjusted estimates were greater for 12th graders based on data from January through June 2004 than for July through December 2003 for past year use of cigarettes, alcohol, marijuana, and cocaine.
- An estimated 36.3 percent of 12th graders (unadjusted) were past year cigarette users based on data from January through June 2004, and 29.1 percent were past year users based on data from July through December 2003.
- For unadjusted data on past year alcohol use, 62.2 percent of 12th graders were estimated to be past year alcohol users based on data from January through June 2004 compared with 56.0 percent of 12th graders based on data from July through December 2003.
- Unadjusted estimates of past year marijuana use among 12th graders were 29.4 percent based on data from January through June 2004 and 24.9 percent based on data from July through December 2003.
- Unlike the patterns observed for the cohort of 12th graders in 2003 and 2004, estimates of past year use of inhalants were lower in the second half of the year than in the first half for both unadjusted and adjusted estimates. For example, unadjusted estimates of past year use of inhalants among 12th graders were 1.9 percent based on data from January through June 2007 and 4.2 percent based on data from July through December 2006.

The cohort of 12th graders in the second half of 2003 and the first half of 2004 also had different estimates of current use of cigarettes, alcohol, and inhalants for both unadjusted and adjusted estimates ([Table C.3.36](#)). As for lifetime and past year use of cigarettes and alcohol, estimates from the first half of 2004 were greater than the estimates from the second half of 2003. However, estimates of current use of inhalants were lower in the second half of 2004 than in the first half of 2003.

- The unadjusted estimates of current cigarette use among 12th graders were 25.8 percent based on data from the first half of 2004 and 21.3 percent based on the second half of 2003.

- For alcohol, unadjusted estimates indicated that 39.4 percent of 12th graders were current alcohol users based on data from the first half of 2004, and 31.1 percent were current users based on the second half of 2003 (Figure 3.13).

Figure 3.13 Percentage of 12th Graders within a Given School Year Who were Past Month Alcohol Users Based on the Period of Data Collection in NSDUH, 2002 to 2008



⁺Difference between the estimate in this school year for January to June and the estimate for July to December is statistically significant at the .05 level.

NOTE: This figure compares half-yearly estimates for the same cohort of students during a specified school year. For the 2002 to 2003 school year, for example, the two estimates were based on data collected from July to December 2002 and January to June 2003. Annual average estimates do not include data from January to June 2002 or July to December 2008 because the corresponding group of students from the other half of the academic year (i.e., 2001 to 2002 or 2008 to 2009) was not included. Estimates are not adjusted for absences.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2002 to 2008.

- Both unadjusted and adjusted estimates indicated that 0.3 percent of 12th graders were current users of inhalants based on data from the first half of 2004. In comparison, 1.3 percent of 12th graders were current users of inhalants (both unadjusted and adjusted) based on data from the second half of 2003.
- Unadjusted and adjusted estimates of current alcohol use for 12th graders also were greater based on data from the first half of 2007 (unadjusted: 37.7 percent) than based on data from the second half of 2006 (unadjusted: 32.0 percent) (Figure 3.13).

Although there was a general—but often not statistically significant—pattern in the direction of higher estimates in January through June than in July through December, the lack of significant differences between the halves of the year for 12th graders might be attributable to smaller sample sizes when the estimates were limited to single years of data and further subdivided into the two halves of the year. Therefore, annual average estimates for 12th graders in the two halves of the year were run for the combined 2002 to 2008 data to improve the precision of estimates. Estimation of annual averages was limited to data that were not adjusted for absences. A total of six cohorts were included in the annual averages. These annual averages did not include data from 12th graders at the two extremes (i.e., January through June 2002 and July through December 2008) because these two groups did not include complete cohorts; for example, the corresponding group in the same cohort as 12th graders who were interviewed in July to December 2008 would consist of 12th graders in January to June 2009.

- Alcohol was the only substance that showed a consistent seasonal difference between the fall (July to December) and spring (January to June) halves of the school year for the lifetime, past year, and past month periods. An annual average of 71.8 percent of 12th graders were lifetime alcohol users in January to June, compared with 69.4 percent in July to December. Annual average estimates of past year alcohol use were 62.6 percent for January to June and 59.0 percent for July to December, or about 6 percent higher in January to June than in July to December. Annual average estimates of current alcohol use were 38.8 percent for January to June and 35.4 percent for July to December, or about 10 percent higher in January to June than in July to December (Figure 3.13).
- Marijuana and cocaine showed greater annual average estimates of lifetime use in January to June (marijuana: 39.2 percent; cocaine: 7.0 percent) than in July to December (marijuana: 37.0 percent; cocaine: 5.9 percent) but did not show significant differences for the past year or past month.
- The annual average estimate of past year cigarette use was significantly greater in January to June (35.3 percent) than in July to December (32.9 percent). However, this pattern did not hold for lifetime or past month estimates of cigarette use.
- In contrast to the pattern for other substances, the annual average estimate of current use of inhalants in July to December was greater than the annual average estimate in January to June (0.8 vs. 0.4 percent).

3.4. Summary

As noted in the introduction to this chapter, school-based surveys such as MTF and YRBS do not include data from dropouts and absentees (or do not include data from chronic absentees, in the case of YRBS), two groups that are likely to have a higher prevalence of substance use. Results of the analyses in this chapter are consistent with other literature (e.g., Gfroerer et al., 1997; Stillwell, 2010) that suggests data from dropouts will have a relatively small effect on the overall percentages of 8th and 9th graders who are estimated to be substance users. Examination of data on numbers of users also suggests that inclusion of dropouts will have small effects on the numbers of youths in these two grades who are estimated to be substance users.

Consistent with what Gfroerer and colleagues (1997) hypothesized, inclusion of data from dropouts had greater effects on the percentages of persons at the 12th grade level who were estimated to be substance users than for youths in the 8th and 9th grades. For the most part, however, estimated percentages of persons at the 12th grade level or of subgroups of persons at this level with data from dropouts showed fairly modest increases relative to data without dropouts, often by a factor of about 10 percent. For example, if 20 percent of youths in a given grade were estimated to be users of a particular substance when data from dropouts were not included, an increase by a factor of 10 percent would yield an estimate of 22 percent. Even if such an increase were *statistically* significant, a change from 20 to 22 percent, for example, likely would be of limited *practical* significance for making decisions about substance use prevention policy or substance use prevention programming.

However, inclusion of data from dropouts had a greater effect on the percentages of persons at the 12th grade level or certain subgroups at this grade level who were current cigarette users, current alcohol users, or current binge alcohol users. Specifically, data from dropouts raised the overall percentages of 12th graders who were estimated to be current cigarette users by a factor of 30 percent. Inclusion of data from dropouts raised the percentage of 12th grade blacks who were current cigarette users by about 50 percent: from 14.0 percent without dropouts to 21.1 percent with dropouts. Similarly, the estimated percentage of 12th grade blacks who were current alcohol users increased by about 20 percent when data from dropouts were included; the estimated percentage of 12th grade blacks who were current binge alcohol users increased by about 40 percent when data from dropouts were included.

Inclusion of data from dropouts also had a more substantial effect on percentages of 12th graders who were estimated to be users of substances other than tobacco, alcohol, or marijuana. Specifically, inclusion of data from dropouts increased the estimated percentage of 12th graders who were lifetime users of cocaine by about 50 percent overall and by about 30 to 50 percent for certain subgroups of 12th graders. In addition, inclusion of data from dropouts increased the percentage of 12th graders who were estimated to be lifetime Ecstasy users by about 40 percent overall and by about 40 to 60 percent for subgroups of 12th graders. Given the small percentages of 12th graders who were lifetime heroin users (0.6 percent based on data without dropouts and 1.7 percent including data from dropouts), the estimated percentage of persons at the 12th grade level who were lifetime heroin users appeared to be particularly sensitive to the effects of excluding or including data from dropouts.

Furthermore, data from dropouts significantly affected estimates of the *numbers* of substance users in the 11th and 12th grade levels. Information on numbers of substance users is important for estimating the size of the adolescent population needing early intervention or treatment services. Data on estimated numbers of users among youths in a given grade and among dropouts assigned to that grade suggest that in-school surveys would capture the majority of youths in the 11th grade category who were current users of cigarettes, current alcohol users, current binge alcohol users, past year and marijuana users, and lifetime cocaine users. Conversely, these data for 11th graders suggest that about 10 to 13 percent of these users of cigarettes, alcohol, or marijuana would be missed for youths at that grade level through school-based surveys. In addition, exclusion of data from dropouts would appear to miss more than 20 percent of the 11th graders who were lifetime cocaine users.

Data from dropouts had an even greater effect on numbers of 12th graders who were estimated to be users of different substances. Specifically, dropouts would appear to comprise

about 40 percent of the current cigarette users, about 25 percent of the current alcohol users, about 30 percent of the current binge alcohol users, and about 30 percent of the current marijuana users at the 12th grade. Moreover, inclusion of data from dropouts would appear to nearly double the estimated numbers of 12th graders who were lifetime users of cocaine and Ecstasy relative to the estimated numbers without dropouts.

As noted in the introduction to Section 3.1, however, assumptions needed to be made about the grades that dropouts would be in if they were still in school. Therefore, the conclusions to be drawn will depend on how valid these assumptions are for youths at different grade levels.

Findings from this analysis also may underscore the need for a certain degree of caution about the kinds of inferences to be made about the population of older adolescents as a whole from school-based surveys. In particular, MTF estimates the percentages of youths in different grades who have used various substances in the lifetime, past year, or past month periods but does not make estimates of the *numbers* of youths in these grades who are substance users (see Section A.4 in Appendix A for additional discussion of this issue). For policymakers and service providers who are interested in knowing the numbers of adolescents who are users of various substances, as opposed to the percentages of adolescents who are substance users, exclusion of dropouts could appreciably affect some estimates of these numbers of adolescent substance users, especially for older adolescents.

Analysis of data on absentees also suggests that exclusion of absentees from school-based surveys will slightly affect estimates of substance use among adolescents because in an average month, most youths are absent from school no more than 1 or 2 days, if at all. Consistent with prior research (Bachman & O'Malley, 1981; Johnston & O'Malley, 1985), however, analyses of NSDUH data found that frequent absentees were more likely to be past year or current substance users than their peers who were not absent from school.

Examination of trend data for 12th graders in NSDUH also raises some questions about whether the inclusion or exclusion of absentees in annual estimates will not appreciably affect substance use trends. Although most trend data were consistent with an assumption of no appreciable effect on trends when absentees are excluded, estimates based on weights that were adjusted for absences sometimes yielded significant differences in prevalence between consecutive survey years when differences were not significant based on unadjusted data for 12th graders.

Trends in lifetime, past year, and current use for 12th graders in NSDUH who were interviewed in the first 6 months of the year and those who were interviewed in the second 6 months of the year were similar for most substances. However, situations were observed in which estimates differed between consecutive years for data collected in one half of the year but not for the other half. As noted previously, trends in lifetime cocaine use between consecutive years that were not adjusted for absences were stable based on data collected in January through June but showed some variation for unadjusted data from July through December and for data that were adjusted for absences. Given that the lifetime prevalence of cocaine use between consecutive years was stable from 2004 onward for estimates based on data from each half of the year and for unadjusted and adjusted data, the changes from 2002 to 2003 may be anomalous, particularly for estimates based on data from the second half of the year. Nevertheless, these findings suggest that trends in lifetime use of less prevalent substances such as cocaine could vary depending on the data collection period.

Estimates within a cohort of 12th graders typically did not differ according to whether data were collected in the July through December or January through June period. The notable exception was that some estimates of lifetime, past year, and current use for the cohort of 12th graders in 2002 to 2003 were greater for January through June 2003 than for July through December 2002. Unadjusted and adjusted estimates of current alcohol use among 12th graders in 2006 to 2007 also were greater based on data from the first half of 2007 than for the second half of 2006. Although the higher prevalence among 12th graders in the second half than in the first half of a school year may be related to 12th graders being older in the latter half of the school year, most estimates did not differ significantly depending on whether data were collected in the first or second half of the year. Consequently, something atypical may have occurred for the cohort of 12th graders in 2002 to 2003.

In the annual average data for 2002 to 2008 with the larger sample sizes for July through December and January through June, only one situation was observed (for current use of inhalants) in which the annual average estimate in July through December was greater than the corresponding estimate in January through June. When other annual average estimates were significantly different between the two halves of the year, the estimate in January through June was greater than the estimate in July through December. For many estimates, however, there was no significant difference in the annual average estimates between the two halves of the year.

Recent initiation of use could account for higher annual average estimates of lifetime use of alcohol, marijuana, and cocaine among 12th graders in the second half of a school year (i.e., January to June) than in the first half of the year (i.e., July to December). Recent initiation could explain the higher lifetime rate of alcohol use in January to June than in July to December, because the annual average estimate of past year use also was greater in January to June than in July to December. That is, initiation of use in the second half of the school year would be expected to yield higher annual average past year estimates in January to June than in July to December, because these recent initiates presumably would not have reported past year use if they had been surveyed in July to December. Furthermore, assuming a greater potential stigma for use of marijuana and cocaine than for alcohol, 12th graders who initiated marijuana or cocaine use in January to June might be willing to report that they used these drugs at least once in their lifetime but to underreport more recent use.

Although these findings are not completely clear-cut, whether students are surveyed in the fall or spring could make a difference for some prevalence estimates. Factors that could affect estimates for 12th graders between the first and second halves of the year include aging of the cohort, seasonal differences in substance use behaviors between the fall and spring semesters of the 12th grade, initiation of use after survey data collection in the fall, and students dropping out of school in or before the spring. With regard to aging of the cohort, rates of substance use steadily rise as youths progress from ages 12 to 18. In 2008, for example, the rate of past month marijuana use in NSDUH (regardless of school enrollment status) was 7.7 percent among 15 year olds, 10.9 percent among 16 year olds, 14.5 percent among 17 year olds, and 17.8 percent among 18 year olds (OAS, 2009b). In addition, 12th graders who have reached their 18th birthday in the spring could be more likely to report cigarette use in the spring than in the fall if they still were aged 17 in the fall. All but the effect of dropouts could increase the estimates in the spring. As indicated by the analysis of data for dropouts and nondropouts in this chapter, missing the 12th graders who were in school in the fall but dropped out of school by the spring would be expected to depress the estimates in the spring.

An additional consideration for whether students are surveyed in the fall or the spring concerns whether statistically significant differences between the fall or spring would be of practical significance. For example, the annual average estimate of past year alcohol use based on combined 2002 to 2008 NSDUH data was greater in January to June than in July to December (62.6 vs. 59.0 percent). From policy and programming perspectives, however, estimates based on either half of the school year indicate that the majority of 12th graders had used alcohol at least once in the past year.

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4. Privacy of NSDUH Interviews for Adolescents

As noted in Chapter 1, the potential for household interviews to provide adolescents with less privacy than they would have in a school setting is a possible explanation for why school-based surveys such as Monitoring the Future (MTF) and the Youth Risk Behavior Survey (YRBS) typically yield estimates of substance use that are higher than those obtained from household surveys such as the National Survey on Drug Use and Health (NSDUH). Therefore, this chapter examines the extent and the nature of the privacy afforded youths aged 12 to 17 in NSDUH by analyzing combined data from the 2002 to 2008 surveys. The chapter also discusses relationships between interview privacy and estimates of substance use.

Privacy of NSDUH interviews was measured from interviewer reports. Interviewers were asked to assess the level of privacy as part of a larger set of observation questions about interview characteristics (e.g., location of the interview, assessment of the respondent's understanding of the interview) that they completed at the conclusion of the interview and without any input from respondents. Interviewers assigned one of the following ratings for the privacy level for the interview: (1) completely private—no one was in the room or could overhear any part of the interview; (2) minor distractions—person(s) in the room or listening less than one third of the time; (3) person(s) present or listening about one third of the time; (4) serious interruptions of privacy more than half the time; and (5) constant presence of other person(s). If interviewers rated an interview as being less than completely private, they were asked to report who else was present or listening during the interview (i.e., not counting the interviewer); interviewers could report the presence of multiple people during an interview.

The language of the interview (English or Spanish) was one of the correlates examined for youths. In the combined NSDUH data from 2002 to 2008, interviews were conducted in Spanish for less than 2 percent of adolescent interviews.

4.1. Privacy Levels

This section examines whether interview privacy in NSDUH varies for different subgroups of adolescents, such as whether older adolescents are more likely than younger ones to have private interviews. This section also describes who else was present when youths did not have completely private interviews. Consistent with analyses presented elsewhere in this report, all percentages are weighted percentages for the entire population of youths aged 12 to 17.

4.1.1 Overall Privacy Levels

- An estimated 77.0 percent of youths aged 12 to 17 had completely private interviews, 17.4 percent had less than private interviews with only minor distractions, 2.6 percent had other persons present about one third of the time, 0.4 percent had serious interruptions of privacy more than half of the time, and 2.7 percent had the constant presence of another person (Table C.4.1).

- With few exceptions, the likelihood of youths having a completely private interview increased as age increased (Table C.4.1). The percentage of youths with completely private interviews ranged from 72.2 percent of those who were aged 12 to 80.0 percent of those who were aged 17. Youths who were aged 12 were less likely than those who were older to have completely private interviews. Similarly, youths who were aged 13 were less likely than those aged 14 or older to have completely private interviews. However, percentages of youths with completely private interviews were comparable for youths aged 14 or 15 (77.3 and 77.8 percent) and for youths aged 16 or 17 (79.7 vs. 80.0 percent).
- At the other end of the privacy continuum, 3.3 percent of youths aged 12, 2.9 percent of those aged 13 or 14, 2.4 percent of those aged 15 or 16, and 2.2 percent of those aged 17 were estimated to have the least privacy, in which another person was constantly present (Table C.4.1). Youths aged 12 were more likely than those at older ages to have the least private interviews.
- The likelihood of youths having a completely private interview did not differ for males and females (77.2 and 76.8 percent) (Table C.4.1).
- Percentages of youths with completely private interviews were comparable for whites (78.0 percent) and Asians (78.1 percent) (Table C.4.1). Youths who were white were more likely to have completely private interviews than those who were black (75.6 percent) or were Hispanic (74.3 percent). Whites also were more likely to have completely private interviews than those who reported two or more races (75.1 percent). In addition, the percentage of youths who were American Indian or Alaska Native who had completely private interviews (80.4 percent) was greater than the percentages for black youths, those who reported two or more races, and those who were Hispanic but was not significantly different from the percentages for white and Asian youths.
- Interviews with youths conducted in English were more likely to be completely private (77.1 percent) than those that were conducted in Spanish (68.6 percent) (Table C.4.1). An estimated 25.7 percent of Spanish-language interviews and 17.2 percent of English-language interviews had minor distractions.

4.1.2 Persons Present

Types of other persons who were present during interviews that are discussed in this section include (1) parents, (2) other adult relatives, (3) other adults, (4) children younger than 15 (which could include siblings), and (5) other persons. Interviewers also could report that a spouse or a live-in partner (or boyfriend or girlfriend) was present, which was generally more relevant for adult respondents than for youths. For analysis of interview privacy among youths, reports of a spouse or a live-in partner/boyfriend/girlfriend being present were classified in the "other" category. In addition, multiple people could have been present at the same time or at various times during an interview. Consequently, relationship categories discussed in this section are not mutually exclusive, and percentages often sum to more than 100 percent. However, the comparisons discussed in this section involve mutually exclusive subgroups of youths (e.g., percentages of youths at different ages who had a parent present).

- When youths aged 12 to 17 had less than completely private interviews, 77.2 percent had at least one parent present, 11.3 percent had at least one other adult relative present, 5.5 percent had another adult present, 30.2 percent had one or more children younger than 15 present, and 3.3 percent had other persons present (Table C.4.2).
- Parents were present for 80.3 percent of youths aged 12 and for 80.0 percent of youths aged 13 who did not have private interviews (Table C.4.2). In comparison, 75.4 percent of youths aged 16 and 70.5 percent of those aged 17 who did not have a private interview had a parent present.
- Youths who were aged 12 and did not have a private interview were more likely than those who were older to have one or more children younger than 15 present during the interview (34.1 percent) (Table C.4.2). Youths who were aged 13 who did not have a private interview also were more likely to have children younger than 15 present (31.0 percent) than those who were aged 16 or 17 (27.4 and 26.5 percent). As noted previously, children younger than 15 could include siblings.
- Among youths aged 17 who did not have a private interview, 14.9 percent had another adult relative present, and 8.8 percent had another adult present (Table C.4.2). In comparison, another adult relative was present for only 8.5 percent of youths aged 12 and for 9.7 percent of youths aged 13 who did not have a private interview. Other adults were present for only 3.9 percent of youths aged 12 and 3.8 percent of those aged 13 who did not have a private interview.
- White youths who did not have a private interview were more likely to have a parent present during the interview (81.5 percent) than were their counterparts who were black (65.6 percent), American Indian or Alaska Native (67.7 percent), Asian (74.3 percent), reported two or more races (76.5 percent), or who were Hispanic (75.0 percent) (Table C.4.2). Asian youths, those who reported two or more races, and Hispanic youths also were more likely than black youths to have a parent present. In contrast, other adult relatives were present for 14.0 percent of these Asian youths, 16.6 percent of these black youths and for 18.3 percent of these American Indian or Alaska Native youths but only for 9.4 percent of their white counterparts. Percentages of adolescents without complete privacy who had children younger than 15 present also were higher for blacks (37.4 percent), American Indians or Alaska Natives (39.6 percent), Asians (32.0 percent), and Hispanics (36.4 percent) than for whites (26.0 percent).
- Youths without complete privacy whose interviews were conducted in Spanish were more likely than those whose interviews were conducted in English to have one or more children younger than 15 present during the interview (42.9 vs. 29.9 percent) (Table C.4.2).

4.2. Privacy and Substance Use

This section compares estimates of substance use in NSDUH based on the level of privacy of the interviews. This section also compares estimates of substance use for interviews that were rated as not being completely private, according to who else was present during an

interview. These comparisons were not adjusted for potential confounding for other characteristics that could be associated both with interview privacy and the prevalence of substance use. Therefore, the section on adjusted comparisons presents results of logistic regression models with various substance use measures as the dependent variables.

4.2.1 Unadjusted Comparisons

Substance Use Estimates and Interview Privacy

As might be expected based on the substance use literature for adolescents noted in Section 1.1 in Chapter 1, completely private interviews in NSDUH tended to yield the highest prevalence estimates, and at the other end of the continuum, the least private interviews in which the constant presence of another person was noted tended to yield the lowest estimates. However, prevalence estimates for interviews in which someone was present more than half of the time (but not constantly) tended not to differ significantly from estimates for other groups, possibly because of the small prevalence of interviews in which someone was present more than half of the time (0.4 percent). Prevalence estimates for completely private interviews and those with only minor distractions also tended to be significantly different because these two groups comprised the two largest privacy groups for youths (77.0 and 17.4 percent, respectively) (Table C.4.1).

In addition, the effect of interview privacy on prevalence estimates is likely to be related to the size of the actual lifetime prevalence among youths in the population. If youths have never used a particular substance, no stigma would be assumed to be associated with reports of nonuse regardless of whether the interviews were completely private or other persons were present for at least part of the interviews. For example, younger children have less privacy and lower reports of substance use. However, these lower rates of substance use cannot entirely be associated with lower privacy rates because younger children overall tend to have lower lifetime, past year, and current usage rates than older adolescents have. Therefore, these results should be interpreted carefully. Section 4.2.2 examines the associations between privacy and prevalence rates, while taking into account differences in age and other demographic characteristics. Furthermore, NSDUH respondents who do not report lifetime use of a substance are not asked questions to identify whether they used it in the past year or past month. Therefore, this section first compares estimates of lifetime use according to the privacy of the interviews. Comparisons for past year or current (i.e., past month) use by interview privacy are discussed for more prevalent substances.

Although tables present estimates by interview privacy for county type and language of the interview (English or Spanish), estimates for these characteristics are not discussed in this section. Overall tests for statistical significance were inconsistent for county type (see Section B.2.4 in Appendix B for a discussion of significance testing procedures). Because interviews in English comprised more than 98 percent of the adolescent interviews in the combined data, variations in substance use estimates by interview privacy for English-language interviews are likely to reflect variations among youths overall. In addition, several estimates for Spanish-language interviews were suppressed because of low precision (see Section B.2.3).

- An estimated 28.0 percent of youths aged 12 to 17 were lifetime cigarette users based on completely private interviews (Table C.4.3). Interviews with minor distractions yielded a prevalence of lifetime cigarette use of 26.6 percent for youths. The least private interviews, in which another person was constantly present, yielded a lifetime prevalence estimate of only 22.6 percent. A higher prevalence of lifetime cigarette use from completely private interviews than from the least private interviews also was observed for both male and female youths and for whites, blacks, and Hispanics.
- The prevalence of lifetime alcohol use among youths with the least private interviews (33.3 percent) was lower than the estimates for youths with completely private interviews (42.2 percent), interviews with minor distractions (37.8 percent), or interviews with another person present or listening about one third of the time (36.1 percent) (Table C.4.6). A higher prevalence of lifetime alcohol use from completely private interviews than from the least private interviews also was observed for youths aged 16, those aged 17, males, females, whites, blacks, and Hispanics.
- Lifetime marijuana use followed the same pattern of a lower prevalence among youths with the least private interviews (13.5 percent) than among youths with completely private interviews (18.6 percent), interviews with minor distractions (16.6 percent), or interviews with another person present or listening about one third of the time (15.9 percent) (Table C.4.9). A higher prevalence of lifetime marijuana use from completely private interviews than from the least private interviews also was observed for youths aged 17, males, females, whites, blacks, and Hispanics.
- Youths aged 12 to 17 with completely private interviews and those with minor distractions had comparable estimates of lifetime cocaine use (2.4 and 2.3 percent) (Table C.4.12). In contrast, the least private interviews yielded an estimate of lifetime cocaine use (1.4 percent) that was lower than the estimates from completely private interviews and those with minor distractions. A higher prevalence of lifetime cocaine use from completely private interviews than from interviews that were least private also was observed for youths aged 17, males, females, whites, blacks, and youths reporting two or more races.
- Among non-Hispanic black youths, 0.3 percent of those with completely private interviews were estimated to be lifetime cocaine users (Table C.4.12); among those who had the least private interviews, the estimated lifetime prevalence was less than 0.05 percent. The lifetime prevalence for youths reporting two or more races who had completely private interviews was nearly 7 times the estimate for those who had the least private interviews (2.7 vs. 0.4 percent).

- Lifetime inhalant use did not follow the patterns observed for lifetime use of cigarettes, alcohol, marijuana, and cocaine. Among all youths aged 12 to 17, there was no relationship between interview privacy and estimates of lifetime use (Table C.4.14). Estimates of lifetime inhalant use also were not related to interview privacy by gender or race/ethnicity. Among youths aged 12, interviews with minor distractions yielded an estimate of lifetime inhalant use (5.8 percent) that was lower than that for completely private interviews (7.3 percent). However, the estimate for interviews in which another person was present about one third of the time was *greater* than the estimate for interviews with minor distractions (9.1 vs. 5.8 percent).
- Estimates of past year cigarette use showed the same general pattern as for lifetime cigarette use, in which completely private interviews yielded higher estimates than the least private interviews (Table C.4.4). An estimated 17.9 percent of youths aged 12 to 17 were past year cigarette users based on completely private interviews. The corresponding estimate for the least private interviews was only 14.2 percent. A higher prevalence of past year cigarette use from completely private interviews than from the least private interviews also was observed for males, females, whites, Asians, youths reporting two or more races, and Hispanics. Unlike the pattern for lifetime use, estimates of past year cigarette use among blacks did not differ for completely private interviews (11.0 percent) and those that were the least private (9.5 percent).
- Because of the lower prevalence, interview privacy had less of an effect on estimates of current cigarette use than was observed for lifetime and past year use. Estimates of past month use continued to differ for all youths aged 12 to 17 who had completely private interviews (11.2 percent) and those that were least private (9.5 percent) (Table C.4.5). The estimated prevalence among male youths also was greater for completely private interviews than those that were the least private (10.9 vs. 8.1 percent). However, corresponding estimates did not differ significantly for females or by race/ethnicity.
- Estimates of past year alcohol use showed the same general pattern as for lifetime alcohol use, in which completely private interviews yielded higher estimates than interviews with the least privacy. Completely private interviews yielded an estimate of 34.2 percent of youths aged 12 to 17 who were past year alcohol users (Table C.4.7). In comparison, interviews with the least privacy yielded an estimate of only 26.4 percent. A higher prevalence of past year alcohol use from completely private interviews than from the least private interviews also was observed for youths aged 14, 16, or 17; males; females; whites; Asians; and Hispanics. Unlike the pattern for lifetime use, estimates of past year alcohol use among blacks did not differ for completely private interviews (25.2 percent) and those that were the least private (20.9 percent).
- Based on completely private interviews, 17.4 percent of youths were current alcohol users (Table C.4.8). In comparison, the least private interviews yielded an estimate of 12.9 percent. A higher prevalence of current alcohol use from completely private interviews than from the least private interviews also was observed for youths aged 16 or 17, males, females, whites, and Hispanics.

- Estimates of past year marijuana use showed the same general pattern as for lifetime marijuana use. Completely private interviews yielded an estimate of 14.4 percent of youths aged 12 to 17 who were past year marijuana users, and interviews that had the least privacy yielded an estimate of 9.6 percent (Table C.4.10). A higher prevalence of past year marijuana use from completely private interviews than from interviews that had the least privacy also was observed for youths aged 16 or 17, males, females, whites, and blacks. In particular, the estimate of past year use among blacks based on completely private interviews (12.6 percent) was nearly twice the corresponding estimate for interviews with the least privacy (6.7 percent).
- Completely private interviews yielded an estimate of 7.4 percent of youths who were current marijuana users (Table C.4.11). In comparison, the least private interviews yielded an estimate of 4.7 percent. A higher prevalence of current marijuana use from completely private interviews than from the least private interviews also was observed for youths aged 16 or 17, males, females, whites, blacks, and youths reporting two or more races. In particular, estimates of current marijuana use among blacks and youths reporting two or more races based on completely private interviews (6.4 and 8.7 percent, respectively) were more than twice the corresponding estimates from the least private interviews (2.8 and 2.9 percent).
- Youths with completely private interviews had a higher estimate of past year cocaine use (1.7 percent) than did youths in interviews with the least privacy (1.0 percent) (Table C.4.13). Among youths aged 17, completely private interviews yielded a past year cocaine use estimate of 4.5 percent, and interviews with minor distractions yielded an estimate of 4.7 percent; these estimates were not significantly different. In comparison, interviews for youths aged 17 that were least private yielded an estimate of 2.5 percent, which was lower than these other two estimates. Males with completely private interviews also had a higher estimate of past year cocaine use (1.7 percent) than did their counterparts whose interviews were the least private (0.9 percent). The estimate of past year cocaine use for Hispanic youths with completely private interviews (2.0 percent) was more than twice the estimate from Hispanics with the least private interviews (0.9 percent). Estimates of past year cocaine use also differed for Asians with completely private interviews and those with the least private interviews (0.4 vs. 0.1 percent).
- Consistent with the pattern for lifetime inhalant use, there was no relationship between interview privacy and estimates of past year use among youths overall (Table C.4.15). However, completely private interviews yielded higher estimates of past year inhalant use for Asian youths (3.2 percent) and those reporting two or more races (5.1 percent) than corresponding interviews did that had the least privacy (0.2 and 1.0 percent, respectively).

Substance Use Estimates and Other Persons Present

When interviews were not completely private, prevalence estimates tended to be lower when a parent was present compared with interviews in which other adult relatives, adult nonrelatives, or other nonrelatives were present (not including the need for a parent to be present at the beginning to give permission for the youth to be interviewed). Lifetime prevalence estimates are discussed first, followed by estimates for current use; patterns for past year use

were similar to those observed for lifetime and current use according to who else was present during an interview. Comparisons in this section also take into account that estimates for different types of persons who were present were not mutually exclusive. Similar to the estimates presented earlier in this section, the presence of other persons also is related to factors such as age, race/ethnicity, and other demographic factors that are independently associated with substance use (i.e., regardless of interview privacy). Therefore, differences in estimates based on who was present during the interview cannot necessarily be attributed solely to the presence of these other persons.

- Data from youths aged 12 to 17 overall who did not have private interviews and had a parent present yielded an estimated lifetime prevalence of cigarette use of 24.0 percent (Table C.4.16). When one or more children were present, the estimate was 26.4 percent. Estimates of lifetime cigarette use were 32.1 percent for youths who had another adult relative present, 37.5 percent for those who had other adults present, and 43.5 percent for those who had other persons present. Lower estimates of lifetime cigarette use when a parent was present than when other adult relatives, other adults, and other persons were present also were observed for male, female, white, and Hispanic youths.
- Among youths aged 12 with less than private interviews, the prevalence of lifetime cigarette use showed little variation regardless of who else was present (Table C.4.16). However, the prevalence among these youths was lower if a parent was present (6.3 percent) than if another adult relative was present (9.6 percent). An estimated 49.4 to 53.0 percent of youths aged 16 with less than private interviews were lifetime cigarette users when other adult relatives, other adults, and other persons were present. In comparison, the prevalence was 39.0 percent when a parent was present. By the age of 17, more than 60 percent of youths who had adult nonrelatives or other persons present were estimated to be lifetime cigarette users. Although an estimated 45.9 percent of youths aged 17 were lifetime cigarette users if a parent was present, this estimate still was lower than the estimates when adult nonrelatives or other persons were present.
- An estimated 35.5 percent of youths who had a parent present and 35.7 percent of those who had children present during their interviews were lifetime alcohol users (Table C.4.19). In comparison, estimates of lifetime alcohol use were 43.5 percent when another adult relative was present, 46.4 percent when another adult was present, and 53.0 percent when other persons were present. Among females, 35.4 percent of those who had a parent present were estimated to be lifetime alcohol users, but this percentage increased to 58.5 percent of those who had other persons present (i.e., someone other than a parent, an adult relative, other adults, or children younger than 15); a similar pattern was observed for white youths. Among black youths, 30.3 percent of those who had a parent present were estimated to be lifetime alcohol users; percentages were higher when an adult relative or someone from the other persons category was present (40.0 and 41.5 percent, respectively).

- Youths aged 13, 14, and 17 were less likely to be lifetime alcohol users if a parent was present than if someone in the other persons category was present. Among youths aged 17 with parents present, for example, 63.5 percent were estimated to be lifetime alcohol users (Table C.4.19). When someone in the other persons category was present, however, the estimate increased to 77.8 percent.
- Estimates of lifetime marijuana use were 14.5 percent for youths who had a parent present, 21.8 percent for those who had another adult relative present, 24.8 percent for those who had other adults present, 15.7 percent for those who had children present, and 30.4 percent for those who had other persons present (Table C.4.22). When parents were present, estimates of lifetime use were 15.7 percent for whites, 12.8 percent for blacks, and 13.1 percent for Hispanics. In comparison, estimates when someone from the other persons category was present were 35.7 percent for whites, 21.8 percent for blacks, and 25.3 percent for Hispanics.
- Among youths aged 17, 34.2 percent were estimated to be lifetime marijuana users based on interviews conducted when a parent was present (Table C.4.22). In comparison, 41.2 percent of those who had an adult relative present, 42.5 percent of those who had an adult nonrelative present, and 50.9 percent of those who had other persons present were estimated to be lifetime marijuana users.
- An estimated 1.7 percent of youths aged 12 to 17 whose parents were present and 1.9 percent of those who had children present were lifetime cocaine users (Table C.4.25). The estimate increased to 4.5 percent for youths when an adult nonrelative was present and to 7.2 percent when other persons were present. When other persons were present, 5.8 percent of males and 8.4 percent of females were estimated to be lifetime cocaine users. These rates were greater than those when a parent was present (1.6 percent of males and 1.9 percent of females).
- Among youths aged 17, 5.0 percent were estimated to be lifetime cocaine users based on interviews conducted when a parent was present (Table C.4.25). In comparison, 8.4 percent of those who had an adult nonrelative present and 13.9 percent of those who had other persons present were estimated to be lifetime cocaine users.
- Youths who had someone present other than a parent, other adult relative, other adult, or a child were more likely to be lifetime users of inhalants than those who had a parent present (14.3 vs. 9.4 percent) (Table C.4.26). Males and females who had other adult relatives present also were more likely to be lifetime users of inhalants (12.1 and 11.3 percent, respectively) than those whose parents were present (9.6 and 9.1 percent, respectively). In addition, the estimate for females who had other persons present (16.4 percent) was greater than that when parents were present.

- The estimate of lifetime inhalant use among white youths when a parent was present (10.1 percent) was lower than estimates when other adult relatives (14.2 percent), other adults (12.7 percent), children younger than 15 (11.8 percent), or other persons (16.4 percent) were present (Table C.4.26). Although the estimate of lifetime inhalant use among Hispanic youths when other persons were present (18.3 percent) appeared to be larger than the estimate when parents were present (8.7 percent), the overall chi-square test of association between privacy level and lifetime inhalant use was not significant for Hispanics.
- Estimates of current cigarette use among youths based on interviews conducted when other persons were present showed patterns similar to those for lifetime use. Adolescents were about twice as likely to be current cigarette users when other adults were present (18.0 percent) or were more than twice as likely to be current users when other persons were present (22.1 percent) than they were when a parent was present (9.2 percent) (Table C.4.18). Among youths aged 17, more than one in three of those who had other adults present or other persons present were estimated to be current cigarette users. In comparison, 22.7 percent of youths aged 17 were estimated to be current cigarette users when a parent was present.
- Estimates of current alcohol use for youths were 13.4 percent when parents were present during the interview, 16.2 percent when other adult relatives were present, 20.5 percent when other adults were present, 13.0 percent when children were present, and 24.2 percent when other persons were present (Table C.4.21); except for interviews when children were present, the estimate of current use when a parent was present was lower than the estimates for these other groups. Nearly 30 percent of youths aged 17 were estimated to be current alcohol users when a parent was present. However, nearly 40 percent of youths at this age were estimated to be current alcohol users when other adults or other persons were present.
- When a parent was present, about 1 in 10 youths was estimated to be a past year marijuana user (Table C.4.23). However, when other adults were present, about 1 in 5 youths was estimated to be a past year user, and when other persons were present, nearly 1 in 4 was estimated to be a past year user.
- Among youths aged 17, 25.2 percent were estimated to be past year marijuana users when parents were present (Table C.4.23). In comparison, rates of past year marijuana use were 30.4 percent when another adult relative was present, 31.6 percent when another adult was present, and 36.5 percent when persons other than a parent, an adult relative, another adult, or a child were present.

- White youths who had other persons present during their interviews were more than twice as likely to be estimated to be past year marijuana users than those whose parents were present (27.4 vs. 12.1 percent) (Table C.4.23). Similarly, Hispanic youths who had other persons present during their interviews were twice as likely to be past year marijuana users as those whose parents were present (18.2 vs. 9.1 percent). Blacks also were more likely to be past year marijuana users in the presence of other adult relatives (13.7 percent), other adults (13.8 percent), or other persons (17.5 percent) than when parents were present (9.1 percent).
- Estimates of current marijuana use based on interviews conducted when other persons were present showed patterns similar to those for lifetime and past year use. Estimates of current use were 5.7 percent when parents were present, 9.1 percent when other adult relatives were present, 11.8 percent when other adults were present, 6.1 percent when children were present, and 13.0 percent when other persons were present (Table C.4.24); these estimates of current marijuana use were lower when parents were present than when other adult relatives, other adults, and other persons were present. White youths who had other persons present were more than twice as likely as those whose parents were present to be current users (15.2 vs. 6.1 percent). Among black youths, estimates of current marijuana use when adult relatives other than a parent or other persons were present (8.2 and 13.3 percent, respectively) also were greater than the estimate when parents were present (5.3 percent). Estimates of current use did not differ significantly for other racial/ethnic groups according to who else was present during an interview.

4.2.2 Adjusted Comparisons

As noted previously, older youths in NSDUH often were more likely than their younger counterparts to have a completely private interview. In addition, findings in Chapter 2 from MTF and YRBS, which are conducted in school settings rather than in youths' homes, indicated that for most substances, youths in higher grades were more likely to be substance users than those in lower grades (i.e., when grade level in most cases is a proxy for age). Therefore, it is possible that the higher rates of substance use for those in completely private settings, for example, may be more related to the age of the adolescents in a completely private setting than to the extent of privacy during the NSDUH interview. To examine this possibility, logistic regression models were run to examine the independent association of interview privacy and substance use, while taking into account the potential confounding effects of other characteristics.

An iterative process was used to specify the logistic regression models. First, unweighted frequencies were run for respondents aged 12 to 17 with the combined 2002 to 2008 NSDUH data to determine whether there would be adequate numbers of respondents to support models for substance use measures of interest and to support inclusion of interaction terms in the models between interview privacy and other characteristics. There was sufficient variation in the sample to run models for lifetime and past year use of cigarettes, alcohol, and marijuana and for lifetime use of cocaine. However, the privacy categories for "persons present about one third of the time" and for "serious interruptions of privacy about half of the time or more" needed to be combined into a single category: persons present one third of the time or more (but not constantly); constant presence of other persons during the interview was retained as a separate category.

Initial models were run for substance use measures described previously as the dependent variables. These models included the following covariates: (1) age (as a continuous variable from the ages of 12 to 17), (2) gender, (3) race/ethnicity, (4) county type (i.e., large metropolitan, small metropolitan, or non-metropolitan area), (5) language of the interview (i.e., English or Spanish), (6) privacy of the interview (i.e., completely private, minor distractions, persons present one third of the time or more, or constant presence of other persons), (7) household size for households with two or more persons including the youth (discrete categories for two to six persons in the household or for seven or more persons), (8) one or both parents living in the household (but not necessarily present during the interview), and (9) presence of any children of the youth living in the household. Parents could include biological, step-, adoptive, or foster parents. Thus, the presence of two parents in the household in these analyses did not mean that a youth was living with both biological parents.

The initial models also included the following interaction terms:

- privacy with gender;
- privacy with adolescent age categories (12 or 13, 14 or 15, and 16 or 17);
- privacy with race/ethnicity; and
- privacy with household size.

If a given interaction term was significantly associated with a dependent variable, the model was rerun to include only that interaction term along with the covariates for main effects described previously, to verify that the interaction term remained significant in the absence of the other interaction terms. For example, if the interaction term for privacy and age group was significant, the model was rerun for the main effects and the interaction term for privacy and age group, excluding the remaining interaction terms for privacy with gender, race/ethnicity, and household size.

The interaction term for privacy and gender was not significantly associated with any of the dependent variables in the full models with all four interaction terms and therefore was not investigated further. Significant interactions for privacy and age group were observed for all dependent variables in the full models and in models that included only the covariates for main effects and the interaction term for privacy and age group. Significant interactions for privacy and race/ethnicity also were consistently observed in the model that contained the privacy and race/ethnicity interaction term for lifetime use of cigarettes and cocaine and for past year (but not lifetime) use of marijuana. Interactions for privacy and household size were not investigated further because significant interactions in the full model were observed for only three substance use measures.

Based on these results, separate models were run for each dependent variable for the following age groups: (1) 12 or 13, (2) 14 or 15, and (3) 16 or 17. Age (oldest vs. youngest) was included as a covariate in these models. Separate models also were run for non-Hispanic whites, non-Hispanic blacks, and Hispanics for lifetime use of cigarettes and cocaine and for past year use of marijuana. The language of the interview was included as a covariate in the models for Hispanics but not for whites or blacks. Adjusted odds ratios (AORs) in these models indicate the

relative odds of reporting substance use for interviews conducted without complete privacy, divided by the odds of reporting use of the substance in a completely private interview.

- Interview privacy was significantly associated with lifetime cigarette use in models for youths aged 12 or 13 and those aged 14 or 15 but not for youths aged 16 or 17 (Table C.4.27). Youths in these two youngest age groups who had someone else constantly present during their interviews were less likely to be lifetime cigarette users than their counterparts with completely private interviews (AORs of 0.76 for those aged 12 or 13 and 0.80 for those aged 14 or 15). However, interview privacy was not associated with past year cigarette use for any of the three adolescent age groups (Table C.4.28).
- Non-Hispanic white and Hispanic youths aged 12 to 17 who had someone else constantly present during their interviews were less likely to be lifetime cigarette users than their counterparts with completely private interviews (AORs of 0.87 and 0.72, respectively) (Table C.4.34); interview privacy was not associated with lifetime cigarette use for non-Hispanic blacks. Among white youths, those who had minor distractions during their interviews were slightly *more* likely than those with private interviews to be lifetime cigarette users.
- Among youths aged 16 or 17, those whose interviews were less than completely private were less likely to be identified as lifetime or past year alcohol users than were those who had completely private interviews (AORs of 0.72 for lifetime use and 0.74 for past year use) (Tables C.4.29 and C.4.30). In addition, youths aged 12 or 13 and those aged 14 or 15 who had the least private interviews (i.e., the constant presence of another person) were less likely than their counterparts with private interviews to be lifetime alcohol users (AORs of 0.76 and 0.79, respectively). Youths aged 14 or 15 who had the least private interviews also were less likely to be past year users than their counterparts with completely private interviews.
- Youths aged 16 or 17 who had the least private interviews were less likely than those with completely private interviews to be identified as lifetime or past year marijuana users (AORs of 0.73 for lifetime use and 0.63 for past year use) (Tables C.4.31 and C.4.32). Youths aged 14 or 15 who had the least private interviews also were less likely than those with completely private interviews to be lifetime marijuana users (AOR of 0.79).
- The constant presence of another person during the interview decreased the likelihood of white and black youths being identified as past year marijuana users (AORs of 0.69 and 0.53, respectively) (Table C.4.35). White youths who had someone else present one third of the time or more also were less likely to be past year marijuana users than those with private interviews. Among Hispanic youths, only those with minor distractions were less likely than those with private interviews to be past year marijuana users.

- The constant presence of another person decreased the likelihood of youths aged 16 or 17 and black youths being identified as lifetime cocaine users (Table C.4.33 and C.4.36). Among youths aged 16 or 17, those with the least private interviews had 62 percent of the odds of being lifetime cocaine users relative to those with completely private interviews. Black youths who had the least private interviews had only 10 percent of the odds of being lifetime cocaine users relative to their counterparts with completely private interviews.
- Similar odds ratios were observed when the least private interviews were significantly associated with substance use in models by adolescent age group. For example, the odds ratios for lifetime cigarette use when another person was constantly present (relative to completely private interviews) were 0.76 for youths aged 12 or 13 and 0.80 for youths aged 14 or 15 (Table C.4.27). For lifetime alcohol use, odds ratios for the constant presence of another person versus completely private interviews were 0.76 for youths aged 12 or 13, 0.79 for those aged 14 or 15, and 0.72 for those aged 16 or 17 (Table C.4.29).

Additional covariates in the models that consistently showed significant associations with substance use (independent of interview privacy) are discussed subsequently.

- In all models by age group, the older adolescents in an age category were more likely than the younger ones to be substance users. Except for lifetime cocaine use among youths aged 12 or 13, blacks also were less likely than whites to be users. In particular, although black youths were less likely than their white counterparts to have completely private interviews, factors other than interview privacy contributed to differences in prevalence estimates for these two groups.
- Youths living in rural areas were more likely than those in large metropolitan areas to be lifetime users of cigarettes and alcohol in most models by age group. The likelihood of being a lifetime marijuana user for youths aged 14 or 15 did not differ for those in large metropolitan or rural areas, and youths aged 16 or 17 in rural areas were less likely than those in large metropolitan areas to be lifetime marijuana users. Youths living in rural areas also were more likely than those in large metropolitan areas to be past year users of cigarettes, but youths aged 16 or 17 in rural areas were less likely than those in large metropolitan areas to be past year alcohol users.
- Among youths aged 14 or 15 and among those aged 16 or 17, youths whose interviews were conducted in Spanish were less likely than those whose interviews were conducted in English to be lifetime or past year users of cigarettes, alcohol, or marijuana. Youths aged 16 or 17 whose interviews were conducted in Spanish also were less likely than their English-language counterparts to be lifetime cocaine users.

- Among youths aged 16 or 17, those living in smaller households were more likely than those living in households with seven or more people to be lifetime or past year users of alcohol or marijuana. For lifetime and past year alcohol use, this relationship was significant for most households with fewer people; for lifetime and past year marijuana use, youths aged 16 or 17 who were living in households with two or three people (including the youth) were more likely to be users than those living in households with seven or more people.
- The presence of only one parent (biological, step-, adopted or foster parent) or neither parent in the household typically increased the likelihood of substance use relative to situations in which two parents were present. This relationship was observed in all models by age group for lifetime and past year use of cigarettes, alcohol, and marijuana and for lifetime cocaine use except for youths aged 12 or 13. This relationship also was observed in models by race/ethnicity for past year marijuana use, for lifetime cigarette use among whites and Hispanics, and for lifetime cocaine use among whites. In addition, adolescent blacks were more likely to be lifetime cigarette users and Hispanic youths were more likely to be lifetime cocaine users if only the mother or neither parent was present than if two parents were present.
- Among youths aged 16 or 17, those having a child living with them were *more* likely than those who did not have a child living with them to be lifetime users of cigarettes, alcohol, marijuana, and cocaine and to be past year users of cigarettes. White youths aged 12 to 17 who had a child living with them (but not corresponding black or Hispanic youths) also were more likely to be lifetime cigarette users than those who did not have a child living with them.

4.2.3 Substance Use Estimates for Completely Private Interviews and All Youths

As noted in Section 4.2.1, completely private interviews in NSDUH tended to yield the highest prevalence estimates, and the least private interviews yielded the lowest estimates. As noted in Section 4.2.2, interview privacy continued to be associated with some substance use estimates in logistic regression models that took into account potential confounding relationships between privacy, demographic characteristics, and prevalence rates.

However, the question remains about how well interview privacy issues explain the lower prevalence estimates in Chapter 2 for NSDUH than in school-based surveys. One way to quantify the effects of interview privacy (or lack thereof) on substance use estimates in NSDUH is to compare prevalence estimates based on completely private interviews with overall estimates based on all interviews. Estimates based on completely private interviews provide a benchmark for what the prevalence estimates in NSDUH might be if all interviews with adolescents were completely private.

As noted previously, 77 percent of NSDUH adolescents had completely private interviews, and another 17 percent had only minor distractions. Consequently, there was little difference between selected substance use estimates based on completely private interviews and corresponding overall estimates for adolescents or subgroups of adolescents. Unlike estimates elsewhere in this report, differences between estimates based on all interviews and those based

on completely private interviews have not been tested for statistical significance. Even if any differences were significant, however, these differences are minor from a substantive standpoint.

- Complete interview privacy affected estimates of lifetime use of cigarettes, alcohol, marijuana, and cocaine and estimates of current use of cigarettes and alcohol for all youths aged 12 to 17 by a factor of about 2 to 4 percent (Tables C.4.37, C.4.38, and C.4.39). For example, the estimates of lifetime and current cigarette use among youths based on all NSDUH data were 27.5 and 11.0 percent, respectively. Corresponding estimates based on completely private interviews were 28.0 and 11.2 percent. An estimated 18.1 percent of youths were lifetime marijuana users based on all interviews and 18.6 percent based on completely private interviews.
- Estimates for Hispanic youths based on completely private interviews and those based on interviews for all Hispanic youths differed by a factor of about 3 to 6 percent (Tables C.4.37, C.4.38, and C.4.39). For example, estimates of current cigarette use for Hispanics were 8.5 percent based on all interviews and 8.9 percent based on completely private interviews. Estimates of lifetime marijuana use were 17.4 percent based on all interviews and 18.4 percent based on completely private interviews.
- Some estimates for demographic subgroups based on completely private interviews showed slight decreases relative to estimates based on all interviews for that group. These differences can be explained by slightly higher estimates among those with less than private interviews compared with estimates based on completely private interviews. For example, the estimate of current cigarette use among adolescent blacks with completely private interviews was 6.1 percent, and the estimate based on all interviews was 6.2 percent (Table C.4.38). The estimate for blacks based on interviews with minor distractions was 6.6 percent (Table C.4.5). In addition, the estimate of current cigarette use for adolescent blacks when there was the constant presence of another person (6.0 percent) was similar to the estimate for completely private interviews.

It is possible that conducting an interview in an adolescent's home environment has an inhibitory effect on adolescent substance users' willingness to report their use, even if parents or other household members are not in the same room as the adolescent and are not able to see how adolescents are answering the self-administered questions, including questions about substance use. However, differences between estimates based on completely private NSDUH interviews in which no other household member was present or able to overhear and all NSDUH interviews were small relative to the differences between estimates from NSDUH and those from school-based surveys. The NSDUH estimates in Chapter 2 were based on data from youths aged 12 to 20 who were enrolled in school and were interviewed in January through June, and those in Tables C.4.37, C.4.38, and C.4.39 were based on data from youths aged 12 to 17 regardless of school enrollment status or when they were interviewed. Nevertheless, these small differences between NSDUH estimates from completely private interviews and from all adolescents suggest that factors in addition to interview privacy could be contributing to the differences between NSDUH estimates and those from school-based surveys.

4.3. Summary

Results from this chapter generally were consistent with other findings from the adolescent substance use literature mentioned in Section 1.1 in Chapter 1, suggesting that youths who have used tobacco, alcohol, or other substances tend to underreport their use in household interview settings if they do not think that their interviews are private—especially if they think that their parents can deduce whether they have used these substances. Based on NSDUH interviewers' ratings of interview privacy, completely private interviews in NSDUH typically yielded the highest prevalence estimates, and those that were least private (i.e., those for which the constant presence of one or more other persons during the interview was reported) typically yielded the lowest estimates. When interviews were less than completely private, interviews in which parents were present typically yielded lower estimates than interviews in which adult nonrelatives or persons other than parents, other adult relatives, other adults, or children were present.

However, underreporting of substance use may not always be the sole reason for lower estimates among youths when parents are present. Specifically, lower estimates of substance use when parents were present may sometimes be associated with subgroups of youths who are less likely to be substance users. When interviews were less than completely private, for example, parents were more likely to be present for youths aged 12 or 13 than for their counterparts aged 16 or 17; the prevalence of substance use among younger adolescents also is typically lower than the prevalence among older adolescents. In addition, the presence of a parent during an interview may, in some instances, be associated with a level of parental monitoring of the child's activities that lessens the child's opportunity to use various substances. Furthermore, except for situations in which parents were the only persons present and they were present for the entire interview, data on the presence of parents or other persons did not capture a level of detail to determine *when* parents or other persons were present. For example, underreporting of substance use because of the presence of a parent would be a less likely explanation for a youth's responses to the substance use questions if the parent was not present for the self-administered substance use questions (which are the first self-administered questions in the interview) but was present for later sections of the interview.

Because certain demographic characteristics among youths (e.g., age) may be associated both with interview privacy and estimates of substance use, logistic regression models were run to examine relationships between interview privacy and substance use estimates in NSDUH when other potential confounders were taken into account. One key finding was that although adolescents aged 16 or 17 were more likely than younger adolescents to have private interviews, decreases in interview privacy more commonly had a negative effect on substance use estimates in models for youths aged 16 or 17 than in models for younger adolescents. In particular, youths aged 16 or 17 with the least private interviews were less likely than those with completely private interviews to be identified as lifetime marijuana or cocaine users or past year marijuana users. The constant presence of another person during the interview also decreased the likelihood of blacks being identified as past year marijuana users or lifetime cocaine users relative to their counterparts with completely private interviews.

Although NSDUH interviews are intended to be conducted in the most private setting possible, these logistic regression model results for older youths and blacks point to the importance of maximizing interview privacy for these two groups of youths. Given that older

adolescents are more likely than younger ones to have used marijuana or cocaine, additional efforts to increase the percentage of completely private interviews for adolescents aged 16 or 17 beyond 80 percent could yield more reports of marijuana and cocaine use among these older youths. In addition, the lower percentages of black and Hispanic youths with completely private interviews (75.6 and 74.3 percent) compared with the percentage for white youths (78.0 percent) could indicate the need for additional efforts to increase the privacy of interviews for black and Hispanic youths. However, age group models in which race/ethnicity was a covariate suggested that interview privacy does not completely explain lower estimates of substance use among black youths than among white youths.

The finding that interview privacy was not significantly associated with lifetime or past year cigarette use in models for youths aged 16 or 17 also is consistent with findings from Chapter 2 that NSDUH cigarette use estimates for older youths tended to be comparable with or in some instances were higher than the estimates in the two school-based surveys—in contrast with the general pattern of estimates being higher in the school-based surveys. Although interview privacy was associated with lifetime cigarette use in models for younger adolescents, this association was not observed for past year use. In contrast, the two school-based surveys yielded higher estimates of current cigarette use (which by definition includes the past year) for adolescents in lower grades than NSDUH did. If interview privacy is a key explanatory factor for lower substance use estimates in household surveys than in school-based ones but interview privacy has less of an effect on youths' willingness to report recent cigarette use in household surveys, then household and school-based surveys would be expected to yield similar estimates of recent cigarette use. However, MTF and YRBS yielded higher estimates of current cigarette use for 8th and 9th graders, respectively, than NSDUH did.

In addition, when youths with the least private interviews were less likely to be substance users in models by age group, the effects on estimates (as indicated by the odds ratios) were similar across age groups of adolescents and substance use measures. In contrast, findings from Chapter 2 generally show a greater difference in substance use estimates between NSDUH and the school-based surveys for younger adolescents and less of a difference by the 12th grade. If it is hypothesized that concerns about interview privacy contribute to lower substance use estimates in NSDUH than in school-based surveys for younger adolescents, these logistic regression model results suggest that household interview privacy may be confounded by other factors for younger adolescents.

Because a focus of modeling was on examining relationships between the overall *level* of privacy in NSDUH interviews and substance use estimates, models did not examine the effects on prevalence estimates depending on the types of other persons who were present during interviews (e.g., parents). Nevertheless, the finding was important that interviews with a parent present for some or all of the time typically yielded lower estimates of substance use than interviews did when other persons were present. As noted previously, the lower estimates that were reported when parents were present could occur for reasons other than a reluctance of substance-using youths to report their use in the presence of a parent.

In addition, more than three fourths of NSDUH interviews with adolescents were rated as completely private, meaning that no one else was present during the interview or could overhear. Some interviewers could have overrated the privacy level of their interviews; based on the association of decreased interview privacy with lower substance use estimates, overrating of interview privacy could have negatively affected the estimates based on interviews that were

classified as completely private. Nevertheless, the differences between estimates based on completely private interviews and all NSDUH interviews were small relative to the differences between substance use estimates from NSDUH and those from surveys based in schools rather than in household settings.

Although interview privacy may not completely explain the differences between estimates from NSDUH and school-based surveys, further research on the topic of parental presence during interviews could aid in differentiating situations in which the presence of parents—particularly at the beginning of the interview when respondents are asked the substance use questions—would appear to have an adverse effect on the truthful reporting of substance use and situations in which a parent's presence would appear to have a more neutral effect on how youths answer questions in the interview. Understanding the reasons why parents were present during their children's interviews in NSDUH could assist the Center for Behavioral Health Statistics and Quality to identify ways to create a more comfortable NSDUH interview environment for youths while also addressing any safety or other concerns that parents might have about their children being interviewed at home. Assuming that attaining complete privacy for 100 percent of NSDUH interviews is not likely to occur as long as they are conducted in respondents' homes, other efforts to create a more private household interview environment for youths (and NSDUH respondents in general) also may need to be considered; these may include implementation of any procedures that further reduce the likelihood of interviewers (and, by extension, other household members) knowing how youths answered self-administered questions or efforts to maximize the percentage of youths who use their headphones for all of the self-administered sections of the interview.

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5. Discussion

As Chapter 1 notes, the National Survey on Drug Use and Health (NSDUH), Monitoring the Future (MTF), and the Youth Risk Behavior Survey (YRBS) all collect information about substance use among adolescents. For many variables and measures, however, these surveys yield different estimates for the same behaviors they are attempting to measure. Therefore, goals of this study are (1) to help users understand the reasons for differences in estimates of youth substance use across different federally funded surveys; (2) to facilitate accurate interpretation of results from these surveys; and ultimately, (3) to improve the understanding of the true nature and extent of youth substance use in the United States.

Chapter 1 and Appendix A present background information about characteristics of these surveys to begin suggesting reasons for differences in estimates of substance use among adolescents. Chapter 2 presents estimates from all three of these surveys, with discussion of similarities and differences among the surveys. Because school-based surveys such as MTF and YRBS do not include substance use information from school dropouts and are likely to miss frequent absentees, Chapter 3 uses NSDUH data for adolescents to explore the potential effects on substance use estimates when these two groups are included in or excluded from estimates. Chapter 3 also discusses differences in results according to whether school surveys are conducted during the fall or the spring of the school year.

In addition, the potential for reduced privacy in household settings has been offered as an explanation for lower substance use estimates in household surveys such as NSDUH than in school-based surveys such as MTF and YRBS (Brener et al., 2006; Fendrich & Johnson, 2001; Gfroerer, Wright, & Kopstein, 1997; Griesler, Kandel, Schaffran, Hu, & Davies, 2008; Johnson & Bowman, 2003; Kann, Brener, Warren, Collins, & Giovino, 2002). Specifically, adolescent substance users may be more prone to underreport their use in household settings out of concern that a parent may discover that they have used certain substances. Therefore, Chapter 4 examined relationships between interview privacy and substance use prevalence estimates in NSDUH.

This chapter reviews findings from Chapters 2 through 4. Findings from these previous chapters also are interpreted with the aim of providing policymakers, service providers, and substance abuse researchers with a more complete understanding of substance use data for adolescents in the United States.

5.1. Highlights from Chapters 2 through 4

As noted in Chapter 2, NSDUH, MTF, and YRBS to a large extent showed similar patterns of substance use by gender and race/ethnicity within each survey. In addition, NSDUH and MTF showed similar trends in the prevalence of substance use among 12th graders from 2002 to 2008, although some year-to-year variations were observed between the surveys. However, NSDUH, MTF, and YRBS differed most notably in the *magnitude* of their respective prevalence estimates. NSDUH estimates tended to be lower than the estimates from the two school-based surveys, and YRBS estimates for 10th and 12th graders tended to be greater than estimates from MTF. Estimates for NSDUH also converged more closely with or became comparable with estimates from these other surveys by the 12th grade. An exception was that

NSDUH estimates of current cigarette use in the 11th and 12th grades were comparable to the YRBS estimates and were *higher* than the MTF estimate for 12th graders. However, YRBS yielded higher estimates of current use of smokeless tobacco and cigars among 12th graders than NSDUH did.

Despite MTF and YRBS estimates tending to be higher than NSDUH estimates, these two surveys are designed to be representative of the school-based population. For this reason, they do not include school dropouts. MTF also does not include students who were absent on the day of survey administration. YRBS conducts make-up questionnaire administrations for students who were absent on the day a survey was administered at their school but is less likely to include data from chronic absentees. Nevertheless, surveys such as MTF and YRBS are not designed to make estimates for the adolescent population overall.

Therefore, Chapter 3 examined how NSDUH estimates from youths who were in school differ from estimates from the broader population of youths. Consistent with what Gfroerer and colleagues (1997) hypothesized, analyses in Chapter 3 that compared estimates at a given grade level (i.e., if the dropouts were assigned to the grade they would have been in school) with or without dropouts found that data from dropouts had a minimal effect on substance use estimates among youths who could be classified at the 8th and 9th grade levels. Inclusion of data from dropouts showed more of an effect on the percentages of youths at the 12th grade level who were estimated to be substance users. Nevertheless, most of these estimated percentages increased only modestly for 12th graders, often by about 10 percent. However, inclusion of data from dropouts notably affected estimates of the *numbers* of substance users among youths classified to be in the 11th and 12th grade levels. For example, dropouts who are assumed to be at the 12th grade level comprised 40 percent of the current cigarette users, 25 percent of current alcohol users, 30 percent of current binge alcohol users, and more than 30 percent of current marijuana users at this grade level. These findings are of relevance when using school-based surveys to describe overall youth substance use, particularly in estimating the total numbers of youth in the broader population using a substance.

Analysis of data on absentees in Chapter 3 showed that the inclusion of frequent absentees would have a minimal effect on overall national estimates of substance use among students. Adjustment of the analysis weights of NSDUH respondents to reduce the contribution of frequent absentees to substance use estimates did not show significant effects on substance use estimates.

Because the lower estimates in NSDUH than in the school-based surveys are consistent with previously cited research suggesting that privacy issues in household surveys can reduce youths' reporting of substance use in those surveys, Chapter 4 examined relationships in NSDUH between substance use prevalence and interview privacy. Results from this chapter generally were consistent with these other findings, suggesting that youths who have used tobacco, alcohol, or other substances tend to underreport their use in household interview settings if the interviews are not private. Completely private interviews in NSDUH typically yielded the highest prevalence estimates, and those that were least private (i.e., those for which the constant presence of one or more other persons during the interview was reported) typically yielded the lowest estimates. Interviews in which a parent was present typically yielded lower estimates than interviews in which someone was present who had another relationship to the respondent.

However, the differences between estimates based on completely private interviews and all NSDUH interviews were small because 77 percent of all NSDUH interviews with adolescents were completely private and another 17 percent involved only minor distractions. This finding suggests that underreporting of adolescent substance use in household surveys because of privacy issues may not be the sole explanation for lower estimates from NSDUH relative to those from school-based surveys such as MTF and YRBS. As Appendix A notes, for example, factors such as procedures for obtaining parental permission, interview format and skip logic, and procedures for handling inconsistent or missing data also are likely to contribute to these differences in prevalence estimates. Implications of these other differences are discussed in the remaining sections of this chapter. Nevertheless, findings from Chapter 4 reiterate the importance of privacy in household-based surveys, such as NSDUH, that ask about sensitive behaviors.

5.2. Contributions of NSDUH, MTF, and YRBS toward Understanding Adolescent Substance Use

NSDUH, MTF, and YRBS all provide a vehicle for investigating and understanding the many facets of substance use among adolescents. No single survey that would be of acceptable length to respondents could adequately cover the full array of issues and outcomes of interest that are associated with adolescent substance use (Harrison, 2001). Thus, when all three of these surveys provide estimates of the same substance use behavior among adolescents, each contributes to a broader understanding of adolescent substance use and how substance use is related to other issues of interest.

For example, NSDUH includes detailed questions to measure substance use disorders (i.e., substance dependence or abuse), receipt of substance abuse treatment services, mental health conditions (e.g., major depressive episode), and receipt of treatment or counseling for mental health problems. In addition to substance use questions, MTF includes questions about risk behaviors for human immunodeficiency virus (HIV) infection. MTF also includes a longitudinal component that follows samples of high school seniors into young adulthood and further into adulthood that allows tracking of changes in substance use patterns among the same persons as they encounter various life experiences, such as college, employment, and marriage. By focusing on six priority health risk behavior categories—including tobacco, alcohol, and other drug use—that are important contributors to the leading causes of death, disability, and social problems in the United States, YRBS provides data on adolescent substance use in the broader context of adolescent health, including relationships between substance use and other health behaviors or conditions.

Furthermore, similar findings across these surveys can increase policymakers' confidence in the validity of the results. For example, all three surveys include "core" questions about substance use that do not change across survey years to permit accurate monitoring of trends in substance use. NSDUH and MTF are conducted annually, and YRBS is conducted every 2 years. In years when YRBS is conducted, therefore, convergence of trend data across these surveys can increase policymakers' confidence in drawing conclusions about whether the prevalence of use of specific substances (or categories of substances, such as any use of illicit drugs) among adolescents is increasing, decreasing, or remaining stable. When these surveys yield similar findings for demographic, geographic, or other correlates of adolescent substance use, these results also can assist policymakers in drawing conclusions about subgroups of adolescents who

are at greater or lower risk for substance use and conclusions about the implications for preventing substance use, preventing other problems associated with substance use, and encouraging cessation of use.

When estimates differ among these surveys, policymakers and other data users understandably will want to know which survey's estimates of substance use are the "right" ones or at least are more appropriate to use to inform the topic at hand. Given all of the methodological differences among these three surveys (see below and Appendix A) and given that each survey is based on a sample of respondents, however, these surveys' estimates will never be exactly the same.

5.3. Evaluating the Accuracy of Substance Use Estimates

A common assumption is that the natural tendency of substance-using adolescents will be to underreport use because they recognize it as being socially undesirable or because of concerns about negative consequences if others (e.g., parents) find out about their use. In a review of validation studies on self-reported drug use, Harrison (1997) noted that patterns of self-reporting were consistent with the social desirability hypothesis about underreporting of stigmatized behaviors, with urine test results and self-reports being more congruent for marijuana and less congruent for cocaine. However, much of this prior validation research has focused on arrestees (e.g., Fendrich & Xu, 1994; Harrison, 1995). Nevertheless, data users might conclude that higher substance use estimates for adolescents, such as those from school-based surveys, were based on more truthful reports and therefore are more accurate than lower estimates, such as those from NSDUH. As noted in the introduction to this chapter, however, respondents' willingness to be truthful about their substance use is not the only factor that can affect the accuracy of estimates of substance use among adolescents.

Effects of Question Structure and Wording

Questionnaire structure and question wording can affect the accuracy of self-reports of substance use. In particular, NSDUH uses "filter" or "gate" questions that first ask about lifetime use in a yes/no question format; the subset of respondents who had used in their lifetime are asked when they last used the substance to identify those who used it in the past year or past month. In contrast, MTF and YRBS usually do not ask a dichotomous gate question about use but instead ask about the number of occasions (in MTF) or the number of days or times (in YRBS) when respondents used a substance in a period of interest. YRBS uses a dichotomous question for lifetime use of cigarettes but does not include instructions for respondents to skip remaining questions about cigarette use if they answer the lifetime cigarette use question as "no." MTF uses a dichotomous gate question for cigarettes and alcohol that allows respondents to skip additional questions about these substances if they have never used. For the frequency-of-use questions in YRBS and MTF, respondents are expected to indicate nonuse in a given period by reporting that they used a substance on "0" days/times or occasions in that period. In YRBS, for example, respondents who previously reported that they never smoked cigarettes can report that they smoked cigarettes on "0 days" in the past 30 days.

A potential benefit of survey instruments that use filter questions—especially for surveys such as NSDUH that are administered in household settings—is that they require less time for respondents to answer the questions and therefore are generally less burdensome for both

interviewers and respondents (Hawthorne, 2003; OAS, 2001). However, research on topics other than substance use also has shown that filter questions can increase respondents' likelihood of providing negative answers or expressing no opinion (Bishop, Oldendick, & Tuchfarber, 1983; Hawthorne, 2003; Knäuper, 1998; Von Korff et al., 2008). Thus, the structure of substance use questions may be contributing to why MTF and YRBS estimates of lifetime use of alcohol, marijuana, cocaine, and heroin are higher than corresponding NSDUH estimates at each grade and why YRBS estimates of lifetime Ecstasy use are higher than NSDUH estimates at each grade.

In particular, Knäuper (1998) found that respondents were less likely to report that they observed or were the victims of crimes if they were asked yes/no filter questions than if they were asked to report the number of crimes (including zero). Comparison of the open-ended responses for the types of crimes that respondents were thinking of when they answered the questions indicated that respondents who were asked the filter question focused on more serious crimes than respondents who were asked directly about the number of times they observed or were the victims of crime. Knäuper interpreted these findings to mean that respondents might underreport the occurrence of an event if they interpret a yes/no filter question as applying to a relatively rare event (e.g., serious crimes such as homicides). In contrast, asking respondents to report how many times an event occurred could cause respondents to interpret that they need to think about a broader range of events that might apply (e.g., both serious crimes and less serious crimes, such as shoplifting).

The gate questions in NSDUH emphasize that respondents should answer a substance use question affirmatively if they have used the substance *even once*. However, there still could be some subtleties in the types of "use" that NSDUH respondents think they should report or that may not apply. For example, the NSDUH question about lifetime cigarette use asks respondents if they ever "smoked part or all of a cigarette." Similarly, YRBS asks respondents to report if they ever tried cigarette smoking, "even one or two puffs." MTF asks if respondents "ever smoked cigarettes." Thus, NSDUH and YRBS provide explicit instructions to adolescents that they should report lifetime cigarette use even if they did not smoke an entire cigarette. NSDUH also asks respondents to report lifetime cigar use if they ever smoked part of all of a cigar. In contrast, for snuff, chewing tobacco, marijuana, cocaine, heroin, and specific hallucinogens or inhalants, NSDUH asks respondents whether they ever "used" these substances. For alcohol, NSDUH respondents are asked if they ever had a "drink" of an alcoholic beverage, defined as a can or bottle of beer, a glass of wine or a wine cooler, a shot of liquor, or a mixed drink with liquor in it. Consequently, adolescents in NSDUH could underreport use of substances they used only rarely, especially if they did not consider themselves to have been "users" or "drinkers."

In addition, the NSDUH interview is structured such that respondents who report lifetime use of a given substance are asked more detailed questions about that substance and those who do not report use are skipped to the question about lifetime use of the next substance. Consequently, NSDUH respondents may eventually become conditioned to deny lifetime substance use in order to reduce the number of subsequent questions they are asked (i.e., attenuation). Research involving interviews with adults in which affirmative answers to lead questions were followed by more detailed follow-up questions yielded fewer reports of mental health disorders and mental health service utilization than interviews that asked a series of "stem" or "lead" questions before respondents received the follow-up questions (Duan, Alegria, Canino, McGuire, & Takeuchi, 2007; Kessler et al., 1998). Jensen, Watanabe, and Richters

(1999) also found that when the order of mental health question modules in the Diagnostic Interview Schedule for Children (DISC) was randomized for parent-child pairs, both parents and children endorsed fewer symptoms for the mental health condition that was presented second than for the condition that was presented first, regardless of the condition. Researchers attributed these findings to conditioning or attenuation.

As noted previously, NSDUH estimates of lifetime cigarette use among 12th graders were comparable to or higher than estimates in MTF and YRBS. Cigarette use is the first set of substance use questions that NSDUH respondents are asked. NSDUH estimates starting with smokeless tobacco use were lower than those in the other two surveys. NSDUH also estimates a lower prevalence of lifetime use of smokeless tobacco and cigars than cigarette use for youths aged 12 to 17 (OAS, 2009b). Thus, an adolescent respondent in NSDUH who reports lifetime use of cigarettes would be asked the remaining questions about cigarette use. If this respondent has never used snuff, chewing tobacco, cigars, or pipe tobacco, the next question that the respondent would see would be about lifetime use of alcohol. The adolescent in this scenario would have the experience of seeing that the affirmative report of cigarette use led to more questions about cigarette use and that not reporting use of snuff, chewing tobacco, cigars, or pipe tobacco led to him or her being asked fewer questions. Except for cigarette and alcohol use questions in MTF that allow lifetime nonusers to skip remaining questions about these substances, MTF and YRBS respondents are instructed to answer every substance use question, with nonusers having a way to indicate that a question does not apply. Furthermore, an entire class period will be taken up with MTF or YRBS administration regardless of how long it takes respondents to answer the questions. Consequently, MTF and YRBS respondents may not be motivated to finish sooner and would benefit less than NSDUH respondents in terms of reducing respondent burden if they deny use. Any conditioning of adolescents in NSDUH to answer lifetime questions negatively could contribute to lower estimates of substance use in NSDUH than in MTF and YRBS for substances other than cigarettes.

Recalling Use in Different Reference Periods

Because NSDUH respondents are not given the opportunity to report past year or current use unless they first report lifetime use of a given substance, higher estimates of substance use in MTF and YRBS than in NSDUH could carry over to estimates of more recent use. If NSDUH respondents report lifetime use, however, the NSDUH interview procedures assist respondents in defining the start and end dates for the past 12-month and past 30-day reference periods, including automatically filling in the starting date of a reference period for some questions. In contrast, paper-and-pencil questionnaires for MTF and YRBS refer to the past 12 months or past 30 days without defining the boundaries of these periods. Consequently, estimates of past year or current use from paper-and-pencil questionnaires could have some measurement error—especially if a respondent's most recent use was close to the boundary for the past 12 months or the past 30 days. In particular, paper-and-pencil surveys could overestimate the prevalence of past year or current use if adolescent respondents incorrectly recall an event as occurring more recently than it actually did ("telescoping"). Specifically, telescoping could contribute to respondents shifting their reports of their past year frequency of use to the past 30 days or shifting reports of lifetime use to the past 12 months.

MTF has identified difficulties with respondents recalling the number of occasions on which they used substances over the period of the past 12 months (Bachman & O'Malley, 1981;

Bachman, Johnston, O'Malley, & Schulenberg, 2006). In particular, there is a tendency for the reported frequency of use in the past year to be lower than expected relative to the frequency of use in the past 30 days (e.g., as if most use in the past 12 months was confined to the past 30 days), for the frequency of use in the past 30 days to be too high, or both. Bachman and O'Malley (1981) concluded that respondents may be able to remember whether they used a substance at all in the period of interest, even if they have difficulty remembering the number of times they used it. Therefore, MTF has responded to this phenomenon in part by focusing on reports of any use versus no use in a given period.

Survey Administration Mode

NSDUH, MTF, and YRBS all use self-administered questions to collect information about sensitive behaviors. Studies have shown that self-administered questions yield more reports of sensitive behaviors than interviewer-administered questions in which respondents must respond verbally to an interviewer (Aquilino, 1994; Tourangeau & Smith, 1996; Turner, Lessler, & Devore, 1992).

Fendrich (2005) suggested using audio computer-assisted self-interviewing (ACASI) to improve interview privacy and the consistency of interview data. In an experiment as part of the 1995 Survey of Adolescent Males, Turner and colleagues (1998) found that males were equally likely to report sex with females regardless of whether questions were administered with ACASI or traditional self-administered paper-and-pencil questionnaires but they were more likely to report sexual activity with other males in the ACASI version than in the paper-and-pencil version. Core substance use questions in NSDUH are administered using ACASI and include "consistency checks" that alert respondents when they have entered an answer that is inconsistent with a previous one and that allow them to resolve the inconsistency while the interview is in progress.

Brener and colleagues (2006) tested paper-and-pencil questionnaires and computer-assisted self-interviewing (CASI) rather than ACASI in school and home settings and found slightly higher average rates of missing data in the paper-and-pencil questionnaires (school: 2.1 percent; home: 1.6 percent) than in the CASI questionnaires (0.6 percent in both settings). Youths were less likely to report 7 of 55 risk behaviors in the paper-and-pencil interviews than in CASI, including first use of a cigarette before the age of 13, lifetime alcohol use, current alcohol use, and driving after drinking in the past 30 days.

Context of Substance Use Questions

A further source of variation in substance use estimates concerns the context in which questions are presented to respondents (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. [Table A.3](#) in Appendix A notes the differences in order of presentation of substance use questions in NSDUH, MTF, and YRBS and where these questions appear relative to other questions in the survey. In particular, substance use questions in NSDUH and MTF appear relatively early in these surveys' questionnaires. In contrast, YRBS asks most substance use questions after respondents answer questions about motor vehicle safety, violence and assault, and feelings of sadness and contemplating or attempting suicide. In addition, NSDUH

and MTF ask about use of most substances in the lifetime period, the past 12 months, and the past 30 days; YRBS does not ask about use in the past 12 months. All of these contextual differences could affect adolescents' reports (or nonreports) of substance use in these surveys.

General Survey Information for Parents and Adolescents

Another factor in NSDUH that could lead adolescents to underreport substance use is the emphasis on drug use that is communicated to parents and adolescents before adolescents begin answering questions. Specifically, the survey name explicitly mentions drug use, although the survey name may be less stigmatizing about substance use than the name prior to 2002, which was the National Household Survey on Drug Abuse (NHSDA). The consent information for parents and adolescents in NSDUH also explicitly mentions first that the survey "asks about tobacco, alcohol, and drug use or non-use" before mentioning other contents of the survey. In comparison, neither survey name for MTF or YRBS mentions drug use. The cover page for the MTF 12th grade questionnaire reads, "The questions ask your opinions about a number of things—the way things are now and the way you think they ought to be in the future. In a sense, many of your answers on this questionnaire will count as 'votes' on a wide range of important issues" (Bachman et al., 2006). MTF lead letters to parents mention that the survey includes questions about use of alcohol and drugs but only after mentioning that the survey covers potentially less sensitive topics about school experiences, attitudes toward school and education, and plans for the future (Bachman et al., 2006). The introduction for the YRBS questionnaire (available at <http://www.cdc.gov/HealthyYouth/yrbs/>) emphasizes that the survey is about "health behavior" and "health issues" without explicitly mentioning substance use. Although Sudman (2001) compared the introduction for the former NHSDA with introductions for MTF and YRBS, he suggested that the introductions in the latter two surveys could be less threatening to adolescents.

Potential Overreporting of Substance Use

Despite underreporting of substance use in surveys being an important threat to the validity of adolescent substance use estimates, surveys also may overestimate the prevalence of use if some adolescents overreport use of substances that they have never used or that they have not used recently. In addition to telescoping being a potential source of overreporting, overreporting could occur in a group setting if adolescent respondents think it is "cool" to have used certain substances or that their peers might think negatively of them (e.g., as being "nerds") if they were to report their nonuse truthfully. As noted in Chapter 2, for example, MTF yielded an estimate of lifetime heroin use among 12th graders (1.5 percent) that was more than twice the NSDUH estimate (0.6 percent). The YRBS estimate for 12th graders (2.5 percent) was about 4 times the NSDUH estimate. Furthermore, unlike the expected pattern of increasing lifetime heroin use across the 8th, 10th, and 12th grades seen in NSDUH, the estimates of lifetime heroin use in MTF were the same for students in each of the 8th, 10th, and 12th grades, which implies the absence of heroin initiation after the 8th grade. YRBS yielded a lifetime heroin use estimate of 3.0 percent for 9th graders in addition to the estimate of 2.5 percent among 12th graders (Table C.2.29). Although these findings do not discount the possibility of underreporting of lifetime heroin use among adolescents in NSDUH, the constant percentages for lifetime heroin use in MTF and the estimates of 3.0 percent of 9th graders and 2.5 percent of 12th graders in YRBS being lifetime heroin users may indicate overestimates of the prevalence of lifetime heroin use in the two school-based surveys, particularly among younger adolescents.

Including questions about fictitious drugs has been used to identify potential overreporting of substance use in surveys of adolescents (Petzel, Johnson, & McKillip, 1973). Adolescents generally are unlikely to report use of these fictitious drugs (Bachman et al., 2006; Petzel et al., 1973). Petzel and colleagues (1973) reported that excluding the data from respondents who reported use of a fictitious drug did not significantly affect estimates for the other drugs in the survey. However, the conclusion cannot necessarily be drawn that low reports of use of fictitious drugs directly translate to low occurrences of overreporting of substance use in surveys of adolescents. Inclusion of a fictitious drug in substance use surveys may be thought of as a way to identify indiscriminate, patterned (e.g., patterns of darkening circles on optically scanned answer sheets), or random responses to questions about substance use rather than deliberate overreporting of use—especially if a survey uses an optically scanned answer sheet in which respondents darken circles to indicate their answers. Thus, respondents can determine that they have never used a fictitious drug they do not recognize but still can overreport use of a substance that they do recognize.

In addition, a reliability study of the 1999 YRBS was conducted in which students were re-administered the questionnaire approximately 2 weeks after the first administration (Brenner et al., 2002). Kappa statistics (measuring agreement between the baseline and follow-up data) were expressed as percentages and were greater than 80 percent for lifetime use of cigarettes, alcohol, and marijuana and for current use of cigarettes. Kappas also were greater than 70 percent for lifetime use of cocaine and methamphetamine and for current use of alcohol and marijuana; kappas of 61 percent or greater were considered to have "substantial" reliability. Kappas less than the overall mean of 60.7 percent were observed for lifetime heroin use and lifetime injection drug use (57.4 and 53.9 percent, respectively), current cocaine use (48.3 percent), and current inhalant use (42.2 percent). Although these findings do not disprove overreporting in school-based surveys, Fowler and Stringfellow (2001) suggested that it would be more difficult for respondents to remember an exaggerated report than a truthful one on follow-up. However, the lower reliability of results for lifetime heroin use in the 1999 YRBS is consistent with concerns noted previously about the accuracy of self-reported heroin use among adolescents, which could include overreporting.

A validity study was conducted as part of the 2000 and 2001 NHSDAs (i.e., the survey name for NSDUH prior to 2002) among youths aged 12 to 17 and young adults aged 18 to 25 in the 48 contiguous States (i.e., excluding Alaska and Hawaii). The validity study included an abbreviated version of the interview (including ACASI for the substance use questions) and also collected biological specimens (urine and hair) from consenting respondents (Harrison, Martin, Enev, & Harrington, 2007). With advances in technology for testing biological specimens, it is possible to identify drug use with reasonable accuracy by testing urine specimens. However, the "window" of detection for most drugs in urine is 2 to 7 days after a single occasion of use (Cone, 1997). Testing of hair samples for drug use is a less proven technology because of issues about the ability of hair testing to distinguish between drug use and external exposure; how hair treatments, hair color, and hair type can affect test results; and variability in the amount and distribution of a drug that is incorporated into hair.

For marijuana, there was 89.8 percent agreement between self-reports for the past 30 days and urine test results; this was dominated by 82.9 percent of respondents ($n = 3,738$) who reported no use in the past 30 days and whose urine tested negative for marijuana. In addition, 4.4 percent of respondents reported no use in the past 30 days but had positive urine tests, and

5.8 percent reported use but did not have positive urine tests. When self-reports for marijuana use in the past 7 days were compared with urine test results, 4.8 percent reported no use in the past 7 days but tested positive, and 2.7 percent reported use but did not test positive. For a past 3-day reporting period, 5.2 percent reported no use in the past 3 days but tested positive, and 1.7 percent reported use but did not test positive (Harrison et al., 2007). Thus, when self-reports and urine test results were discordant for marijuana, youths and young adults tended to underreport rather than overreport their use. Nevertheless, even for the reporting periods that were closer to the interview, when marijuana would be more readily detectable in the urine of less frequent or heavy users, 1.7 to 2.7 percent of respondents reported use of marijuana that was not detected in their urine.

When youths aged 12 to 17 who overreported marijuana use in the past 30 days but had negative urine test results ($n = 30$) were compared with "true nonusers" who reported of nonuse in the past 3 days and had a negative urine test result ($n = 1,704$), blacks were less likely than whites to overreport use in the past 3 days. Perceived difficulty in answering drug-related questions (based on a series of four questions about difficulty in understanding the questions, remembering the information, clarity of their memories about the drug-related information, and how often they made a best guess in answering the questions) also increased the likelihood of overreporting marijuana use in the past 3 days (Harrison et al., 2007). This latter finding is consistent with concerns that misunderstanding of survey questions can cause some adolescent respondents to report substance use incorrectly.

Youths who were identified as underreporters of marijuana use in the past 7 days (i.e., did not report marijuana use but had a positive urine test result; $n = 57$) also were compared with true nonusers whose negative urine test results were consistent with their reports of nonuse of marijuana in the past 7 days ($n = 1,698$). The likelihood of underreporting marijuana use in the past 7 days increased as the privacy level of the interview decreased. This finding is consistent with logistic regression model results for marijuana from Chapter 4 showing that the constant presence of another person decreased the prevalence of lifetime marijuana use for youths aged 14 or 15 and those aged 16 or 17 (Table C.4.31). The constant present of another person also decreased the prevalence of past year marijuana use for youths aged 16 or 17 (Table C.4.32) and for whites and blacks (Table C.4.35).

However, Harrison and colleagues (2007) noted that urine drug test results are not always 100 percent accurate. Windows of time for detecting drugs in urine are inexact and are affected by the drug that was used, biological factors, and analytic factors. Furthermore, the choice of testing laboratories and the choice of confirmatory tests can affect the validity of biological specimen test results.

Willingness to Respond and Question Interpretation

As noted previously, it has been assumed that adolescent substance users taking surveys may underreport behaviors such as substance use, with the extent of underreporting being directly related to the degree of respondent concern about potential adverse consequences of reporting the use of a particular substance (Harrison, 1997). Thus, use of substances, such as tobacco products and alcohol, that are illegal for adolescents but are legal for adults (or adults aged 21 or older, in the case of alcohol) might be assumed to be less susceptible to underreporting, especially if questions about these substances are self-administered. Use of

marijuana might be more likely than use of tobacco products or alcohol to be underreported but less likely than cocaine use to be underreported. An additional assumption is that reporting of lifetime use will be less threatening than reporting of more recent use, particularly use in the past 30 days. Further, reporting of lifetime use may be less threatening for older adolescents than for younger ones for whom initiation of use may be more recent (Sudman, 2001).

The convergence of estimates between NSDUH and the other two surveys by the 12th grade (although still lower in NSDUH among 12th graders for most estimates) is consistent with the hypothesis that questions about lifetime use are less threatening for older adolescents (presumably in higher grades) than for younger ones. Moreover, NSDUH estimates of lifetime cigarette use among 12th graders were comparable to or higher than estimates in MTF and YRBS. This latter finding also is consistent with the assumption of less concern associated with reporting of lifetime cigarette use among older adolescents.

Based on the work of Knäuper (1998), however, an alternate explanation for the cigarette use findings is that the instructions provided to NSDUH respondents (i.e., ever having smoked "part or all" of a cigarette) may elicit more complete reports of cigarette use in the lifetime filter question. Stated another way, older adolescent respondents in NSDUH may understand better than younger ones that even minimal cigarette use should be reported.

Similarly, the convergence of lifetime alcohol use estimates between NSDUH and the other two surveys by the 12th grade could reflect older adolescents being less concerned with reporting any use of alcohol in their lifetime. Alternatively, older adolescents could understand better than younger ones which alcohol use they should or should not report. Specifically, all three surveys indicate to respondents that alcohol use refers to more than a few sips. Consequently, younger adolescents who might have taken a sip from someone else's drink could be more likely than older adolescents to misreport alcohol use.

Inhalants

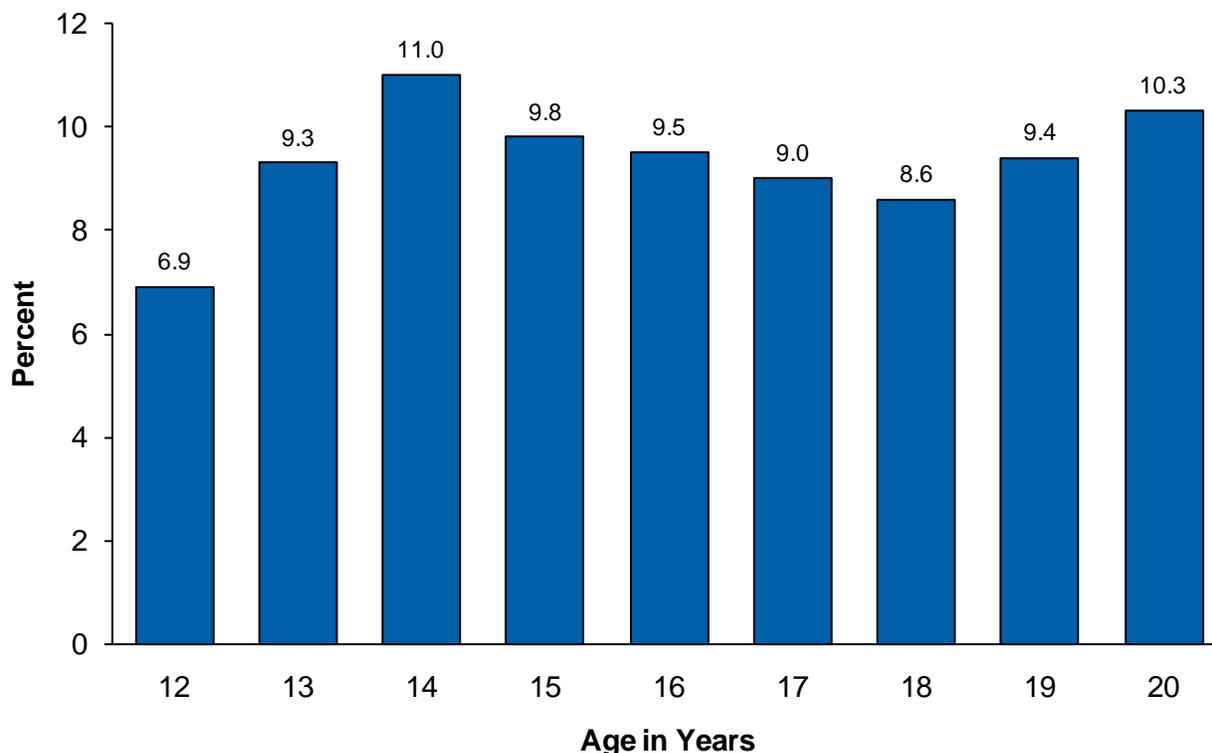
As Chapter 2 notes, NSDUH, MTF, and YRBS data all yielded the counterintuitive finding that the prevalence of inhalant use decreased as grade increased. The *lifetime* prevalence would be expected to increase as grade increases because youths who initiated use of inhalants in an earlier grade would remain lifetime users in later grades. Three explanations for this finding are possible:

- Inhalant users in earlier grades have dropped out of school before they would have reached later grades.
- Youths who may have reported inhalant use in earlier grades deny using inhalants when interviewed in later grades (i.e., "recanting").
- Some youths in earlier grades may have misreported use of inhalants because they did not fully understand the questions; youths in later grades may better understand the questions about inhalant use and thus answer them more accurately.

As examples, however, NSDUH estimates of lifetime inhalant use in 2007 and 2008 for all persons aged 12 to 20 (regardless of school enrollment status) do not support the explanation

of the lifetime prevalence of inhalant use decreasing as grade increases because of the effects of school dropouts. In 2007, the prevalence of lifetime inhalant use among youths aged 13 to 15 ranged from 10.1 to 11.1 percent; an estimated 9.5 percent of youths aged 16 and 7.7 percent of persons aged 18 were lifetime inhalant users. In 2008, the prevalence of lifetime use of inhalants was 9.3 percent for youths aged 13, 11.0 percent for those aged 14, 9.8 to 9.0 percent for those aged 15 to 17, and 8.6 percent for persons aged 18 (Figure 5.1).

Figure 5.1 Lifetime Inhalant Use in NSDUH among Persons Aged 12 to 20, by Single Years of Age: Percentages, 2008



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

YRBS data also show a decrease in the lifetime prevalence of inhalant use from the 9th grade (14.2 percent) to the 12th grade (10.7 percent) (Table C.2.34). Thus, in order for the lifetime prevalence of inhalant use to increase from the lowest to the highest grades (consistent with the pattern for other substances), the prevalence of lifetime inhalant use among school dropouts would need to be sufficiently high to overcome and reverse a 3.5 percentage point decrease from the 9th to the 12th grades.

As noted in Section 1.1 in Chapter 1, recanting has been observed in longitudinal studies of adolescents in which respondents who reported use of a particular substance in an earlier survey wave deny having ever used that substance in one or more subsequent waves (Fendrich, 2005; Fendrich & Rosenbaum, 2003). Fendrich and Mackesy-Amiti (2000) also examined this phenomenon in cross-sectional rather than longitudinal data. In the analysis of cross-sectional data, recanting was related to reports of less frequent use and inconsistent reporting in the main questionnaire. Infrequent users might be more reluctant to report their use, or they might fail to

recall their past use. The positive association between recanting and inconsistent reporting in the main questionnaire also suggested that carelessness in taking the survey could contribute to recanting.

In addition, NSDUH, MTF, and YRBS specifically ask about use of inhalants to get high, rather than about any use. NSDUH includes the additional instruction, "We are not interested in times when you inhaled a substance accidentally—such as when painting, cleaning an oven, or filling a car with gasoline." Consequently, lower estimates of lifetime inhalant use among youths in higher grades (who also are likely to be older than the youths in lower grades) may reflect a better understanding among older youths of the types of exposure to inhalants that they should or should not report. Conversely, some younger adolescents might overreport exposure to inhalants that would not qualify as deliberately inhaling substances to get high. Consistent with this explanation, Fendrich and Rosenbaum (2003) reported that respondents who first reported use in later survey waves were less likely to recant than those who reported use in earlier waves. The authors raised the question of whether maturity and psychosocial development might contribute to more reliable reports of substance use among older adolescents.

Ultimately, the accuracy of reporting appears to be associated with multiple interrelated factors. Inaccurate reporting can occur either when a user of a particular substance does not report using it or when a nonuser of a substance reports its use. One related factor may be the interaction between question complexity and the ability of a respondent to interpret questions correctly. As respondents get older, they may be better able to understand what the questions mean. Another factor affecting accuracy may be the respondent's perception of the likelihood of other persons (e.g., parents or classmates) finding out the answers they provided and the perceived consequences of these persons knowing their answers. For example, students may think that classmates sitting nearby might be able to see whether they reported or did not report using a substance. Similarly, a child in a household setting may be concerned that his or her parent might be able to view the child's responses on the computer screen while walking through the room where the child is completing the survey. The adolescent's estimation of the consequences of reporting substance use may vary based on factors such as his or her age, parental permissiveness, or perceived "coolness" of the substance or substance use. These factors may affect how honest adolescents are in their responses.

5.4. Implications for Policymakers and Other Data Users

In a prior review of adolescent substance use estimates from these same surveys, Harrison (2001) concluded that all three surveys were well designed and well executed and that one survey's design and results were not necessarily better or more valid than another's, although Harrison also noted that larger sample sizes will improve the precision of estimates. Given all of the methodological differences among these surveys, Harrison concluded that the similarities in what these surveys told policymakers and others about adolescent substance use in the United States were more worth emphasizing than the differences were.

Harrison's (2001) review was part of a series of articles published in the same issue of the *Journal of Drug Issues* (including Fendrich & Johnson, 2001; Fowler & Stringfellow, 2001; Sudman, 2001) that compared data from these surveys through 1998. NSDUH has undergone many important changes since that time. These include (1) in 1999, changing from a paper-and-pencil questionnaire to a computer-assisted interview, with ACASI used for the most sensitive

questions; (2) expanding the sample considerably since 1999 to include respondents in all 50 States and the District of Columbia to allow for estimation at the State level; (3) in 2002, changing the survey name from the National Household Survey on Drug Abuse to the National Survey on Drug Use and Health; and (4) since 2002, offering respondents a \$30 incentive for completing the NSDUH interview. Given all of these changes, another review and comparison of adolescent substance use estimates based on more current data is warranted.

Roughly a decade following the publication of the articles comparing NSDUH (formerly NHSDA), MTF, and YRBS in the *Journal of Drug Issues*, this study reaches the same overall conclusions that Harrison (2001) reached. Because of the many methodological differences among NSDUH, MTF, and YRBS, this study does not conclude that estimates of substance use among adolescents from any one of these surveys are more accurate than estimates from another. Each survey has definite strengths and limitations. The multiple methodological differences all can contribute to differences in estimates across these surveys.

However, policymakers are likely to be most interested in information that provides straightforward answers to specific questions. Examples of issues with important policy implications include, but are not limited to, whether the prevalence of substance use among adolescents is increasing or decreasing (i.e., trends), which subgroups of adolescents are more likely or less likely to be users (i.e., correlates of use), or numbers of adolescents exhibiting a particular characteristic related to substance use (e.g., number of adolescents needing substance abuse treatment).

Clearly, policymakers' options are limited if data for a particular issue are available from only one of these surveys. For example, NSDUH provides estimates both for percentages and *numbers* of adolescent substance users; MTF and YRBS provide percentages but not numbers of users. Therefore, a policymaker would need to use NSDUH data for information on issues such as the number of adolescents in the population that corresponds to a particular percentage (e.g., thousands, millions, tens of millions), the numbers of youths who recently initiated use of certain substances, or the numbers of youths who need substance abuse treatment or mental health counseling.

As noted previously, a key issue for policymakers and the substance abuse field is monitoring both short- and long-term trends in the prevalence of substance use among adolescents. Trend data from national surveys allow policymakers and other stakeholders to gauge the relative success of and any challenges in *overall* efforts to prevent or delay the onset of use of tobacco, alcohol, and illicit drugs among youths. In particular, for most variables, MTF offers more than 35 years of trend data on substance use among 12th graders and about 20 years of trend data for 8th and 10th graders (Bachman et al., 2006). Although YRBS is conducted every 2 years rather than annually, data on trends in adolescent substance use are available from YRBS from 1991 onward (Brener et al., 2004b). Because of changes to NSDUH in 2002 (OAS, 2009a), recent trend data for adolescents in NSDUH are available from 2002 onward. Nevertheless, NSDUH and MTF showed similar trends in the prevalence of substance use among 12th graders from 2002 to 2008. Previous comparisons of NSDUH and MTF data also have indicated that the two surveys show similar trends in the prevalence of substance use among adolescents (OAS, 2009a). Therefore, trend data from any of these surveys are likely to be useful to policymakers.

Data on correlates of substance use among adolescents, such as by demographic (e.g., age or school grade, gender, race/ethnicity) or geographic characteristics (e.g., region) are useful to policymakers for identifying whether certain groups of adolescents are more likely or less likely to be users of certain substances, or whether the prevalence of use does not differ among subgroups of adolescents. In turn, policymakers can use these data on correlates of substance use among adolescents to make decisions about allocation of funds and programming for substance use prevention or intervention with groups of substance users, including whether prevention messages or interventions need to be tailored to the needs or other characteristics of specific groups of adolescents.

Except for inhalants and heroin, data from Chapter 2 indicated that NSDUH, MTF, and YRBS usually showed that the prevalence of use of different substances increased as adolescents' grade increased (and by extension, as age increased), with prevalence estimates being highest among 12th graders. Among 12th graders, all three surveys showed similar variations in the prevalence of substance use by gender and for whites, blacks, and Hispanics. Provided that a survey measured a substance use behavior of interest for a time period of interest (e.g., YRBS does not allow estimation of the prevalence of use in the past year, but NSDUH and MTF generally do), data from Chapter 2 suggest that any of these surveys would permit policymakers to reach similar overall conclusions about demographic correlates of substance use among adolescents.

Depending on available sample sizes (especially for subgroups of adolescents) and other design characteristics that affect the variance of estimates, however, some differences in the prevalence of substance use that are statistically significant for members of a given subgroup based on data from a particular survey may not be significant in all three of these surveys. For example, NSDUH and MTF indicated that 12th grade males were more likely than their female counterparts to be current alcohol users (Figure 2.4); estimates for these two surveys were based on 7 years of data from 2002 to 2008. In YRBS, 54.5 percent for 12th grade males and 53.1 percent for females at this grade were current alcohol users based on data from 2003, 2005, and 2007 (Figure 2.4). Although these estimates for 12th grade males and females in YRBS were in the same direction as those for NSDUH and MTF, these estimates were not significantly different based on 3 years of YRBS data.

5.5. Topics for Further Investigation

Recognizing that NSDUH, MTF, and YRBS provide differing estimates of substance use among adolescents, an overarching goal of this study was to conduct analyses that could contribute to policymakers' and other stakeholders' understanding of the reasons for these differences. However, this study could not fully investigate all of the issues that could contribute to differences in estimates of adolescent substance use or continued efforts to improve the accuracy of estimates.

Based on the findings from this study, therefore, this section discusses potential topics for further investigation for further understanding adolescent substance use. Topics for further investigation fall into three broad topic areas:

- identifying and reducing unintentional reporting errors in substance use questions;

- identifying and reducing deliberate underreporting or overreporting of substance use; and
- conducting controlled methodological investigations to elucidate more fully the factors that contribute to differences in adolescent substance use estimates.

Reducing Unintentional Reporting Errors

Adolescent survey respondents who want to report accurately about their substance use could nevertheless provide inaccurate self-reports if they misunderstand the meaning of a substance use question. As noted previously, for example, some overreporting of marijuana use among adolescents has been associated with self-reported difficulty in answering drug use questions (Harrison et al., 2007). Substance users who correctly understand the intended meaning of a question about a particular substance use behavior also could provide inaccurate self-reports if they report that their use occurred more recently or less recently than it actually did.

As noted previously, for example, all three surveys indicate to respondents that alcohol use refers to more than a few sips. MTF indicates that alcohol use refers to "more than just a few sips" (Bachman et al., 2006). NSDUH instructs respondents not to include "times when you only had a sip or two from a drink" as "having had a drink of any type of alcoholic beverage," and YRBS instructs respondents not to include "drinking a few sips of wine for religious purposes." NSDUH and YRBS also provide more extensive examples of alcoholic beverages than MTF does. YRBS mentions beer, wine, wine coolers, and liquor such as rum, gin, vodka, or whiskey. NSDUH provides examples of 7 types of beer; 6 types of wine; 7 types of liquor; 12 types of liqueurs, cordials, or brandy; and 12 types of mixed drinks or cocktails. NSDUH also defines what is meant by a "drink." In comparison, MTF mentions that alcoholic beverages include beer, wine, liquor, and any other beverage that contains alcohol. Thus, the level of detail and types of instructions presented to respondents about alcohol could affect how well adolescents understand which use of alcohol they should or should not report in these surveys.

How adolescent respondents define a "drink" also could affect their reports of binge alcohol use, which is defined in NSDUH and YRBS for both sexes as having five or more drinks on the same occasion (in NSDUH) or in a row (in YRBS) in the past 30 days; MTF asks about having five or more drinks in a row in the past 2 weeks. However, the ability for respondents to provide correct information about binge drinking is unclear. Since 2006, for example, NSDUH has included questions in a noncore module that ask female respondents about consumption of four or more drinks on a single occasion in the past 30 days. Logically, the number of days that females report that they had four or more drinks on the same occasion should be greater than or equal to the number of days they reported for consumption of five or more drinks on the same occasion. However, these data are inconsistent for a substantial number of female respondents in NSDUH. In 2008, for example, nearly 20 percent of female respondents aged 12 or older gave answers to their frequency of consumption of four or more drinks on a single occasion in the past 30 days that were lower than their reported frequency of consumption of five or more drinks in the past 30 days or the number of drinks they consumed the last time they drank in that period. These inconsistent reports could be related to the considerably later placement in the interview of the questions about consumption of four or more drinks (such that females who reported consumption of five or more drinks do not recall their previous answer) or respondents misinterpreting the question about four or more drinks as referring to consumption of *exactly*

four drinks on the same occasion (because they previously had been asked about consumption of five or more drinks). Therefore, further methodological research could investigate how well adolescents understand the concepts associated with measuring binge alcohol use and any specific sources of difficulty in answering these questions.

Reducing Deliberate Underreporting or Overreporting of Use

As previous research (e.g., Gfroerer et al., 1997) has found, this study found that most substance use estimates in MTF and YRBS were higher than corresponding estimates in NSDUH. Although MTF and YRBS are both administered in schools, YRBS estimates of substance use also tended to be higher than those from MTF.

Further investigation of the potential roles of any underreporting or overreporting among adolescent respondents would be helpful for understanding the contributions to differences in estimates among these surveys from these types of deliberately inaccurate self-reports. However, testing of biological specimens has limitations of its own for corroborating adolescents' self-reports, including issues related to the feasibility of collecting these data as part of school-based surveys (e.g., logistical issues, effects on school and respondent participation). Therefore, one important area for future work would be the development of innovative methodological research methods for identifying potential underreporting or overreporting of substance use that do not rely on collection of biological specimens. In particular, some of the relationships between substance use and privacy by age group in logistic regression models from Chapter 4 suggest that methods for identifying and reducing underreporting of substance use could be important for various substances and subgroups of adolescents. If underreporting is contributing to lower estimates for the least private interviews, then efforts to reduce underreporting, such as additional confidentiality assurances or appeals for truthful answers, might be more important for reports of lifetime cigarette use among younger adolescents but less so for older adolescents, especially if ever smoking a cigarette is a less stigmatized behavior for older adolescents. The lower likelihood of older adolescents with the least private interviews to report past year alcohol use, lifetime marijuana use, and past year marijuana use suggests that efforts to reduce underreporting for these measures may be more important for older adolescents than for the youngest ones.

In addition, further investigation of the contributions of older adolescents' denials of past use of inhalants (i.e., recanting) or their improved understanding of the meaning of questions about use of inhalants would be important for improving the accuracy of self-reported use of inhalants among adolescents at all ages. (The contribution of school dropouts to estimates of inhalant use among older adolescents is principally a population *coverage* issue rather than a self-report issue.) Moreover, if recanting—especially among less frequent lifetime users—is an important source of the decreases in lifetime prevalence of inhalant use as respondents' grades (or ages) increase, further understanding of the underlying reasons for recanting would be important. For example, failure to recall infrequent past events has different implications for survey design than conscious misreporting of infrequent use as never having used. If overreporting of use among younger adolescents is contributing to their higher estimates of inhalant use, then their reasons for overreporting may need to be better understood.

The tendency for inconsistencies between self-reports and urine test results among validity study respondents to be in the direction of respondents underreporting rather than

overreporting their use (Harrison et al., 2007) also has important implications for NSDUH in terms of reducing the tendency of adolescent (and young adult) respondents to underreport use. Further understanding of factors that encourage underreporting of substance use among adolescents in NSDUH and factors that promote more truthful reporting will be important.

Additional investigation of privacy issues in NSDUH and their effects on reporting of adolescent substance use could include examining interactions between interview privacy and relationships to the respondent for persons who were present during interviews. In particular, the effects on prevalence estimates could be examined when another person was constantly present during the interview *and* a parent was present. Because the data on the types of other people who were present during interviews were not mutually exclusive, it would not be possible to determine whether the duration of other people's presence differed during the interview. For example, if an interviewer reported the constant presence of others during the interview and that a parent and another adult relative were present during the interview, any of the following could have been true: (1) the parent (but not the other relative) was present for the entire interview; (2) the other adult relative (but not the parent) was present for the entire interview; (3) each were present at different times during the interview; or (4) both were present for the entire interview. However, if sufficient numbers of NSDUH interviews with adolescents exist in which only a parent was present, these data could be analyzed to examine the interaction of interview privacy and parental presence on substance use estimates in NSDUH.

An additional issue regarding interview privacy in NSDUH concerns the selection of up to two household members for an interview; selection of up to two household members reduces the number of households that need to be sampled annually to yield the targeted number of interviews. These procedures include selection of parent-child pairs within the household. If a parent and an adolescent are selected for the interview and the parent completes the survey before the adolescent does, then the parent would know how long the interview took to complete based on his or her answers. NSDUH includes questions about several additional topics besides substance use, including mental health issues for adults and a special module for parents when they and a child aged 12 to 17 are selected for interviews. Therefore, a youth's substance use may be difficult to infer from the length of time it takes the youth to complete the interview. Nevertheless, one issue for possible further study is examination of the effect of interview order on adolescent substance use estimates, especially when a parent and a child both complete the survey and the parent is interviewed first.

Controlled Methodological Investigations

Because of all of the methodological differences among NSDUH, MTF, and YRBS, investigations that attempt to control or limit the variations in these factors would be important for further research on reasons for the differences in these surveys' estimates. The study by Brener and colleagues (2006) used active parental permission for adolescents to participate (i.e., parents needed to complete forms showing that they had given permission for their children to participate) and kept the content of survey questions constant while varying the survey location (classroom or home) or the mode of administration (paper-and-pencil questionnaire or computer-assisted self-interview). Although the study used a convenience sample, respondents were randomly assigned to one of four study conditions based on interview location and mode.

The authors noted that an important limitation of this study was that the school surveys were administered in group settings but the questionnaires in the home setting were completed individually. Consequently, the researchers could not determine the effects of the group or individual administration on reporting. However, requiring individual administration of a survey in school settings could allow students to interact about the survey and contaminate the data. In addition, the study did not assess whether a parent was present during the in-home administration. The authors also noted that it was not possible to determine whether higher estimates of risk behaviors in the school setting than in the home setting were related to the presence of peers in the school setting or the perceived anonymity of that setting. Nevertheless, additional research could build on findings from this study, such as by using a probability sample design. In addition, the NSDUH procedures for asking interviewers to report information about the characteristics of the interview following the conclusion of the interview could be used to capture information such as the presence of other persons during in-home survey administration or characteristics of in-school administration.

Potential topics for investigation through further controlled methodological studies include, but are not limited to, the following:

- effects of the content of introductory information about a study on resulting estimates;
- effects of question context on estimates;
- effects of ACASI on estimates in household settings and group survey administration in schools; and
- effects of questionnaire structure on estimates.

For each of these potential topics, other factors that could influence reporting (e.g., survey setting) would be held constant as much as possible to evaluate the effect of the factor being tested.

For example, variation of the content of introductory information about a study in a manner that allows parents and adolescents to make informed decisions about their participation while keeping other factors constant—such as the requirement for active parental permission, administration in a household setting, and the questionnaire content—would allow testing of the independent effect of introductory information on substance use prevalence estimates. Similarly, testing of a questionnaire in a household setting that asks about health topics other than substance use before asking questions about substance use (as in YRBS) could be useful for testing the independent effects of the context of questions on substance use estimates.

As noted previously, Brener and colleagues (2006) tested CASI (rather than ACASI) versus paper-and-pencil questionnaires. ACASI could further enhance the privacy of group survey administrations by allowing respondents to listen to questions on headphones and key their answers without classmates possibly seeing which questions are appearing on the computer screens. Furthermore, CASI or ACASI in group administration settings in schools could be used to test whether "filter" questions reduce the reporting of substance use compared with a computer-assisted interview format that makes minimal or no use of skip logic for substance use questions. A related issue for CASI or ACASI administration with skip logic is testing whether

respondents in school settings report less substance use to reduce the number of questions they need to answer. However, a potential drawback with testing the effects of skip logic for both CASI and ACASI in group administrations is that the length of time for completing the survey could distinguish between substance users and nonusers. Consequently, a CASI or ACASI instrument for a group administration would need to be structured in a manner that minimizes the differences in administration time for users and nonusers.

As a further test to investigate whether question organization and skip logic condition adolescents to report less substance use, an experiment could be designed that varies whether adolescent respondents in a CASI or an ACASI survey are asked questions about lifetime use of all substances before they are asked more detailed questions for the substances they endorsed versus a format in which subsequent questions for a given substance immediately follow the lead lifetime question. This type of experiment could be conducted in school settings, household settings, or both. Results could help in assessing whether conditioning might contribute to lower estimates of adolescent substance use in NSDUH, independent of other features of that survey that also could contribute to lower estimates. Conducting this type of experiment in school and household settings also would be helpful for assessing whether conditioning occurs independent of the survey setting or whether this phenomenon is especially pronounced in a particular setting.

6. References

- Aquilino, W. S. (1994). Interview mode effects in surveys of drug and alcohol use: A field experiment. *Public Opinion Quarterly*, 58, 210-240.
- Bachman, J. G., Johnston, L. D., O'Malley, P. M., & Schulenberg, J. E. (2006). *The Monitoring the Future project after thirty-two years: Design and procedures* (Monitoring the Future Occasional Paper No. 64). Ann Arbor, MI: Institute for Social Research.
- Bachman, J. G., & O'Malley, P. M. (1981). When four months equal a year: Inconsistencies in student reports of drug use. *Public Opinion Quarterly*, 45, 536-548.
- Bishop, G. F., Oldendick, R. W., & Tuchfarber, A. J. (1983). Effects of filter questions in public opinion surveys. *Public Opinion Quarterly*, 47(4), 528-546.
- Brener, N. D., Billy, J. O. G., & Grady, W. R. (2003). Assessment of factors affecting the validity of self-reported health-risk behavior among adolescents: Evidence from the scientific literature. *Journal of Adolescent Health*, 33, 436-457.
- Brener, N. D., Eaton, D. K., Kann, L., Grunbaum, J. A., Gross, L. A., Kyle, T. M., & Ross, J. G. (2006). The association of survey setting and mode with self-reported health risk behaviors among high school students. *Public Opinion Quarterly*, 70, 354-374.
- Brener, N. D., Grunbaum, J. A., Kann, L., McManus, T., & Ross, J. (2004a). Assessing health risk behaviors among adolescents: The effect of question wording and appeals for honesty. *Journal of Adolescent Health*, 35, 91-100.
- Brener, N. D., Kann, L., Kinchen, S. A., Grunbaum, J. A., Whalen, L., Eaton, D., Hawkins, J., & Ross, J. G. (2004b, September 24). Methodology of the Youth Behavioral Risk Surveillance System. *MMWR Recommendations and Reports*, 53(RR12), 1-13.
- Brener, N. D., Kann, L., McManus, T., Kinchen, S. A., Sundberg, E. C., & Ross, J. G. (2002). Reliability of the 1999 Youth Risk Behavior Survey questionnaire. *Journal of Adolescent Health*, 31, 336-342.
- Butler, M. A., & Beale, C. L. (1994, September). *Rural-urban continuum codes for metro and non-metro counties, 1993* (Staff Report No. AGES 9425). Washington, DC: U.S. Department of Agriculture, Economic Research Service.
- Centers for Disease Control and Prevention (2007). *2007 Youth Risk Behavior Survey (YRBS). 2007 national YRBS data users manual*. Atlanta, GA: Author.
- Centers for Disease Control and Prevention. (2009, March). *A guide to conducting your own Youth Risk Behavior Survey*.

- Chartier, M., Vander Stroep, A., McCauley, E., Herting, J. R., Tracy, M., & Lymp, J. (2008). Passive versus active parental consent: Implications for the ability of school-based depression screening to reach youth at risk. *Journal of School Health, 78*(3), 157-186.
- Cone, E. J. (1997). New developments in biological measures of drug prevalence. 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. 108-130). Rockville, MD: National Institute on Drug Abuse.
- Duan, N., Alegria, M., Canino, G., McGuire, T. G., & Takeuchi, D. (2007). Survey conditioning in self-reported mental health service use: Randomized comparison of alternative instrument formats. *Health Services Research, 42*, 890-907.
- Eaton, D. K., Lowry, R., Brener, N. D., Grunbaum, J. A., & Kann, L. (2004). Passive versus active parental permission in school-based survey research: Does the type of permission affect prevalence estimates of risk behaviors? *Evaluation Review, 28*(6), 564-577.
- Fendrich, M. (2005). The undeniable problem of recanting. *Addiction, 100*, 143-144.
- Fendrich, M., & Johnson, T. P. (2001). Examining prevalence differences in three national surveys of youth: Impact of consent procedures, mode, and editing rules. *Journal of Drug Issues, 31*, 615-642.
- Fendrich, M., & Mackesy-Amiti, M. E. (2000). Decreased drug reporting in a cross-sectional student drug use survey. *Journal of Substance Abuse, 11*, 161-172.
- Fendrich, M., & Rosenbaum, D. P. (2003). Recanting of substance use reports in a longitudinal prevention study. *Drug and Alcohol Dependence, 70*, 241-253.
- Fendrich, M. & Xu, Y. (1994). The validity of drug use reports from juvenile arrestees. *International Journal of the Addictions, 29*, 971-985.
- Forsyth, B. H., Lessler, J. T., & Hubbard, M. L. (1992). Cognitive evaluation of the questionnaire. In C. F. Turner, J. T. Lessler, & J. C. Gfroerer (Eds.), *Survey measurement of drug use: Methodological studies* (DHHS Publication No. ADM 92-1929, pp. 13-52). Rockville, MD: National Institute on Drug Abuse.
- Fowler, F. J., Jr., & Stringfellow, V. L. (2001). Learning from experience: estimating teen use of alcohol, cigarettes, and marijuana from three survey protocols. *Journal of Drug Issues, 31*, 643-664.
- Frissell, K. C., McCarthy, D. M., D'Amico, E. J., Metrik, J., Ellingstad, T. P., & Brown, S. A. (2004). Impact of consent procedures on reported levels of adolescent alcohol use. *Psychology of Addictive Behaviors, 18*(4), 307-315.
- Gfroerer, J., Wright, D., & Kopstein, A. (1997). Prevalence of youth substance use: The impact of methodological differences between two national surveys. *Drug and Alcohol Dependence, 47*, 19-30.

- Griesler, P. C., Kandel, D. B., Schaffran, C., Hu, M. C., & Davies, M. (2008). Adolescents' inconsistency in self-reported smoking. *Public Opinion Quarterly*, *72*, 260-290.
- Harrison, L. (1995). The validity of self-reported data on drug use. *Journal of Drug Issues*, *25*, 91-111.
- Harrison, L. (1997). The validity of self-reported drug use in survey research: An overview and critique of research methods. 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. 17-36). Rockville, MD: National Institute on Drug Abuse.
- Harrison, L. D. (2001). Understanding the differences in youth drug prevalence rates produced by the MTF, NHSDA, and YRBS studies. *Journal of Drug Issues*, *31*, 665-694.
- Harrison, L. D., Martin, S. S., Enev, T., & Harrington, D. (2007). *Comparing drug testing and self-report of drug use among youths and young adults in the general population* (DHHS Publication No. SMA 07-4249, Methodology Series M-7). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.
- Hawthorne, G. (2003). The effect of different methods of collecting data: Mail, telephone, and filter data collection issues in utility measurement. *Quality of Life Research*, *12*, 1081-1088.
- Jensen, P. S., Watanabe, H. K., & Richters, J. E., (1999). Who's up first? Testing for order effects in structured interviews using a counterbalanced experimental design. *Journal of Abnormal Child Psychology*, *27*, 439-445.
- Johnson, T. P., & Bowman, P. J. (2003). Cross-cultural sources of measurement error in substance use surveys. *Substance Use and Misuse*, *38*, 1447-1490.
- Johnston, L. D., & O'Malley, P. M. (1985). Issues of validity and population coverage in student surveys of drug use. In B. A. Rouse, N. J. Kozel, & L. G. Richards (Eds.), *Self-report methods of estimating drug use: Meeting current challenges to validity* (NIDA Research Monograph 57, pp. 31-54). Rockville, MD: National Institute on Drug Abuse.
- Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2009). *Monitoring the Future national survey results on drug use, 1975-2008. Volume I: Secondary school students* (NIH Publication No. 09-7402). Bethesda, MD: National Institute on Drug Abuse.
- Kann, L., Brener, N. D., Warren, C. W., Collins, J. L., & Giovino, G. A. (2002). An assessment of the effect of data collection setting on the prevalence of health risk behaviors among adolescents. *Journal of Adolescent Health*, *31*, 327-335.
- Kessler, R. C., Wittchen, H. U., Abelson, J. M., McGonagle, K., Schwarz, N., Kendler, K. S., Knäuper, B., & Zhao, S. (1998). Methodological studies of the Composite International Diagnostic Interview (CIDI) in the US National Comorbidity Survey (NCS). *International Journal of Methods in Psychiatric Research*, *7*, 33-55.
- Kish, L. (1965). *Survey sampling*. New York, NY: Wiley.

Klein, R. J., Proctor, S. E., Boudreault, M. A., & Turczyn, K. M. (2002). *Healthy People 2010 criteria for data suppression: Statistical notes, no. 24*. Hyattsville, MD: National Center for Health Statistics.

Knäuper, B. (1998). Filter questions and question interpretation. *Public Opinion Quarterly*, *62*(1), 70-78.

National Institute on Alcohol Abuse and Alcoholism. (2005) *Helping patients who drink too much. A clinician's guide* (updated 2005 edition). Rockville, MD: National Institutes of Health.

Office of Applied Studies. (2001). *Development of computer-assisted interviewing procedures for the National Household Survey on Drug Abuse* (HHS Publication No. SMA 01-3514). Rockville, MD: Substance Abuse and Mental Health Services Administration.

Office of Applied Studies. (2003). *Results from the 2002 National Survey on Drug Use and Health: National findings* (NHSDA Series H-22, HHS Publication No. SMA 03-3836). Rockville, MD: Substance Abuse and Mental Health Services Administration.

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

Office of Applied Studies. (2007). *Results from the 2006 National Survey on Drug Use and Health: National findings* (NSDUH Series H-32, HHS Publication No. SMA 07-4293). Rockville, MD: Substance Abuse and Mental Health Services Administration.

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

Office of Applied Studies. (2009b). *Results from the 2008 National Survey on Drug Use and Health: Detailed tables*. 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.

Office of Management and Budget. (2003, June 6). *OMB Bulletin No. 03-04: Revised definitions of metropolitan statistical areas, new definitions of micropolitan statistical areas and combined statistical areas, and guidance on uses of the statistical definitions of these areas*. Washington, DC: The White House.

O'Malley, P. M., Johnston, L. D., Bachman, J. G., & Schulenberg, J. (2000). A comparison of confidential versus anonymous survey procedures: Effects on reporting of drug use and related attitudes and beliefs in a national study of students. *Journal of Drug Issues*, *30*(1), 35-54.

Petzel, T. P., Johnson, J. E., & McKillip, J. (1973). Response bias in drug surveys. *Journal of Consulting and Clinical Psychology*, *40*, 437-439.

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

Stillwell, R. (2010). *Public school graduates and dropouts from the common core of data: School year 2007-08* (NCES Publication No. 2010-341). Washington, DC: National Center for Education Statistics.

Sudman, S. (2001). Examining substance abuse data collection methodologies. *Journal of Drug Issues*, *31*, 695-716.

Tourangeau, R., & Smith, T. W. (1996). Asking sensitive questions: The impact of data collection mode, question format, and question context. *Public Opinion Quarterly*, *60*, 275-304.

Turner, C. F., Ku, L., Rogers, S. M., Lindberg, L. D., Pleck, J. H., & Sonenstein, F. L. (1998). Adolescent sexual behavior, drug use, and violence: Increased reporting with computer survey technology. *Science*, *280*, 867-873.

Turner, C. F., Lessler, J. T., & Devore, J. W. (1992). Effects of mode of administration and wording on reporting of drug use. In C. F. Turner, J. T. Lessler, & J. C. Gfroerer (Eds.), *Survey measurement of drug use: Methodological studies* (HHS Publication No. ADM 92-1929; pp. 177-219). Rockville, MD: National Institute on Drug Abuse.

Von Korff, M., Crane, P. K., Alonso, J., Vilagut, G., Angermeyer, M C., Bruffaerts, R., de Girolamo, G., Gureje, O., de Graaf, R., Huang, Y., Iwata, N., Karam, E. G., Kovess, V., Lara, C., Levinson, D., Posada-Villa, J., Scott, K. M., & Ormel, J. (2008). Modified WHODAS-II provides valid measure of global disability but filter items increased skewness. *Journal of Clinical Epidemiology*, *61*, 1132-1143.

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