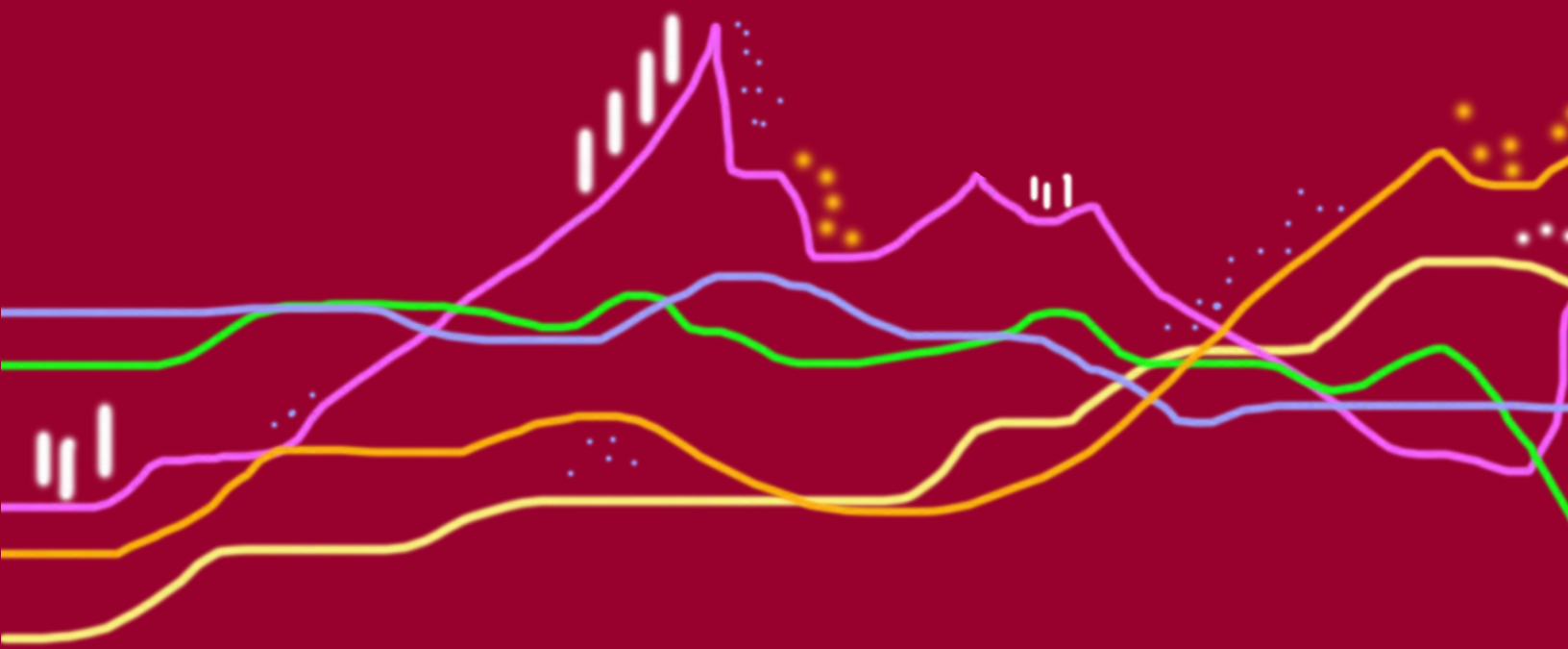


# MONITORING *the* FUTURE

## National Survey Results on Drug Use, 1975-2023: Overview and Detailed Results for Secondary School Students

Richard A. Miech  
Lloyd D. Johnston  
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**Students**

by

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Institute for Social Research  
University of Michigan  
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# Chapter 1

## INTRODUCTION

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Substance use is a leading cause of preventable morbidity and mortality; it is in large part why, among 17 high-income nations, people in the U.S. have the highest probability of dying by age 50.<sup>1,2,3</sup> Substance use is also an important contributor to many social problems including domestic violence, violence more generally, criminal behavior, suicide, and more—and it is typically initiated during adolescence. It warrants our sustained attention.

Monitoring the Future (MTF) is designed to give such attention to substance use among the nation's youth and adults. It is an investigator-initiated study that originated with, and is conducted by, a team of research professors at the University of Michigan's Institute for Social Research. Since its onset in 1975, MTF has been funded continuously by the National Institute on Drug Abuse—one of the National Institutes of Health—under a series of peer reviewed, competitive research grants. The 2023 survey, reported here, is the 49<sup>th</sup> consecutive national survey of 12<sup>th</sup> grade students and the 33<sup>rd</sup> national survey of 8<sup>th</sup> and 10<sup>th</sup> grade students (who were added to the study in 1991).

MTF contains ongoing national surveys of both adolescents and adults in the United States. It provides the nation with a vital window into the important but often hidden problem behaviors of use of illegal drugs, alcohol, tobacco, and psychotherapeutic drugs used without a doctor's orders. For nearly five decades, MTF has helped provide a clearer view of the changing topography of these problems among adolescents and adults, a better understanding of the dynamic factors that drive some of these problems, and a better understanding of some of their consequences. It has also given policymakers, government agencies, public health professionals, and nongovernmental organizations (NGOs) in the field some practical approaches for intervening.

A widespread epidemic of illicit drug use emerged in the 1960s among U.S. youth, and since then dramatic changes have occurred in the use of nearly all types of illicit drugs, as well as alcohol and tobacco. Of particular importance, as discussed in detail below, are the many new illicit drugs that have emerged, along with new forms of alcoholic beverages and nicotine products. Among the substances that have arisen over the life of the survey are new classes of drugs that include vaping devices, hookah smoking, synthetic marijuana, and drugs taken for strength enhancement. New devices and methods for taking drugs, such as vaporizers and e-cigarettes, provide novel ways to use substances and use them in new combinations. Unfortunately, the number of new substances added to the list over the years substantially outnumbers the number removed because so many substances remain in active use. Throughout these many changes, substance use among the nation's youth has remained a major concern for parents, educators, health professionals, law

<sup>1</sup> Case, A. & Deaton, A. (2015). [Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century](#). *Proceedings of the National Academy of Sciences*, 112(49), 15078-15083.

<sup>2</sup> Murphy, S. L., Xu, J., Kochanek, K. D., & Arias, E. S. (2020). [Mortality in the United States, 2020](#). NCHS Data Brief, no 395. Hyattsville, MD: National Center for Health Statistics.

<sup>3</sup> Esser, M. B., Leung, G., Sherk, A., Bohm, M. K., Liu, Y. Lu, H., & Naimi, T. S. (2022). [Estimated deaths attributable to excessive alcohol use among US adults aged 20 to 64 years, 2015 to 2019](#). *JAMA Network Open*, 5(11), e2239485.

enforcement, and policymakers, largely because substance misuse is one of the largest and yet most preventable causes of morbidity and mortality during and after adolescence.

The MTF annual monograph series is a key vehicle for disseminating MTF’s epidemiological findings. In addition to this monograph, the series includes a separate, annual monograph that presents prevalence and trends among U.S. adults ages 19 to 60, including both college students and young adults who are not attending college (scheduled for publication this summer), as well as an additional, periodic monograph that presents information on risk and protective behaviors for HIV among young adults. All MTF publications, including press releases, are available on the project website at [www.monitoringthefuture.org](http://www.monitoringthefuture.org).

## **CONTENT AREAS COVERED**

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Two of the major topics included in the present monograph are (a) the *prevalence and frequency* of use of a great many substances, both licit and illicit, among U.S. secondary school students in 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grades and (b) *historical trends* in use by students in those grades. Distinctions are made among important demographic subgroups in these populations based on gender, college plans, region of the country, population density, parent education, and race/ethnicity. MTF has demonstrated that key attitudes and beliefs about drug use are important determinants of usage trends, in particular the amount of risk to the user perceived to be associated with the various drugs and disapproval of using them; thus, those measures also are tracked over time, as are students’ perceptions of certain relevant aspects of the social environment—in particular, perceived availability of each drug, peer norms about their use, and use by friends. Data on grade of first use, noncontinuation of use, trends in use in lower grades (based on retrospective reports), and intensity of use are also reported here.

### **Drug Classes**

Initially, 11 separate classes of drugs were distinguished in order to heighten comparability with a parallel series of publications based on the National Survey of Drug Use and Health (NSDUH, formerly titled the National Household Survey of Drug Abuse): marijuana (including hashish), inhalants, hallucinogens, cocaine, heroin, narcotics other than heroin (both natural and synthetic), amphetamines, sedatives, tranquilizers, alcohol, and tobacco. Separate statistics have been presented for a number of subclasses of drugs within these more general categories: PCP and LSD (both hallucinogens), barbiturates and methaqualone (both sedatives), methamphetamine, crystal methamphetamine (“ice”), and crack and cocaine other than crack.

In the years since the study was launched, many additional categories of substances have been added to the MTF questionnaires—in many but not all cases in all three grades. Relatively fewer substances have been dropped due to their reaching very low prevalence. The substances added and dropped are shown in [Table 1-1](#) sequentially by year and within year by the grade levels affected.

The large number of substances added over the years illustrates the dynamic and multidimensional nature of the country’s drug problems. As time passes and new trends develop, additional drugs will be added to the study’s coverage; occasionally ones that fall to very low prevalence levels (such as bath salts, “look-alike” pseudo-amphetamines, kreteks, bidis, PCP, and Provigil) are dropped. It is important, given this rapidly shifting variety of drugs, that information be gathered

and reported relatively quickly to inform legislators, regulatory agencies, scientists, practitioners in the field, parents, and educators about the extent to which newer drugs are making inroads in the youth population and what subgroups are proving most vulnerable.

Much of the information reported here deals with illicit use of controlled substances. The major exceptions are alcohol, vaping, cigarettes, other tobacco products, inhalants, nonprescription stimulants, medicines taken appropriately by prescription in the treatment of ADHD, creatine, cough and cold medicines, and salvia. In the questions about nonmedical use of psychotherapeutic drugs, respondents are asked to exclude any use with a doctor's order.

Throughout this report, we also focus attention on drug use at high frequency levels in addition to reporting proportions that have ever used various drugs. This is done to help differentiate levels of magnitude, or extent, of drug involvement. While there is no scientific or public consensus on what levels or patterns of use constitute misuse, there is a consensus that higher levels of use are more likely to have detrimental effects for the person who uses and for society. We have indirect measures of dosage per occasion by asking respondents about the duration and intensity of highs they usually experience with each type of drug. These items have shown some interesting trends over the years, detailed in [Chapter 7](#).

### **Attitudes, Beliefs, and Early Experiences**

Separate sections or whole chapters are devoted to the following issues related to a number of licit and illicit drugs:

- grade of first use;
- noncontinuation of use;
- respondents' own attitudes and beliefs about specific drugs;
- degree and duration of the highs attained;
- perceptions of availability of the drug; and
- perceptions of attitudes and behaviors of others in the social environment related to the use of various drugs.

Some of these variables have proven to be very important in explaining changes in use, as we discuss in detail in [Chapter 8](#).

### **Over-the-Counter Substances**

Included in this monograph are trends in the use of nonprescription stimulants, including cough medicines, and the performance-enhancing substances of anabolic steroids, androstenedione (andro), and creatine.

### **Cumulative Lifetime Daily Marijuana Use**

Also included are trend results from a set of questions about cumulative lifetime marijuana use at a daily or near-daily level. These questions were added to enable us to develop a more complete individual history of daily use over a period of years. They reveal some important facts about frequent users of this drug.

## Trends in Use of Specific Alcoholic Beverages

Twelfth grade data are reported for a wide spectrum of substances, including beer, liquor, wine, and flavored alcoholic beverages. Results on these various substances are discussed in [Chapter 4](#) and [Chapter 5](#). We present trends on alcohol use as well as on most other substances among demographic subgroups and for specific classes of alcoholic beverages in a separate, accompanying publication.<sup>4</sup>

## Sources of Prescription Drugs

MTF documents trends in prescription-type psychotherapeutic drugs used without medical supervision. Since 2008, [Chapter 4](#) and [Chapter 5](#) also contain estimates of the proportion of 12<sup>th</sup> grade students who use *any* psychotherapeutic drug nonmedically in each prevalence period; these estimates can be made only for 12<sup>th</sup> graders, because estimates of use of sedatives and narcotics other than heroin are not reported for students in the lower grades due to concerns about the validity of their reports of these substances.

## Synopses of Other MTF Publications

[Chapter 10](#) contains short synopses of other MTF publications produced during the past year (journal articles, chapters, occasional papers, etc.). References to the full documents are provided, and many are available on the [MTF website](#).

## Appendices

[Appendix A](#) addresses the issue of whether absentees and school dropouts affect MTF results and, if so, to what extent. For illustrative purposes, the appendix provides estimates of prevalence and trends adjusted for these missing segments of the population for marijuana, cocaine, any illicit drug use, cigarettes, and alcohol.

[Appendix B](#) gives the definitions of the various demographic subgroups discussed.

[Appendix C](#) provides trends for 12<sup>th</sup> grade only on various *subclasses* of drugs within each of the following five general classes: hallucinogens other than LSD, amphetamines, tranquilizers, narcotics other than heroin, and sedatives. These tables provide annual prevalence levels over time and show how the mix of subclasses has changed over the years within each of the general classes.

[Appendix D](#) provides trends since 1991 in drug use for the *three grades combined*, as well as the absolute decline and the proportional decline in the prevalence of each drug since the most recent *peak* level. Such tables are helpful in getting a quick read on the trends. By combining the three grades, however, much of the meaningful detail available from grade-specific estimates is lost, including evidence of cohort effects.

In 2017 and earlier, the Appendix C of this monograph reported information on how to take into account the complex sample design in order to calculate confidence intervals for point estimates

<sup>4</sup> Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2022). [Demographic subgroup trends among adolescents in the use of various licit and illicit drugs 1975-2021](#) (Monitoring the Future Occasional Paper No. 97). Ann Arbor, MI: Institute for Social Research, University of Michigan.



and how to calculate statistics that test the significance of changes over time or of differences between subgroups. This appendix is no longer necessary with the opening of MTF's secure remote portal at the [National Addiction and HIV Data Archive Program](#), which now allows researchers to compute such statistics directly using MTF weights and clustering variables (after completing an application process that includes a signed pledge to protect the confidentiality of the data). Interested readers may refer to Appendix C of earlier monographs for the information it provides about design effects and how their computational influence varies by substance. They are listed under Results > Annual Reports on the study website: [www.monitoringthefuture.org](http://www.monitoringthefuture.org).

## **PURPOSES AND RATIONALE FOR THIS RESEARCH**

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Perhaps no social problem has proven more clearly appropriate for and in need of the application of systematic research and reporting than substance misuse. Substance use behaviors are often hidden from public view, can change rapidly and frequently, and are of great importance to the wellbeing of the nation. Many legislative and programmatic interventions are aimed at these behaviors, such as the current opioid crisis and increases in adolescent smoking and illicit drug use, which we reported in the 1970s and again in the 1990s as a relapse in the drug epidemic unfolded.

Young people are often at the leading edge of social change, and this has been particularly true of drug use. MTF documented that the relapse in the drug epidemic in the early 1990s initially occurred almost exclusively among adolescents. Adolescents and adults in their 20s fall into the age groups at highest risk for illicit drug use. Moreover, use that begins in adolescence sometimes continues well into adulthood. This is indicated in the cohort effects that we report for a number of substances (and even in some attitudes and beliefs about them). The original epidemic of illicit drug use in the 1960s began on the nation's college campuses and then spread downward in age. By way of contrast, MTF has shown that the relapse phase in the 1990s first manifested itself among secondary school students and then started moving upward in age as those cohorts matured.

One purpose of MTF is to develop an accurate description of these important changes as they are unfolding. An accurate picture of the basic size and contours of the substance use problem among youth in the U.S. is a prerequisite for informed public debate and policymaking. In the absence of reliable *prevalence* data, substantial misconceptions can develop and resources can be misallocated. In the absence of reliable *trend* data, early detection and localization of emerging problems are more difficult and societal responses more lagged. For example, MTF provided early evidence that cigarette smoking among U.S. adolescents was rising sharply in the early 1990s, which helped stimulate and support some extremely important policy initiatives that culminated in the tobacco settlement between the tobacco industry and the states. MTF documented and described the sharp rise and subsequent decline in ecstasy use and earlier in cocaine use, illustrating the important role that *perceived risk* played in these changes, as it has done for a number of other drugs in the past. The study also helped draw attention to the rise in steroid and androstenedione use among adolescents in the late 1990s, resulting in legislative and regulatory action. It exposed a rise in the use of narcotic drugs other than heroin (especially certain prescription-type analgesics), stimulating an initiative at the White House Office of National Drug Control Policy aimed at reducing use. More recently, MTF has become a key source of information on vaping, and MTF results are cited by the FDA in its recent [regulations](#) prohibiting all flavoring of vaping cartridges except tobacco and menthol. In addition to enabling early detection and localization of

problems, valid trend data make assessments of the impact of major historical and policy-induced events much less conjectural.

The accurate empirical comparison of subgroup differences has challenged conventional wisdom in some important ways. Accurately characterizing not only differences but also differential changes among subgroups has been an important scientific contribution from MTF. For example, dramatic racial/ethnic differences in cigarette smoking emerged during the life of the study—differences that were almost nonexistent when MTF began in 1975. Further, the misinformed assumption by some that Black students use illicit drugs more than do White students has been disconfirmed since the beginning of the study, which shows lower levels of use for Black students in most years, though these differences have been narrowing in recent years as overall use of many substances declined, thus leaving less room for differences.

MTF also monitors a number of factors—peer norms regarding drugs, beliefs about the dangers of drugs, and perceived availability—that help explain the historical changes observed in drug use. Monitoring these factors has made it possible to examine a central policy issue in this nation’s efforts to reduce drug use—namely, the relative importance of supply versus demand factors in bringing about some of the observed declines and increases in drug use.<sup>5</sup> Our group has also put forth a general theory of drug epidemics that uses many of these concepts to help explain the rises and declines that occur in use and emphasizes the importance of demand-side factors.<sup>6</sup>

In addition to accurately assessing prevalence and testing explanations of their causes, the integrated MTF study of adolescents and adults has a substantial number of other important research objectives that are addressed in our other publications. These include (a) assessing the impact of historical events such as the COVID-19 pandemic on population levels of substance use; (b) helping to determine which young people are at greatest risk for developing various short and long term patterns of drug misuse; (c) gaining a better understanding of the lifestyles and value orientations associated with various patterns of drug use and monitoring how subgroup differences shift over time; (d) determining the immediate and more general aspects of the social environment associated with drug use and misuse; (e) determining how major transitions in the social environment (e.g., entry into military service, civilian employment, college, working, unemployment) or in social roles (e.g., engagement, marriage, pregnancy, parenthood, divorce, remarriage) affect changes in drug use; (f) determining the life course trajectories and comorbidity of the various drug-using behaviors from early adolescence to middle and later adulthood and distinguishing such age effects from cohort and period effects; (g) determining the effects of social legislation, such as marijuana legalization, the long term effects of the Master Tobacco Settlement Agreement of 1998, and Tobacco 21 legislation on various types of substance use; (h) examining possible consequences of using various drugs; (i) examining linkages between educational success or failure and substance use; and (j) determining the changing connotations of drug use and

<sup>5</sup> Other major studies have adopted many of these measures including the National Survey on Drug Use and Health (NSDUH) and the European school surveys of substance use in nearly forty European countries (ESPAD), which is largely modeled after Monitoring the Future.

<sup>6</sup> See Johnston, L. D. (1991). [Toward a theory of drug epidemics](#). In R. L. Donohew, H. Sypher, & W. Bukoski (Eds.), *Persuasive communication and drug abuse prevention* (pp. 93–132). Hillsdale, NJ: Lawrence Erlbaum.

changing patterns of multiple drug use among youth.<sup>7</sup> Readers interested in publications dealing with any of these topics should visit the MTF website at [www.monitoringthefuture.org](http://www.monitoringthefuture.org).

The differentiation of age, period, and cohort effects in the use of various substances has been a particularly important contribution of MTF and one for which the study's cohort-sequential research design is especially well suited.

Since 2004, we have also been reporting about factors related to the spread of HIV. These factors include number of sexual partners, gender of sexual partners, condom use, injection drug use, injection drug use using shared needles, illicit drug and alcohol use more generally, and getting tested for HIV. Most of the research objectives listed above for licit and illicit drug use can also be addressed in relation to these very important behaviors. Our emphasis is on measuring and reporting prevalence and trends in HIV-related behaviors in the general population of young adults ages 19–30 who are high school graduates. We have also been measuring the extent to which these various risk and protective behaviors are correlated.

Our efforts over the years and going into the future cover both the epidemiology and etiology of substance use and related risk behaviors. Including both sets of efforts within the same large-scale study—and keeping measurement consistent across historical and developmental time—allows us to provide the nation with scientifically reliable, nationally representative estimates of historical trends of substance use as well as the developmental trends and possible causes, correlates, and consequences of substance use and other risk behaviors from adolescence through adulthood.

<sup>7</sup> For an elaboration and discussion of the full range of MTF research objectives in the domain of substance use, see Johnston, L. D., O'Malley, P. M., Schulenberg, J. E., Bachman, J. G., Miech, R. A., & Patrick, M. E. (2016). *The objectives and theoretical foundation of the Monitoring the Future Study* (Monitoring the Future Occasional Paper No. 84). Ann Arbor, MI: Institute for Social Research, University of Michigan.

**TABLE 1-1**  
**Added and Deleted Prevalence of Use Questions**  
**for 8th, 10th, and 12th Graders**

Drug Name	Year in which added	Grades in which added			Year in which dropped	Grades in which dropped		
		8th	10th	12th		8th	10th	12th
PCP	1979			X	2014 <sup>c</sup>			X
Nonprescription Diet Pills	1982			X				
Stay-Awake Pills	1982			X				
Smokeless Tobacco <sup>a</sup>	1986, 1992			X	1990			X
Crack <sup>b</sup>	1986–1987, 1990			X				
Cocaine other than Crack	1987			X				
Steroids	1989			X				
Crystal Methamphetamine (Ice)	1990			X				
Been Drunk	1991			X				
Ecstasy (MDMA)	1996	X	X	X				
Rohypnol	1996	X	X	X	2002 <sup>h</sup>			X
Methamphetamine	1999	X	X	X				
GHB	2000	X	X	X	2012 <sup>i</sup>	X	X	
Ketamine	2000	X	X	X	2012 <sup>i</sup>	X	X	
Androstenedione	2001	X	X	X	2016 <sup>i</sup>	X	X	
Creatine	2001	X	X	X				
Ritalin	2001	X	X	X				
OxyContin	2002	X	X	X				
Vicodin	2002	X	X	X				
Flavored Alcoholic Beverages (Alcopops) <sup>d</sup>	2003 2004			X				
ADHD Stimulant-type drug—prescribed	2005	X	X	X				
ADHD Non-stimulant-type drug—prescribed	2005	X	X	X				
Any Prescription Drug—not prescribed <sup>e</sup>	2005			X				
10+ drinks in a row in past two weeks	2005 2016			X				
15+ drinks in a row in past two weeks	2005			X				
Over-the-counter Cough/Cold Medicines	2006	X	X	X				
Adderall	2009	X	X	X				
Tobacco using a Hookah	2010, 2016 2016			X				
Small Cigars	2010			X				
Energy Drinks	2010	X	X	X				
Energy Shots	2010	X	X	X				
Alcohol Beverages containing Caffeine <sup>f</sup>	2011	X	X	X				
Snus	2011 2012			X				
Large Cigars	2014	X	X	X				
Flavored Little Cigars	2014	X	X	X				
Regular Little Cigars	2014	X	X	X				

(Table continued on next page.)

**TABLE 1-1 (cont.)**  
**Added and Deleted Prevalence of Use Questions**  
**for 8th, 10th, and 12th Graders**

	Year in which added	Grades in which added			Year in which dropped	Grades in which dropped		
		8th	10th	12th		8th	10th	12th
Vaping Nicotine	2017	X	X	X				
Vaping Marijuana	2017	X	X	X				
Vaping Just Flavoring	2017	X	X	X				
Marijuana Under a Doctor's Orders	2017	X	X	X				
Delta-8	2023			X				
Nicotine Pouches	2023	X	X	X				
Methaqualone	1975			X	1990/2013			X
Nitrites	1979			X	2010			X
Provigil	2009			X	2012			X
Bidis	2000	X	X		2006	X	X	
	2000			X	2011			X
Kreteks	2001	X	X		2006	X	X	
	2001			X	2015			X
Electronic Vaporizers	2015	X	X	X	2017	X	X	X
Look-Alikes	1982			X	2018			X
Bath Salts (synthetic stimulants)	2012	X	X	X	2019	X	X	X
Powdered Alcohol	2016	X	X	X	2020	X	X	X
Heroin With a Needle	1995	X	X	X	2022	X	X	X
Heroin Without a Needle	1995	X	X	X	2022	X	X	X
JUUL	2019	X	X	X	2022	X	X	X
Salvia	2009			X	2023	X	X	X
	2010	X	X		2023	X	X	X
Synthetic Marijuana <sup>g</sup>	2011			X	2023	X	X	X
Dissolvable Tobacco Products	2011			X	2023	X	X	X
	2012	X	X		2023	X	X	X

*Source.* The Monitoring the Future study, the University of Michigan.

*Note.* All prescription-type drugs listed refer to use without a doctor's orders, unless otherwise noted.

<sup>a</sup>Smokeless tobacco was added to one questionnaire form in 1986, dropped in 1990, then added to a different questionnaire form in 1992.

<sup>b</sup>A question on annual use of crack was added to a single form in 1986. The standard triplet questions (lifetime, annual, and 30-day use) were added to two forms in 1987 and to all forms in 1990.

<sup>c</sup>For 12th grade only: Lifetime and 30-day prevalence of use questions were dropped in 2002. A question on annual use remains in the study.

<sup>d</sup>For 12th grade only: A question on annual use of Alcopops was added to a single form in 2003. In 2004 it was replaced by the standard triplet questions (lifetime, annual, and 30-day use) about use of flavored alcoholic beverages.

<sup>e</sup>For 12th grade only: The use of any prescription drug includes use of any of the following: amphetamines, sedatives (barbiturates), narcotics other than heroin, or tranquilizers...without a doctor telling you to use them.

<sup>f</sup>For all grades: In 2012 the alcoholic beverages containing caffeine question text was changed. See text for details.

<sup>g</sup>For all grades: Questions on the annual use of synthetic marijuana were added to the survey in the year specified in the table.

<sup>h</sup>For 12th grade only: Lifetime and 30-day prevalence of use questions were dropped in 2014. A question on annual use remains in the study.

<sup>i</sup>Only 8th and 10th grade questions were dropped from the study.

## Chapter 2

### OVERVIEW OF KEY FINDINGS IN 2023

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Monitoring the Future (MTF), now having completed its 49<sup>th</sup> year of data collection, has become one of the nation’s most relied upon scientific sources of valid information on trends in use of licit and illicit psychoactive drugs by U.S. adolescents, college students, young adults, and adults up to age 60. During the last four decades, the study has tracked and reported on the use of an ever-growing array of such substances in these populations of adolescents and adults.

The annual MTF series of monographs is one of the primary mechanisms through which the epidemiological findings are reported. Findings from the inception of the study in 1975 through 2023 are included in the monographs—the results of 49 national in-school surveys and 47 national follow-up surveys.

MTF has conducted in-school surveys of nationally representative samples of (a) 12<sup>th</sup> grade students each year since 1975 and (b) 8<sup>th</sup> and 10<sup>th</sup> grade students each year since 1991. In addition, beginning with the class of 1976, the study has conducted follow-up surveys of representative subsamples of the respondents from each previously participating 12<sup>th</sup> grade class. These follow-up surveys now continue well into adulthood, currently up to age 65. This monograph focuses on the results from the in-school surveys of 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grade students; a companion report on the panel study results<sup>1</sup> focuses on the follow-up surveys from ages 19 to 65.

MTF is designed to detect age, period, and cohort effects in substance use and related attitudes. Age effects are similar changes at similar ages seen across multiple class cohorts; they are common during adolescence. Period effects are changes that take place over a number of years across multiple age groups in the same calendar year (in this case, all three grades under study—8, 10, and 12). Cohort effects are substance use behaviors or attitudes that distinguish a class cohort from others that came before or after them and are maintained as the cohort ages.

Below we summarize key findings for use of various substances by U.S. 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders in 2023, and full details for all drug trends follow in [Chapter 5](#). In addition, the text below also refers to analyses for all three grades combined. These grade-combined results will appear in this Volume’s Appendix D when the full Volume is released in the summer, and in the meantime these estimates can be found [here](#) on the project’s website under the heading “Table for All Three Grades Combined”, the results of which are presented in [Appendix D](#).

The survey results divide cleanly into the time periods before and after the onset of the COVID-19 pandemic. All surveys in 2020 were completed before March 15, when national social distancing policies were enacted and data collection was halted due to pandemic concerns. Consequently, results from 2020 and previous years are pre-pandemic, while results from 2021 and later took place after the onset of the pandemic and the associated national response.

<sup>1</sup> Patrick, M. E., Schulenberg, J. E., Miech, R. A., Johnston, L. D., O’Malley, P. M., & Bachman, J. G. *Monitoring the Future Panel Study annual report: National data on substance use among adults ages 19 to 60, 1976-2022*. Monitoring the Future Monograph Series. University of Michigan Institute for Social Research: Ann Arbor, MI. Prior year versions are available on the [MTF website](#). An updated version of this report that includes data from 2023—as well as results from respondents age 65—will be available on the MTF website in mid-August.

## EXECUTIVE SUMMARY

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### Lowered Levels of Use Continued After Pandemic Onset for Cannabis, Alcohol, and Nicotine Vaping

Some of the project's largest year-to-year decreases ever recorded took place in the year of the pandemic onset. For example, for each grade the declines in past 12-month use of cannabis from 2020 to 2021 are the largest ever recorded by the survey (since 1975 for 12<sup>th</sup> grade students and since 1991 for 10<sup>th</sup> and 8<sup>th</sup> grade students). Record decreases also took place for alcohol use and nicotine vaping, which together with cannabis have been the most common forms of substance use among adolescents in recent years.

One major question to arise from these previous findings is whether the lower levels of substance use among adolescents would continue in future years. It is possible that the factors that disrupted and lowered drug use during the pandemic in 2021 had a long-lasting effect. This could occur if absence of drug use reduced involvement with peer groups that encouraged the use of drugs, and/or the adolescents who did not use substances during the pandemic were spared psychological/neurological changes that can increase their susceptibility for future drug use. Alternatively, substance use may have quickly rebounded to pre-pandemic levels when adolescents returned to school buildings in 2022 and afterwards, if pre-pandemic patterns of social interaction and drug use rapidly re-established.

The 2023 results show that adolescent drug use levels for the most common substances continued at the lowered levels observed after the pandemic onset. Since the large drop in 2021, cannabis levels for past 12-month use changed little with no clear direction in any of the three grades (see [here](#) for detailed estimates). Levels of alcohol use in the past 12 months for 12<sup>th</sup> grade students were slightly lower in 2023 than they had been in 2021, after a fleeting rebound in 2022. In 8<sup>th</sup> grade 2023 levels of use were also slightly lower in 2023 than in 2021, while in 10<sup>th</sup> grade the 2023 level was slightly higher than 2021, albeit substantially below the pre-pandemic level (by 10 percentage points; for details of all alcohol estimates see [here](#)). Nicotine vaping in the past 12 months continued to drop after 2021 in all three grades, with significant declines in 2023 in both 12<sup>th</sup> and 10<sup>th</sup> grade (see [here](#) for detailed estimates).

### Delta-8: A New Drug on the Adolescent Scene

For the first time in 2023 MTF asked 12<sup>th</sup> grade students about their use of “delta-8.” Delta-8 is a variant of delta-9-THC, which is the main psychoactive compound of cannabis (marijuana). Both delta-8 and delta-9 have similar intoxicating effects but different legal contexts. Delta-8 is federally legal. It is synthesized from hemp, which was legalized in the 2018 Agriculture Improvement Act.<sup>2</sup> Since the passage of this legislation delta-8 products have become increasingly available, including at gas stations and convenience stores, in many U.S. states. Potential health effects of delta-8, including dependence, are currently unknown.

The 2023 results show a delta-8 prevalence of 11.4% for past 12-month use among 12<sup>th</sup> grade students (the only grade asked about its use in 2023). Prevalence was lower in states that had legalized adult use of marijuana, consistent with the possibility that adolescents may be more likely

<sup>2</sup> U.S. Department of Agriculture. [Farm Bill](#). Accessed January 22, 2024.



to use delta-8 when regular marijuana is relatively less available and accessible.<sup>3</sup> The 2024 survey will expand the number of questions on delta-8 in all three grades to better track its trends in use going forward.

### Other Notable Findings

Additional findings on adolescent substance use are notable in 2023. Past-year use of **any illicit drug other than marijuana** continued at the lower levels set in 2021, after the pandemic onset. In 2023 its prevalence in 12<sup>th</sup> grade was 7%, where it has hovered since 2021, and was substantially lower than the pre-pandemic level of 11% in 2020. In 10<sup>th</sup> grade the 2023 prevalence level was 5%, where it has hovered since 2021, and was substantially lower than the pre-pandemic level of 9% in 2020. In 8<sup>th</sup> grade the 2023 prevalence level was 5%, where it has hovered since 2021, and was substantially lower than the 8% level in 2020.

Use of **any prescription drug** without a doctor's orders continued at the lower levels set in 2021, after the pandemic onset. In 2023 past 12-month prevalence in 12<sup>th</sup> grade was 4%, where it has hovered since 2021, and was substantially lower than the 8% level in 2020. (This measure is only reported for 12<sup>th</sup> grade). Use of any prescription drug without a doctor's orders is defined as any use of **amphetamines, sedatives (barbiturates), narcotics other than heroin, or tranquilizers**. The pattern of a drop in 2021 and continued lowered levels afterwards is apparent for all these substances.

**Any nicotine use** in the last 30 days dropped significantly in 2023 in both 12<sup>th</sup> and 10<sup>th</sup> grade. This drop was driven primarily by the declines in nicotine vaping.

The percentage of adolescent **abstainers** from lifetime substance use significantly increased in 12<sup>th</sup> grade to 38% (from 31% in 2022) and in 10<sup>th</sup> grade to 54% (from 49% in 2022). Lifetime abstention from substance use is defined as never use of alcohol, marijuana, or nicotine (either by cigarettes or by vaping). In 12<sup>th</sup> grade *past 30-day* abstention from use of these drugs also significantly increased to 63% (from 58% in 2022).

In 12<sup>th</sup> grade use of **medications for ADHD** (attention-deficit/hyperactivity disorder) sustained the large increases that took place the previous year from 2021 to 2022. In 2023 the percentage of 12<sup>th</sup> grade students who ever took either stimulant or non-stimulant medications for ADHD was 14.6%, which was on 0.3% points below the record high set in 2022.

<sup>3</sup> For more detailed findings see Harlow, A. F., Miech, R. A., & Leventhal, A. M. (in press). Adolescent delta-8-THC and marijuana use in the United States. *JAMA*.



## Chapter 3

### STUDY DESIGN AND PROCEDURES

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Monitoring the Future (MTF) incorporates several survey designs into one study, yielding analytic power beyond the sum of those component parts. The components include cross-sectional studies, repeated cross-sectional studies, and panel studies of individual cohorts and sets of cohorts. The annual cross-sectional surveys provide point estimates of various behaviors and conditions in any given year for a number of subpopulations (e.g., 8<sup>th</sup> graders, 10<sup>th</sup> graders, 12<sup>th</sup> graders, college students, all young adult high school graduates ages 19–30, as well as adults ages 35 to 60) and provide point estimates for various subgroups within these different populations. Repeating these annual cross-sectional surveys over time allows an assessment of change across history in consistent age segments of the population, as well as among subgroups. The panel study permits the examination of developmental change in the same individuals as they assume adult responsibilities, enter and leave various adult roles and environments, and continue further into adulthood. It also permits an assessment of a number of outcomes later in life that MTF has shown to be linked to substance use in adolescence and beyond.

Finally, with a series of panel studies of sequential graduating class cohorts we are able to offer distinctions among, and explanations for, three fundamentally different types of change: period, age, and cohort. It is this feature that creates a synergistic effect in terms of analytic and explanatory power.<sup>1,2</sup>

This manuscript reports results for the 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders, and the accompanying annual report on the panel data<sup>3</sup> reports results for those ages 19 to 60. It also focuses specifically on levels and trends in substance use among nationally representative samples of students enrolled in college and among high school graduates the same age not currently enrolled in college.

In 2023 MTF used an electronic questionnaire format for the fifth consecutive year. Starting in 2021, students in 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grades completed a web-based questionnaire on their own electronic devices during class time (which may have been at home if they were schooling remotely, for example as a result of the pandemic). In both 2019 and 2020 students also completed an electronic questionnaire that was connected to the internet, although they completed the survey on electronic tablets that MTF brought to schools. It is no longer necessary for MTF to bring tablets to schools because practically all schools now have internet access and almost all students have electronic devices to complete the MTF questionnaires. In rare cases when these resources are not available at a school, MTF brings electronic devices for students, as well as a mobile server to collect their survey responses.

<sup>1</sup> Bachman, J. G., Johnston, L. D., O'Malley, P. M., Schulenberg, J. E., & Miech, R. A. (2015). *The Monitoring the Future project after four decades: Design and procedures* (Monitoring the Future Occasional Paper No. 82). Ann Arbor, MI: Institute for Social Research.

<sup>2</sup> For a more detailed description of the full range of research objectives of Monitoring the Future, see Johnston, L. D., O'Malley, P. M., Schulenberg, J. E., Bachman, J. G., Miech, R. A., & Patrick, M. E. (2016). *The objectives and theoretical foundation of the Monitoring the Future study* (Monitoring the Future Occasional Paper No. 84). Ann Arbor, MI: Institute for Social Research.

<sup>3</sup> Patrick, M. E., Miech, R. A., Johnston, L. D., & O'Malley, P. M. (2023). *Monitoring the Future Panel Study annual report: National data on substance use among adults ages 19 to 60, 1976-2022*. Monitoring the Future Monograph Series. Ann Arbor, MI: Institute for Social Research, University of Michigan.

## RESEARCH DESIGN AND PROCEDURES FOR THE 12<sup>th</sup> GRADE SURVEYS

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In 2023 the project surveyed 7,584 12<sup>th</sup> grade students in 83 schools distributed throughout the contiguous U.S. Twelfth graders have been surveyed in the spring semester of each year since 1975. Each year's data collection took place in both public and private high schools, which were selected to provide a representative cross-section of 12<sup>th</sup> graders throughout the contiguous U.S. (see [Figure 3-1](#)). A sampling statistician directed the selection of schools to ensure the rigor of the sampling procedures.

### The Population Under Study

Senior year of high school is a strategic point at which to monitor drug use and related attitudes of youth. First, completion of high school represents the end of an important developmental period in this society, demarcating both the end of universal education and, for many, the end of living full-time in the parental home. Therefore, it is a logical point at which to take stock of accumulated influences. Further, completion of high school represents a jumping-off point—a point from which young people diverge into widely differing social environments and experiences. Thus senior year is a good time to take a “before” measure, allowing for the subsequent calculation of changes that may be attributable to the environmental transitions occurring in young adulthood, including college attendance, civilian employment, military service, and role transitions such as marriage, parenthood, divorce, etc. Finally, there are some important practical advantages built into the original system of data collections with samples of 12<sup>th</sup> graders. The need for systematically repeated, large-scale samples from which to make reliable estimates of change requires that considerable emphasis be put on cost efficiency as well as feasibility. The last year of high school constitutes the final point at which a reasonably good national sample of an age-specific cohort can be drawn and studied economically.

### The Omission of Dropouts

One limitation in the MTF study design is the exclusion of individuals who drop out of high school before graduation—approximately 5–15% of each age cohort nationally, according to U.S. Census statistics. (The dropout rate has been declining in recent years; 5% is the most recent estimate.<sup>4</sup>) Clearly, the omission of individuals who drop out of high school introduces biases in the estimation of certain characteristics of the entire age group; however, for most purposes, the small proportion of students who drop out sets outer limits on the bias. Further, since the bias should remain relatively constant from one year to the next, their omission should introduce little or no bias in year-to-year change estimates. Appendix A in this volume addresses in detail the effects of the exclusion of those who dropped out or were absent in 12<sup>th</sup> grade on estimates of drug use prevalence and trends for the entire age cohort.

### Sampling Procedures and Sample Weights

A multistage random sampling procedure is used to secure the nationwide sample of 12<sup>th</sup> graders each year. Stage 1 is the selection of particular geographic areas, Stage 2 is the selection of one or more high schools in each area (with probability proportionate to the school's student enrollment size for the grade in question), and Stage 3 is the selection of 12<sup>th</sup> graders within each high school

<sup>4</sup> National Center for Education Statistics. (2023, May). [Status dropout rates](#). *Condition of Education*. U.S. Department of Education, Institute of Education Sciences. Retrieved 5 December 2023.

selected. Up to 500 12<sup>th</sup> graders in each school may be included. In schools with fewer 12<sup>th</sup> graders, the usual procedure is to include all of them in the data collection, though a smaller sample is sometimes taken to accommodate the needs of the school (either by randomly sampling entire classrooms or by some other unbiased, random method). Weights are assigned to compensate for differential probabilities of selection at each stage of sampling.

Starting in 2020, to address the smaller sample size in that year as a result of the COVID-19 pandemic and associated greater variability, the analyses were additionally weighted by region of the country (West, Midwest, Northeast and South) and, within each region, by metropolitan/non-metropolitan status. The purpose of this weighting is to ensure that the impact of these two factors on the analysis results is proportional to their size in the nation. Substance use levels and other demographics did not inform the sampling weights. This same weighting procedure was used for the 8<sup>th</sup> and 10<sup>th</sup> grade students. This post-stratification weighting was continued in all subsequent years for all three grades.

In order to be able to check observed trends in any given one-year interval, schools participate in the study for two consecutive years on a staggered schedule, with one half of them being replaced with a new random half-sample of schools each year. Therefore, in any given year about half of the schools in the sample are participating for the first time and the other half are participating for their second and final year. This three-stage sampling procedure, with annual replacement of half of the sample of schools each year, has yielded the numbers of participating schools and students shown in [Table 3-1](#).

### **Questionnaire Administration**

Informed consent (active or passive, per school policy) is obtained from parents of students younger than 18 years and from students themselves aged 18 years or older. About three weeks prior to the questionnaire administration date, parents of the target respondents are sent a letter by first-class mail, usually from the principal, announcing and describing the MTF study and providing parents with an opportunity to decline participation of their child if they wish. A flyer outlining the study in more detail is enclosed with the letter. Copies of the flyers are also given to the students by teachers in the target classrooms in advance of the date of administration. The flyers state that participation is entirely voluntary. MTF representatives and their assistants conduct the actual questionnaire administrations following standardized procedures detailed in an instruction manual. The questionnaires are administered in classrooms during a normal class period whenever possible; however, circumstances in some schools require the use of larger group administrations. Teachers are asked to remain present in the classroom to help maintain order, but to remain at their desks so that they cannot see students' answers.

### **Questionnaire Format**

Because many questions are needed to cover all of the many topic areas in the MTF study, the questionnaire content for 12<sup>th</sup> graders is divided into six different questionnaire forms that are randomly distributed to participants to ensure six virtually identical random subsamples. (Five questionnaire forms were used between 1975 and 1988.) About one third of each form consists of key, or "core," variables common to all forms. All demographic variables are contained in this core set of measures. Key drug use variables are also in the core, while many of the specific drugs that have been added over time are not in the core set, but are in one or more forms. Many questions

on attitudes, beliefs, and perceptions of relevant features of the social environment are in fewer forms, and data are thus based on fewer cases—a single form would have one fifth of the total number of cases in 1975–1988 and one sixth of the total beginning in 1989. All tables in this report list the sample sizes upon which the statistics are based, stated in terms of the weighted number of cases.

## 2019 Estimates

The project conducted a randomized controlled experiment in 2019, in which a randomly-selected half of schools administered the student surveys with electronic tablets connected to the internet, and the other half with traditional paper-and-pencil questionnaires. Use of two different modes in 2019 raised the possibility that differences in 2019 estimates in comparison to other years may have stemmed in part from survey mode effects. We examined this possibility in detail, and for drug prevalence estimates we found no evidence of mode effects.<sup>5</sup> Consequently, for all 2019 drug prevalence estimates we report results from the pooled sample of paper-and-pencil and electronic tablet responses.

## 2020 Estimates

In-school data collection in 2020 was halted on March 15, 2020 as a result of the COVID-19 pandemic. This halt resulted in a sample size about one-quarter the size of a typical data collection. The 2020 in-school data collection was also unique because it was the first year all students recorded their answers on electronic tablets, which MTF brought to the schools. (The previous year a randomly-selected half of schools used electronic tablets.)

Detailed analyses of the 2020 results indicated that the curtailed MTF 2020 sample did not differ significantly from the nationally representative results from previous years in terms of sociodemographics and prevalence of use of substances that had stable prevalence in recent years.<sup>6</sup>

## 2021 Estimates and Beyond

The year 2021 was the first full school year affected by the COVID-19 pandemic and its associated social distancing policies. Anticipating that many students would be schooling remotely, MTF switched to an on-line questionnaire that students completed on their own electronic devices, either at school or at home (if in remote school).

Because the pandemic came on suddenly and unexpectedly, it was not possible for MTF to conduct a randomized-controlled test of the web-survey mode in comparison to electronic tablets. For two reasons we expect that such a test would have shown little to no differences in drug prevalence across the two modes, given that they are similar and both involve electronic devices connected to the internet. First, a 2019 MTF experiment that tested a much more substantial mode difference found no significant effect on drug prevalence estimates. In the 2019 administration, MTF surveyed a randomly-selected half of the schools using electronic tablets and the other half using paper-and-pencil questionnaires and found no mode differences in drug use prevalence.<sup>6</sup> Second, 2021 trends were similar in analyses that used all participants and in analyses that restricted the

<sup>5</sup> Miech, R. A., Couper, M. P., Heeringa, S. G., & Patrick, M. E. (2020). [The impact of survey mode on US national estimates of adolescent drug prevalence: Results from a randomized controlled study](#). *Addiction*, 116(5), 1144–1151.

<sup>6</sup> Miech, R. A., Leventhal, A., Johnston, L., O'Malley, P. M., Patrick, M. E., & Barrington-Trimis, J. (2021). [Trends in Use and Perceptions of Nicotine Vaping Among US Youth From 2017 to 2020](#). *JAMA pediatrics*, 175(2), 185–190.

analysis pool to the 46% of students who had all their classes in their school building, which suggests that at-home and in-school administrations produced similar results (analyses not shown here). Consequently, in this report we directly compare drug prevalence estimates in 2022 and 2021 with previous years.

However, we cannot rule out possible mode effects for some of the attitude and belief estimates after 2020. Consequently, we do not directly compare these results from 2022 and later years with results from 2020 and beforehand. We note that our cautiousness in comparing to previous years does necessarily mean that the results are not comparable, but only that comparability is not known at this point.

## **RESEARCH DESIGN AND PROCEDURES FOR THE 8<sup>th</sup> AND 10<sup>th</sup> GRADE SURVEYS**

In 1991, MTF was expanded to include nationally representative samples of 8<sup>th</sup> and 10<sup>th</sup> grade students surveyed on an annual basis. Separate samples of schools and students are drawn at each grade level. In general, the procedures used for the annual in-school surveys of 8<sup>th</sup> and 10<sup>th</sup> grade students closely parallel those used for 12<sup>th</sup> graders, including the selection of schools and students, questionnaire administration, and questionnaire format. A major exception is that only two different questionnaire forms were used in 8<sup>th</sup> and 10<sup>th</sup> grade from 1991 to 1996, expanding to four forms beginning in 1997. The same four questionnaire forms are used for both 8<sup>th</sup> and 10<sup>th</sup> graders; most of the content is drawn from the 12<sup>th</sup> grade surveys, including the core section. Thus, key demographic variables and measures of drug use and related attitudes and beliefs are generally identical for all three grades. Many fewer questions about other values and attitudes are included in the 8<sup>th</sup> and 10<sup>th</sup> grade forms, in part because we think that many of them are likely to be more fully formed by 12<sup>th</sup> grade and, therefore, are best monitored there.

In 2023, the project surveyed 6,240 8<sup>th</sup> grade students in 76 schools and 8,494 10<sup>th</sup> grade students in a different 76 schools distributed throughout the contiguous U.S. Each year's data collection took place in both public and private schools, which were selected to provide a representative cross-section of 8<sup>th</sup> graders and 10<sup>th</sup> graders throughout the contiguous U.S. (see [Figure 3-1](#)). A sampling statistician directed the selection of schools to ensure the rigor of the sampling procedures.

### **Anonymity**

Since 1999, all surveys for 8<sup>th</sup> and 10<sup>th</sup> graders have been fully anonymous. In previous years, MTF collected confidential, personal identification information from these respondents, and from 1991 to 1993 this information was used to follow up with 8<sup>th</sup> and 10<sup>th</sup> graders in a manner similar to follow-ups of 12<sup>th</sup> graders (see below).<sup>7</sup> Follow-up of 8<sup>th</sup> and 10<sup>th</sup> graders was discontinued after 1993, precluding the need for further collection of confidential, personal identification information. Considerations supporting a switch to fully anonymous surveys in 8<sup>th</sup> and 10<sup>th</sup> grade included the following: (a) school cooperation might be easier to obtain; and (b) to the extent that collecting contact information had any effect on survey responses such an effect would be removed

<sup>7</sup> A book reporting results from analyses of these younger panels was published in 2008. See Bachman, J. G., O'Malley, P. M., Schulenberg, J. E., Johnston, L. D., Freedman-Doan, P., & Messersmith, E. E. (2008). *The education-drug use connection: How successes and failures in school relate to adolescent smoking, drinking, drug use, and delinquency*. New York: Lawrence Erlbaum Associates/Taylor & Francis.

from the national data, which are widely compared with results of state and local surveys (nearly all of which use anonymous questionnaires), thus making those comparisons more valid.

MTF considered in detail the effects of an anonymous survey as compared to a confidential survey that collected personal identification information. In 1998 the half-sample of 8<sup>th</sup> and 10<sup>th</sup> grade schools beginning their two-year participation in MTF received fully anonymous questionnaires, while the half-sample participating for their second and final year continued to get the confidential questionnaires that had been previously in use by MTF since 1991.

Examination of the 1998 results, based on the two equivalent half-samples at both grades 8 and 10, revealed that there was no effect of anonymous as compared to confidential surveys among 10<sup>th</sup> graders and only a very modest effect, if any, in self-reported substance use rates among 8<sup>th</sup> graders (with prevalence levels slightly higher in the anonymous condition).<sup>8</sup> All tables and figures in this volume combine data from both half-samples of 8<sup>th</sup> graders surveyed in a given year. This is also true for 10<sup>th</sup> graders, for whom we found no methodological effect, and 12<sup>th</sup> graders, for whom we assumed no such effect because none was found for 10<sup>th</sup> graders. (See this chapter's later section entitled "Representativeness and Sample Accuracy" for a further discussion of half-samples among all three grades.)

### **Questionnaire Forms and Sample Proportions**

Beginning in 1997, in order to increase the measurement content in the study of 8<sup>th</sup> and 10<sup>th</sup> graders, the number of forms was expanded from two to four, although they are not distributed in equal numbers. Forms 1, 2, 3, and 4 are assigned to one third, one third, one sixth, and one sixth of the students, respectively. Thus, if a question appears on only one form, it is administered to either one third or one sixth of the sample. A question in two forms may be assigned to one third of the sample (one sixth plus one sixth), one half of the sample (one third plus one sixth), or two thirds of the sample (one third plus one third). A question in three forms may be assigned to two thirds (one third plus one sixth plus one sixth), or five sixths of the sample (one third plus one third plus one sixth). Footnotes to the tables indicate what proportions of all respondents in each grade were asked each question, if that proportion is other than the entire sample. All of the samples, whether based on one or more forms, are random samples and therefore representative of the larger population (the universe) of students at each grade.

## **REPRESENTATIVENESS AND SAMPLE ACCURACY**

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### **School Participation**

Schools are invited to participate in the MTF study for a two-year period. With very few exceptions, each school participating in the first year has agreed to participate in the second year as well. When an original, randomly-drawn school in a geographic area declines to participate in the survey, a substitute school is selected in the same geographic area. In these cases the substitute is selected to be demographically similar to the original selection. This should almost entirely remove problems of bias in region, urbanicity, and the like that might result from schools that

<sup>8</sup> We have examined in detail the effects of administration mode using multivariable controls to assess the effects of the change on 8<sup>th</sup>-grade self-report data. Our findings generally show even less effect than is to be found without such controls. See O'Malley, P. M., Johnston, L. D., Bachman, J. G., & Schulenberg, J. E. (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, 35–54.



decline to participate. [Table 3-2](#) presents yearly information on the percentage of originally-selected and substitute schools. These percentages declined in 2021 and afterwards, when schools were addressing the COVID-19 pandemic and many did not have the bandwidth to participate in a survey such as MTF.

Two questions are sometimes raised about the substitute schools: (a) How do substitutions affect the representativeness of the sample? (b) How does variation over time in the percentage of schools that are substitutes contribute to changes in estimates of drug use?

Among participating schools, there is very little difference in substance use levels between the sample of participating schools that were original selections, taken as a set, and the substitute schools taken as a set. Averaged over the years 2003 through 2015 for grades 8, 10, and 12 combined, the difference between original schools and substitute schools averaged 0.26 percentage points in the observed prevalence averaged across a number of drug use measures: two indices of annual illicit drug use, the annual prevalence of each of the major illicit drug classes, and several measures of alcohol and cigarette use. For half of the measures prevalence was higher in the substitute selections and in the other half it was higher in the original selections; specifically, out of 39 comparisons (13 drugs and drug indexes for each grade), prevalence was higher in 20 of the original selections and in 19 of the substitute selections.

Potential biases could be subtle, however. If, for example, it turned out that principals of schools with “drug problems” refused to participate, the sample could be biased. And if any other single factor were dominant in school refusals, that reason for refusal might also suggest a source of potential bias. However, the reasons principals give for declining to participate tend to be varied and are often a function of happenstance events specific to that particular year, such as a weather-related event that reduced the number of school days or the fact that the school already committed to participate in a number of other surveys that year; only very few schools, if any, object specifically to the drug-related survey content.

If it were the case that substitute schools differed substantially in drug use, then which particular schools participated could have a greater effect on estimates of drug use. However, the great majority of variance in drug use lies within schools, not between schools.<sup>9</sup> For example, from 2003 to 2015 for schools with 8<sup>th</sup>, 10<sup>th</sup>, or 12<sup>th</sup> grade students, about 2% to 8% of the variance in smoking cigarettes or drinking alcohol in the past 30 days was between schools. Among the illicit drugs, marijuana showed the largest amount of between-school variation, averaging between slightly less than 4% up to 5% for annual use, and 3% to 4% for 30-day use. Annual prevalence of cocaine use averaged between less than 1% and 1.5%, while prevalence of annual heroin use averaged less than 0.5%. Further, some, if not most, of the between-schools variance is due to differences related to factors such as region and urbanicity, which remain well controlled in the present sampling design.

It is unlikely that the substitute schools affect drug trends. If they did, then we would expect noticeable bumps up or down across all substance use estimates as the percentage of substitute schools varied over time. But MTF produces results that are very smooth and generally change in

<sup>9</sup> O’Malley, P. M., Johnston, L. D., Bachman, J. G., Schulenberg, J. E., & Kumar, R. (2006). [How substance use differs among American secondary schools](#). *Prevention Science*, 7, 409–420.

an orderly fashion from one year to the next. Moreover, different substances trend in distinctly different ways. We have observed, for example, marijuana use decreasing while cocaine use was stable (in the early 1980s), alcohol use declining while cigarette use held steady (in the mid- to late 1980s), ecstasy use rising sharply while cocaine use showed some decline (late 1990s, early 2000s); and marijuana use remaining steady while alcohol use hit historic lows (since 2011). Moreover, attitudes and perceptions about drugs have changed variously, but generally in ways quite consistent with the changes in actual use. All of these patterns are explainable in terms of psychological, social, and cultural factors; they cannot be explained by a common factor of changes in percentage of substitute schools.

Of course, there could be some sort of constant bias across the years, but even in the unlikely event that there is, it seems highly improbable that it would be of much consequence for policy purposes, given that it would not affect trends and likely would have a very modest effect on levels of prevalence. Thus, we have a high degree of confidence that school refusals have not seriously biased the survey results.

Nevertheless, securing the cooperation of schools has become increasingly difficult. This is a problem common to the field, not specific to MTF. Therefore, beginning with the 2003 survey, we have provided payment to schools as a means of increasing their incentive to participate. (By that time, several other ongoing school-based survey studies already were using payments to schools.)

At each grade level, half of each year's sample comprises schools that started their participation the previous year, and half comprises schools that began participating in the current year. (Both samples are national replicates, meaning that each is drawn to be nationally representative by itself.) This staggered half sample design is used to check on possible fluctuations in the year-to-year trend estimates due to school turnover. For example, separate sets of one-year trend estimates are computed based on students in the half-sample of schools that participated in both 2017 and 2018, then based on the students in the half-sample that participated in both 2016 and 2017, and so on. Thus, each one-year matched half-sample trend estimate derived in this way is based on a constant set of schools. When the trend data derived from the matched half-sample (examined separately for each class of drugs) are compared with trends based on the total sample of schools, the results are usually highly similar, indicating that the trend estimates are affected little by school turnover or school substitutions. Of course, levels of absolute prevalence are not as precisely estimated when the sample is only half the usual size.

### **Student Participation**

In 2023, completed questionnaires were obtained from 80% of all sampled students in 8<sup>th</sup> grade, 85% in 10<sup>th</sup> grade, and 72% in 12<sup>th</sup> grade (see [Table 3-1](#) for response rates in all years). Because students with fairly high rates of absenteeism also report above-average rates of drug use, some degree of bias is introduced into the prevalence estimates by missing the absentees. Much of that bias could be corrected through the use of special weighting based on the self-reported absentee rates of the students who did respond; however, we decided not to use such a weighting procedure because the bias in overall drug use estimates is quite small, whereas the necessary weighting procedures would have introduced greater sampling variance in the estimates. [Appendix A](#) in this report illustrates the changes in trend and prevalence estimates that would result if corrections for absentees had been included.



## Sampling Accuracy of the Estimates

Confidence intervals (95%) are provided in [Tables 4-1a through 4-1d](#) for lifetime, annual, 30-day, and daily prevalence of use for 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grade students. For example, lifetime prevalence of marijuana use for 12<sup>th</sup> graders could theoretically vary by up to  $\pm 2.8$  percentage points. The interpretation of this 95% confidence interval is that if we took a large number of samples of this size from the universe of all schools containing 12<sup>th</sup> graders in the contiguous U.S., 95 times out of 100 the sample would yield a result that would be less than 2.8 percentage points divergent from the result we would get from a comparable massive survey of *all* ~4.4 million 12<sup>th</sup> graders in *all* schools. Confidence intervals for the other prevalence periods (last 12 months, last 30 days, and current daily use) are generally smaller than those for lifetime use. In general, confidence intervals for 8<sup>th</sup> and 10<sup>th</sup> graders are very similar to those observed for 12<sup>th</sup> graders. Some drugs that are measured on only one or two questionnaire forms will have larger confidence intervals because they are based on smaller sample sizes.

In 2020, as a result of the smaller sample size, these confidence intervals were wider than they have been in previous years, when confidence intervals averaged  $\pm 1.4\%$  for lifetime prevalence across a wide variety of drug classes. Because of these larger confidence intervals in 2020, the minimum change in prevalence from 2019 to 2020 that was detectable as statistically significant was larger in 2020 than it was in earlier years.

In 2021 and subsequent years sample sizes, and consequently confidence intervals, were relatively closer to their typical size.

The Appendix C of Volume I published in 2017 and earlier years reported information on how to calculate confidence intervals for point estimates and how to calculate statistics that test the significance of changes over time or of differences between subgroups. This appendix is no longer necessary with the opening of MTF's remote portal at the [National Addiction and HIV Data Archive Program](#), which now allows researchers to compute such statistics directly using MTF weights and clustering variables. Interested readers may refer to earlier publications of this monograph for the information it provides about design effects and how their computational influence varies by substance (e.g., see Appendix C [here](#)).

## **VALIDITY OF MEASURES OF SELF-REPORTED DRUG USE**

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Are sensitive behaviors such as drug use honestly reported? Like most studies dealing with sensitive behaviors, we have no direct, totally objective validation of the present measures; however, the considerable amount of existing inferential evidence strongly suggests that the MTF self-report questions produce largely valid data. Here we briefly summarize this evidence.<sup>10</sup>

<sup>10</sup> A more complete discussion may be found in: 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 No. 57 (ADM) 85 1402). Washington, DC: U.S. Government Printing Office; Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (1984). *Drugs and American high school students: 1975-1983* (DHHS (ADM) 85 1374). Washington, DC: U.S. Government Printing Office; Wallace, J. M., Jr., & Bachman, J. G. (1993). *Validity of self-reports in student-based studies on minority populations: Issues and concerns*. In M. de LaRosa (Ed.), *Drug abuse among minority youth: Advances in research and methodology* (NIDA Research Monograph No. 130). Rockville, MD: National Institute on Drug Abuse.

First, using a three-wave panel design, we established that the various measures of self-reported drug use have a high degree of reliability—a necessary condition for validity.<sup>11</sup> In essence, respondents were highly consistent in their self-reported behaviors from model ages 18 to 22. Second, we found a high degree of consistency among logically related measures of use within the same questionnaire administration. Third, the proportion of 12<sup>th</sup> graders reporting some illicit drug use has reached two thirds of all respondents in peak years and over 80% in some follow-up years, constituting *prima facie* evidence that the degree of underreporting must be very limited. Fourth, 12<sup>th</sup> graders' reports of use by their unnamed friends—about whom they would presumably have considerably less reason to conceal information about use—have been highly consistent with self-reported use in the aggregate, both in terms of prevalence and trends in prevalence, as discussed in Chapter 9. Fifth, we have found self-reported drug use to relate in consistent and expected ways based on theory to a number of other attitudes, behaviors, beliefs, and social situations—strong evidence of “construct validity.” Sixth, the missing data levels for the self-reported use questions are only very slightly higher than for the preceding non-sensitive questions, in spite of explicit instructions to respondents immediately preceding the drug section to leave blank those questions they feel they cannot answer honestly. Seventh, an examination of consistency in reporting of lifetime use conducted on the long-term panels of graduating seniors found quite low levels of recanting of earlier reported use of the illegal drugs.<sup>12</sup> There was a higher level of recanting for the psychotherapeutic drugs, suggesting that adolescents may actually overestimate their use of some drugs because of misinformation about definitions, but that this knowledge improves as they get older. Finally, the great majority of respondents, when asked, say they would answer such questions honestly if they are or were users.<sup>13</sup>

As an additional step to assure the validity of the data, we check for logical inconsistencies in the answers to the triplet of questions about use of each drug (i.e., lifetime, annual, and 30-day use), and if a respondent exceeds a maximum number of inconsistencies across the set of drug use questions, his or her record is deleted from the data set. Similarly, we check for improbably high rates of use of multiple drugs and delete such cases, assuming that the respondents are not taking the task seriously. Fortunately, very few cases (< 3%) have to be eliminated for these reasons.

This is not to argue that self-reported measures of drug use are necessarily valid in all studies. In MTF we have gone to great lengths to create a situation and set of procedures in which respondents recognize that their confidentiality will be protected. We have also tried to present a convincing case as to why such research is needed. The evidence suggests that a high level of validity has been obtained. Nevertheless, insofar as any remaining reporting bias exists, we believe it to be in the direction of underreporting. Thus, with the possible exception of the psychotherapeutic drugs, we believe our estimates to be lower than their true values, even for the obtained samples, but not substantially so.

<sup>11</sup> O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (1983). [Reliability and consistency in self-reports of drug use](#). *International Journal of the Addictions*, 18, 805–824.

<sup>12</sup> Johnston, L. D. & O'Malley, P. M. (1997). [The recanting of earlier reported drug use by young adults](#). In L. Harrison (Ed.), *The validity of self-reported drug use: Improving the accuracy of survey estimates* (NIDA Research Monograph No. 167, pp. 59–80). Rockville, MD: National Institute on Drug Abuse.

<sup>13</sup> For a discussion of reliability and validity of student self-report measures of drug use like those used in MTF across varied cultural settings, see Johnston, L. D., Driessen, F. M. H. M., & Kokkevi, A. (1994). [Surveying student drug misuse: A six-country pilot study](#). Strasbourg, France: Council of Europe.

## **Consistency and Measurement of Trends**

MTF is designed to be sensitive to changes from one time period to another. A great strength of this study is that the measures and procedures have been standardized and applied consistently across many years. To the extent that any biases remain because of limits in school and/or student participation, and to the extent that there are systematic distortions (lack of validity) in the responses of some students, it seems very likely that such problems will exist in much the same proportions from one year to the next. In other words, biases in the survey estimates will tend to be consistent from one year to another, meaning that they should have very little effect on our measurement of trends. The smooth and consistent nature of most trend curves reported for the various drugs provides rather compelling empirical support for this assertion.

**TABLE 3-1**  
**Sample Sizes and Response Rates**

Grade:	Number of Public Schools			Number of Private Schools			Total Number of Schools				Total Number of Students				Student Response Rate (%)		
	8th	10th	12th	8th	10th	12th	8th	10th	12th	Total	8th	10th	12th	Total	8th	10th	12th
1975	—	—	111	—	—	14	—	—	125	—	—	—	15,791	—	—	—	78
1976	—	—	108	—	—	15	—	—	123	—	—	—	16,678	—	—	—	77
1977	—	—	108	—	—	16	—	—	124	—	—	—	18,436	—	—	—	79
1978	—	—	111	—	—	20	—	—	131	—	—	—	18,924	—	—	—	83
1979	—	—	111	—	—	20	—	—	131	—	—	—	16,662	—	—	—	82
1980	—	—	107	—	—	20	—	—	127	—	—	—	16,524	—	—	—	82
1981	—	—	109	—	—	19	—	—	128	—	—	—	18,267	—	—	—	81
1982	—	—	116	—	—	21	—	—	137	—	—	—	18,348	—	—	—	83
1983	—	—	112	—	—	22	—	—	134	—	—	—	16,947	—	—	—	84
1984	—	—	117	—	—	17	—	—	134	—	—	—	16,499	—	—	—	83
1985	—	—	115	—	—	17	—	—	132	—	—	—	16,502	—	—	—	84
1986	—	—	113	—	—	16	—	—	129	—	—	—	15,713	—	—	—	83
1987	—	—	117	—	—	18	—	—	135	—	—	—	16,843	—	—	—	84
1988	—	—	113	—	—	19	—	—	132	—	—	—	16,795	—	—	—	83
1989	—	—	111	—	—	22	—	—	133	—	—	—	17,142	—	—	—	86
1990	—	—	114	—	—	23	—	—	137	—	—	—	15,676	—	—	—	86
1991	131	107	117	31	14	19	162	121	136	419	17,844	14,996	15,483	48,323	90	87	83
1992	133	106	120	26	19	18	159	125	138	422	19,015	14,997	16,251	50,263	90	88	84
1993	126	111	121	30	17	18	156	128	139	423	18,820	15,516	16,763	51,099	90	86	84
1994	116	116	119	34	14	20	150	130	139	419	17,708	16,080	15,929	49,717	89	88	84
1995	118	117	120	34	22	24	152	139	144	435	17,929	17,285	15,876	51,090	89	87	84
1996	122	113	118	30	20	21	152	133	139	424	18,368	15,873	14,824	49,065	91	87	83
1997	125	113	125	27	18	21	152	131	146	429	19,066	15,778	15,963	50,807	89	86	83
1998	122	110	124	27	19	20	149	129	144	422	18,667	15,419	15,780	49,866	88	87	82
1999	120	117	124	30	23	19	150	140	143	433	17,287	13,885	14,056	45,228	87	85	83
2000	125	121	116	31	24	18	156	145	134	435	17,311	14,576	13,286	45,173	89	86	83
2001	125	117	117	28	20	17	153	137	134	424	16,756	14,286	13,304	44,346	90	88	82
2002	115	113	102	26	20	18	141	133	120	394	15,489	14,683	13,544	43,716	91	85	83
2003	117	109	103	24	20	19	141	129	122	392	17,023	16,244	15,200	48,467	89	88	83
2004	120	111	109	27	20	19	147	131	128	406	17,413	16,839	15,222	49,474	89	88	82
2005	119	107	108	27	20	21	146	127	129	402	17,258	16,711	15,378	49,347	90	88	82
2006	122	105	116	29	18	20	151	123	136	410	17,026	16,620	14,814	48,460	91	88	83
2007	119	103	111	32	17	21	151	120	132	403	16,495	16,398	15,132	48,025	91	88	81
2008	116	103	103	28	19	17	144	122	120	386	16,253	15,518	14,577	46,348	90	88	79
2009	119	102	106	26	17	19	145	119	125	389	15,509	16,320	14,268	46,097	88	89	82
2010	120	105	104	27	18	22	147	123	126	396	15,769	15,586	15,127	46,482	88	87	85
2011	117	105	110	28	21	19	145	126	129	400	16,496	15,382	14,855	46,733	91	86	83
2012	115	107	107	27	19	20	142	126	127	395	15,678	15,428	14,343	45,449	91	87	83
2013	116	103	106	27	17	20	143	120	126	389	15,233	13,262	13,180	41,675	90	88	82
2014	111	98	105	30	16	17	141	114	122	377	15,195	13,341	13,015	41,551	90	88	82

(Table continued on next page.)

**TABLE 3-1 (cont.)**  
**Sample Sizes and Response Rates**

Grade:	Number of <u>Public Schools</u>			Number of <u>Private Schools</u>			<u>Total Number of Schools</u>				<u>Total Number of Students</u>				<u>Student Response Rate (%)</u>		
	8th	10th	12th	8th	10th	12th	8th	10th	12th	Total	8th	10th	12th	Total	8th	10th	12th
2015	111	102	101	30	18	20	141	120	121	382	15,015	16,147	13,730	44,892	89	87	83
2016	117	92	100	25	18	20	142	110	120	372	17,643	15,230	12,600	45,473	90	88	80
2017	109	89	105	22	17	18	131	106	123	360	16,010	14,171	13,522	43,703	87	85	79
2018	110	106	106	28	21	23	138	127	129	394	14,836	15,144	14,502	44,482	89	86	81
2019	114	104	108	29	22	20	143	126	128	397	14,223	14,595	13,713	42,531	89	86	80
2020	30	36	29	8	2	7	38	38	36	112	3,161	4,890	3,770	11,821	88	89	79
2021	91	84	82	30	16	16	121	100	98	319	11,446	11,792	9,022	32,260	82	78	69
2022	81	82	80	23	20	22	104	102	102	308	9,889	11,950	9,599	31,438	86	84	75
2023	59	61	65	17	15	18	76	76	83	235	6,240	8,494	7,584	22,318	80	85	72

Source. The Monitoring the Future study, the University of Michigan.

**TABLE 3-2**  
**Percentage Original and Replacement School Selections, by Year <sup>a</sup>**

Percent of slots filled by...		'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
Original		59	63	62	63	71	71	66	72	67	66	72	71	68	70	59	55	60	53	52	53	51	51	57	62
Replacements		39	36	35	32	25	26	32	26	29	33	26	26	30	29	39	43	39	44	44	43	47	48	42	35
Total		98	99	97	95	96	97	99	98	96	99	99	98	99	99	98	98	99	97	96	96	98	99	99	97

Percent of slots filled by...		'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
Original		56	49	53	62	63	59	58	53	54	58	56	53	54	58	56	53	54	51	44	44	41	40	41	13
Replacements		42	48	45	37	34	40	39	43	44	39	40	43	44	39	40	43	41	41	49	47	49	50	50	13
Total		98	97	98	99	97	99	97	96	98	97	96	96	98	97	96	96	95	92	93	91	90	90	91	26

Percent of slots filled by...		'21	'22	'23
Original		27	22	16
Replacements		52	50	34
Total		79	72	50

Source: The Monitoring the Future study, the University of Michigan.

<sup>a</sup>In 2020 data collection was halted prematurely as a result of the COVID-19 pandemic.

**FIGURE 3-1**  
**Schools included in 1 Year's Data Collection**  
**8th, 10th, and 12th Grades**



*Source.* The Monitoring the Future study, University of Michigan  
*Note.* One dot equals one school.

Chapter 4:  
Data is forthcoming May 31, 2024



## Chapter 5

### TRENDS IN DRUG USE

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The measurement of historical and developmental change over the past four and a half decades has been among the most important contributions of Monitoring the Future to the fields of substance use research, policy, and prevention. This includes measurements of change in the levels of drug use, in the types of drugs being used, in the methods of using them, in the ages and characteristics of people using them, in related attitudes and beliefs about drug use, and in conditions surrounding use. Such information has significant implications for public policy—for needs assessment, agenda setting, policy formulation, and policy evaluation. More generally, it has implications for the current and future health of the nation. In this chapter, we review the many changes that have taken place over the past 49 years in the use of drugs, both licit and illicit, and we distinguish trends for various sectors of the population.

Historical trend data are presented and discussed in this chapter for students in 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grades. Data for 12<sup>th</sup> graders come from 49 nationally-representative surveys conducted between 1975 and 2023, while data for the 8<sup>th</sup> and 10<sup>th</sup> graders come from 33 nationally-representative surveys conducted between 1991 and 2023. For a variety of substances, the use measures discussed include lifetime use, use during the past 12 months, use during the past 30 days, use on 20 or more occasions during the past 30 days (which we refer to as daily to near-daily use), and daily use.

#### THE COVID-19 PANDEMIC AND ADOLESCENT DRUG USE

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The survey results divide neatly into the time periods before and after the onset of the pandemic. All surveys in 2020 were completed before March 15, when national social distancing policies were enacted and data collection was halted due to pandemic concerns. Consequently, results from 2020 and previous years are pre-pandemic, while results from 2021 and afterwards took place after the onset of the pandemic and the associated national response.

The COVID-19 pandemic is a historical event of particular interest for the 2023 results. From 2020 to 2021 MTF documented some of the largest one-year declines ever recorded by the survey across a wide variety of drugs from. It is possible that these decreases will hold for future years going forward, or, instead, drug prevalence levels may bounce back to where they were before the pandemic, as recorded by MTF with the 2020 results.

#### TWO THEMES IN DRUG TRENDS FROM 1975–2023

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Two general themes are apparent in trends over nearly a half century in use of a majority of drugs, and we elaborate on these themes in what follows. The first theme is what we term the “1990s drug relapse,” which was a rapid increase in prevalence for many drugs that started in the early 1990s. Previous to this period, prevalence levels of many drugs had reached a historical low after years of decline. The prevalence levels for many drugs today lie between the nadirs observed at the start of the 1990s and the peak of 1990s drug relapse. Drugs that do not follow this overall pattern, such as some forms of alcohol use and tobacco use, are important exceptions that we note and discuss below.

The second theme is cohort effects. We use the term cohort here to refer to youth born at roughly the same time who are grouped by grade level and experience history together as they age. A cohort effect is a drug trend that follows a cohort as it grows older. For example, if an upsurge in cigarette smoking occurs in a cohort that is in 8<sup>th</sup> grade, it is likely to be observed two years later when that cohort is in 10<sup>th</sup> grade and then again two years later when that cohort is in 12<sup>th</sup> grade.

A cohort-specific pattern of drug use can stem from factors such as cohort-specific attitudes towards perceived risk of drug use, changing peer norms about the acceptability of drug use, changes in legal status of a drug, and the addictiveness of the drugs that youth use. We have found that cohort effects are often present, and trends among the lower grades can foretell future changes in the higher grades. This has been the case especially during the onset of the drug relapse in the early 1990s.

## **TRENDS IN PREVALENCE OF USE, 1975–2023**

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### **Trends in Indices of Overall Illicit Drug Use**

#### **Abstainers**

Abstainers are defined as students with no use of alcohol, marijuana, or nicotine (either by cigarettes or by vaping). In 2023 levels of lifetime abstinence significantly increased in 10<sup>th</sup> and 12<sup>th</sup> grade. The 2023 levels are at or near the highest recorded since the survey first started tracking this measure in 2017.

Increases in lifetime abstinence were driven by decreases in nicotine vaping and alcohol use. Levels of lifetime cannabis use changed little from 2022 to 2023.

Past 30-day abstinence also trended upwards in all three grades, with a significant increase in 12<sup>th</sup> grade to the highest level recorded by the project.

#### **Any Illicit Drug**

Any illicit drug use is a measure of the percentage of youth who have engaged in use of at least one type of illicit drug. In 2023 the percentages of youth who had ever used any illicit drugs had not returned to 2020 (pre-pandemic) levels and remained near the decreased levels observed during the pandemic in 2021 for lifetime, past 12-month, and past 30-day use.

There have been gradual albeit inconsistent declines for all grades since the peaks in the mid to late 1990s drug use relapse, beginning in 1996 for 8<sup>th</sup> graders, 1997 for 10<sup>th</sup> graders, and 1999 for 12<sup>th</sup> graders. These declines also ended in a staggered fashion in 2007, 2008, and 2009, respectively. The declines were followed by increases between 2007 and 2010 among 8<sup>th</sup> graders, between 2008 and 2011 among 10<sup>th</sup> graders, and between 2009 and 2011 for 12<sup>th</sup> graders. This overall pattern suggests some cohort effects were in play. In 2013 the trend lines shifted up slightly as new examples of drugs in the amphetamine class were added to the questionnaires.

This pattern of younger teens being the first to exhibit many of the turnarounds in use suggests that they may be particularly sensitive to new social forces. Because they are considerably less

likely to have established usage patterns or related attitudes, their behavior and attitudes may simply be more malleable. They then carry those changes in their behaviors and attitudes into later grades as they age; in this volume we discuss a number of such cohort effects.

Prior to the 1990s, a period when Monitoring the Future surveys were limited to 12<sup>th</sup> grade students, their prevalence of lifetime use of any illicit drug peaked at 66% in 1981, the highest level ever recorded by the survey. In other words fully two-thirds of these 12<sup>th</sup> grade students had used one or more illicit drugs. From that year on, lifetime use declined steadily to a prevalence of 41% by 1992, which until this year was the lowest level recorded by the survey (in 2023 lifetime prevalence was 40%).

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

Use of any illicit drug in 12<sup>th</sup> grade is defined as any use of cannabis (which remains illegal at the federal level), LSD, other hallucinogens, crack, cocaine other than crack, or heroin; or any use of narcotics other than heroin, amphetamines, sedatives (barbiturates), or tranquilizers not under a doctor's orders. In 8<sup>th</sup> and 10<sup>th</sup> grade the use of narcotics other than heroin and sedatives (barbiturates) has been excluded because these younger respondents appear to overreport use (perhaps because they include the use of nonprescription drugs in their answers).

#### *Any Illicit Drug Including Inhalants*

When inhalants are included in the index of illicit drug use, the percentages categorized as having ever used an illicit drug rise, especially for 8<sup>th</sup> graders.

As with the findings for any illicit drug use, in 2023 the percentages of youth who had ever used any illicit drugs including inhalants had not returned to their 2020 levels and remained near the decreased levels observed during the pandemic in 2021. Lifetime prevalence levels in 2023 were 22% for 8<sup>th</sup> graders, 29% for 10<sup>th</sup> graders, and 42% for 12<sup>th</sup> graders.

Past 12-month use changed little in 2023 and remained below 2020 levels. Past 30-day use followed the same pattern.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

Use of any illicit drug including inhalants in 12<sup>th</sup> grade is defined as any use of inhalants, cannabis (which remains illegal at the federal level), LSD, other hallucinogens, crack, cocaine other than crack, or heroin; or any use of narcotics other than heroin, amphetamines, sedatives (barbiturates), or tranquilizers not under a doctor's orders. In 8<sup>th</sup> and 10<sup>th</sup> grade the use of narcotics other than heroin and sedatives (barbiturates) has been excluded because these younger respondents appear to overreport use (perhaps because they include the use of nonprescription drugs in their answers).

### *Any Illicit Drug Other Than Marijuana*

In 2023 the percentage of youth who had used any illicit drug other than marijuana in their lifetime had not returned to 2020 levels and remained near the decreased levels observed during the pandemic in 2021. Lifetime prevalence levels in 2023 were 8% for 8<sup>th</sup> graders, 9% for 10<sup>th</sup> graders, and 12% for 12<sup>th</sup> graders.

Past 12-month use and past 30-day use followed the same pattern as lifetime use, with prevalence levels in all grades much closer to 2021 than 2020 levels.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

The proportion of students using illicit drugs other than marijuana has declined by more than half since 1981, when past 12-month levels stood at 10%, 18%, and 21% in 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grade, respectively.

In the 1970s most of the sudden rise in 12<sup>th</sup> graders' reported use resulted from the increasing popularity of cocaine between 1976 and 1979 and, then, to the increasing use of amphetamines between 1979 and 1981. Then from 1982 through 1992 there was a substantial decline in the use of any illicit drug other than marijuana among 12<sup>th</sup> graders.

Use of any illicit drug other than marijuana in 12<sup>th</sup> grade is defined as any use of LSD, other hallucinogens, crack, cocaine other than crack, or heroin; or any use of narcotics other than heroin, amphetamines, sedatives (barbiturates), or tranquilizers not under a doctor's orders. In 8<sup>th</sup> and 10<sup>th</sup> grade the use of narcotics other than heroin and sedatives (barbiturates) has been excluded because these younger respondents appear to overreport use (perhaps because they include the use of nonprescription drugs in their answers).

### *Any Prescription Drug*

The percentage of 12<sup>th</sup> grade students who used any prescription drug without a doctor's orders had not returned to pre-pandemic levels by 2023. Lifetime, past 12-month, and past 30-day use all dropped precipitously from 2020 (before the pandemic) to 2021 (during the pandemic), and have since remained at the new, lower levels. In 2023 lifetime prevalence was 9%, compared to 14% in 2020. Past 12-month use was 4% in 2023, compared to 8% in 2020. Past 30-day use was 2% in 2023, compared to 3% in 2020.

Overall, use of any prescription drug without a doctor's direction has declined markedly since first tracked by the survey in 2005. Prevalence is three to four times lower in 2023 as compared to 2005 for lifetime, past 12-month, and past 30-day use.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

The use of any prescription drug nonmedically defined as any use of amphetamines, sedatives (barbiturates), narcotics other than heroin, or tranquilizers "without a doctor telling you to use them."

### *Any Nicotine Use*

Any nicotine use in the past 30 days dropped markedly in 12<sup>th</sup> and 10<sup>th</sup> grades in 2023, and held steady in 8<sup>th</sup> grade. Today most youth use nicotine by vaping it, and the 2023 decline in any nicotine use is driven in large part by the decline in nicotine vaping. This decline, in turn, is in large part a delayed effect of the pandemic (see commentary on nicotine vaping for more detail).

Any nicotine use was indicated by any use of any of the following: cigarettes, large cigars, flavored small cigars, regular small cigars, tobacco using a hookah, smokeless tobacco, or vaping nicotine.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Any Nicotine Use Other Than Vaping*

Past 30-day prevalence levels of any nicotine use other than vaping had not returned to their 2020 levels by 2023. In 12<sup>th</sup> grade prevalence decreased significantly to 6%, which is the lowest level recorded by the survey since first tracked in 2017. In 10<sup>th</sup> grade prevalence also decreased, although not significantly, and the 4% level is also the lowest tracked by the survey since first tracked in this grade in 2019. In 8<sup>th</sup> grade past 30-day prevalence was unchanged at 3%, where it has been the past three years.

Overall this outcome has declined markedly since first tracked by the survey. The decrease is quite dramatic in 12<sup>th</sup> grade, falling more than threefold from 21% in 2017 to 6% in 2023; it fell by roughly half in 10<sup>th</sup> and 8<sup>th</sup> grade in the four-year interval from 2019 to 2023.

Any nicotine use other than vaping was indicated by any use of any of the following: cigarettes, large cigars, flavored small cigars, regular small cigars, tobacco using a hookah, or smokeless tobacco.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

## **Trends in Use of Specific Drugs**

### *Marijuana (Cannabis)*

The percentage of youth who have used marijuana had not returned to pre-pandemic, 2020 levels by 2023. Lifetime, past 12-month, and past 30-day use all dropped precipitously from 2020 (before the pandemic) to 2021 (during the pandemic), and have since remained at the new, lower levels. The 2023 levels still remain substantial, with the percentage of youth using marijuana in the last year at 29% in 12<sup>th</sup> grade, 18% in 10<sup>th</sup> grade, and 8% in 8<sup>th</sup> grade.

The lower prevalence levels in 2021 and afterwards mark the first substantial change in marijuana prevalence in more than a decade; previous to 2021 marijuana levels had hovered without any systematic trending for about a decade.

Levels of annual marijuana use today are considerably lower than the historic highs observed in the late 1970s, when more than half of 12<sup>th</sup> graders had used marijuana in the past 12 months. This high point marked the pinnacle of a rise in marijuana use from relatively negligible levels before the 1960s.

Daily marijuana use, defined as use on 20 or more occasions in the past 30 days, increased slightly, but not significantly, in 2023. In all grades 2023 levels remained below those in 2020, when all surveys were collected before the start of the national social distancing policies on March 15, 2020 in response to the COVID-19 pandemic.

The prevalence of using marijuana daily for a month or more during one's lifetime is reported for 12<sup>th</sup> graders only. That prevalence was at 21% when first measured in 1982, declined sharply to just 8% by 1992, and rose back to 19% by 1997, followed by a long gradual decline to 12% by 2018, before leveling. It stood at 12% in 2023.

In 2020 prevalence levels are not reported for daily marijuana use for a month because of low sample size that resulted from curtailed data collection due to the pandemic.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Medical Marijuana (Cannabis)*

Since 2017 the survey has included the question “Have you ever used ‘medical marijuana;’ that is, marijuana you used because a doctor told you to use it?” Prevalence has hovered between 1% and 4% in all years in all grades.

### *Delta-8*

Questions on delta-8 were added to the survey in 2023. Delta-8 is a substance derived from hemp. It contains THC-8, which is a chemical similar to the active ingredient THC-9 found in cannabis and reportedly produces a high that some have called “marijuana light.” Regulation of delta-8 is currently under development; because it is derived from hemp, its use and sale is not covered by state, local, and federal laws that regulate cannabis.

In 2023 we included a ‘tripwire’ question that asks just about past 12-month use. If the tripwire shows substantial prevalence, then it motivates the addition of more questions on the substance in future years.

Prevalence was 11.4% among 12<sup>th</sup> grade students for past 12-month use. This prevalence level is considerable for a substance that has only recently come to market. For 2024 we have added more detailed questions on its use, as well as questions on where adolescents obtain it.

### *Inhalants*

Prevalence of inhalant use in the last 12 months changed little in each of the three grades in 2023.

Inhalants are unusual because their prevalence is consistently higher in the lower grades, a pattern not observed for any other drug. The use of inhalants at an early age may reflect the fact that many inhalants are cheap, readily available (often in the home), and legal to buy and possess. The decline in use with age likely reflects their coming to be seen as “kids’ drugs,” in addition to the fact that a number of other, more desirable drugs become more accessible to older adolescents, who also are more able to afford them.

The increase in prevalence of inhalants in all three grades at the start of the 1990s was a continuation of a trend that was observable far earlier among 12<sup>th</sup> grade students, when only they were being surveyed. The same was likely true among 8<sup>th</sup> and 10<sup>th</sup> graders, although our data on them cover only 1991 forward. The anti-inhalant campaign launched by the Partnership for a Drug-Free America in 1995 (partly in response to MTF results showing increasing use) may have played an important role in reversing this long-term trend. Increases in use that began around 2018 proved fleeting, and decreases in prevalence in 2020 and 2021 have returned levels to near record lows.

Prior to 2000, trends in inhalants were confounded by the use of amyl and butyl nitrites, and past MTF reports presented an additional 12<sup>th</sup> grade inhalant trend for measures without nitrites (e.g., see the [2014 MTF report](#) for a detailed description). Since that time youth’s use of nitrites has fallen to very low levels and is no longer tracked by Monitoring the Future.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### [Hallucinogens](#)

The percentage of 12<sup>th</sup> grade students using hallucinogens in the past 12 months has varied little between a narrow window of 4% and 5% over the past decade and in 2023 was 4%. In 10<sup>th</sup> grade a drop in use during the pandemic in 2021 has persisted and the prevalence of past 12-month use in 2023 was 2%. In 8<sup>th</sup> grade declines in use have plateaued since around 2014, in part because prevalence has hovered at 1% since that time and has little room to fall further.

Hallucinogen use followed the typical pattern of an increase during the 1990s relapse, followed by a gradual but inconsistent decline in the following years. Annual hallucinogen use peaked in 1996, which is a few years earlier than the peak for most other drugs. Current levels of annual hallucinogen use are less than half their peak in the 1990s. The two components of the hallucinogens class, LSD and hallucinogens other than LSD, generally followed the same pattern until a sharp decline in LSD use emerged after 1999.

Lifetime prevalence of hallucinogen use among 12<sup>th</sup> graders has never exceeded 15.2%—a level attained in 1976 and then again 21 years later in 1997.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.



### [LSD](#)

LSD prevalence had not returned to 2020 levels by 2023, for either lifetime, past 12-month use, or past 30-day use. In 2023 lifetime and past 12-month prevalence stayed steady or trended down, bringing levels to record or near-record lows. In 12<sup>th</sup> grade prevalence significantly declined for lifetime, past 12-month, and past 30-day use.

LSD was one of the first drugs to decline at the start of the 1980s, almost surely due to increased information about its potential dangers. The subsequent increase in its use during the mid-1990s may reflect the effects of “generational forgetting”—that is, replacement cohorts knowing less than their predecessors about the potential dangers of LSD because they have had less exposure to the negative consequences of using the drug.

We believe that the decline in use prior to 2002 might have resulted in part from a displacement of LSD by sharply rising use of MDMA (ecstasy and more recently Molly). After 2001, when MDMA use itself began to decline, the sharp further decline in LSD use likely resulted from a sudden drop in the availability of LSD (discussed in [Chapter 9](#)), because attitudes generally have not moved in a way that could explain the fall in use, while perceived availability has.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### [Hallucinogens Other Than LSD](#)

Hallucinogens other than LSD include psilocybin, or “shrooms,” which comprise a major component of this category.

In 12<sup>th</sup> grade hallucinogen use shows an unusual pattern of steady increases in prevalence since the pandemic onset. Levels of use steadily increased from 3% in 2019 to 6% in 2023.

In 8<sup>th</sup> and 10<sup>th</sup> grade prevalence shows the more common pattern of declines during the pandemic in 2021 for lifetime, past 12-month, and past 30-day use. Since then levels of use have returned close to the pre-pandemic levels.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### [PCP](#)

The prevalence of past-year PCP use is reported only for 12<sup>th</sup> grade students, and in 2023 it was 0.5%. Prevalence has not risen above 2% for the past 20 years.

PCP was first included in the survey in 1979, and its prevalence dropped rapidly thereafter, suggesting that it achieved a deserved reputation as a dangerous drug very quickly. Its use increased during the 1990s drug relapse, but its annual prevalence increased to a high of only 2.6%. Since 2002, its use has remained low.



To free up space for questions on other drugs, the survey stopped tracking lifetime and past 30-day use of this low-prevalence drug in 2014. These measures will be re-introduced into the survey if past 12-month use increases in the future.

### *Ecstasy (MDMA)*

The percentage of youth who used MDMA (street names “Molly” and “ecstasy”) did not return to 2020 levels in 2023. Prevalence levels in 2023 were at or near the lowest ever recorded by the survey for lifetime, past 12-month, and past 30-day use. In 12<sup>th</sup> grade significant declines in prevalence took place for lifetime, past 12-month, and past 30-day use. All levels for all grades and reporting intervals were at 2% or less.

The historical trend for MDMA follows a pattern somewhat different from most of the other drugs in that an increase did not occur until the late 1990s, and it peaked later than many drugs—in 2001. Obviously there were some special forces at work on the use of this drug, including its popularity at raves followed by public concern about the dangers of its use. Since that time its prevalence has gradually declined, although a short-lived upsurge took place in all grades around 2009–2010.

In 2014 some questionnaire forms in the survey included “Molly” as an example of MDMA, along with ecstasy, and the inclusion of this example appeared to make relatively little difference in the overall prevalence of MDMA. In 2015 the remaining forms were changed to also include “Molly” as an example in the questions about MDMA.

Trends in MDMA use are unique because the upswing in use in 1999 occurred first in the older grades. The 8<sup>th</sup> graders did not show this resurgence until a year later, in 2000. A different dynamic seemed to be at work for MDMA than for most other drugs during this historical period, because it appears that the increase in use rippled down the age scale rather than the reverse; this may be because raves (which older teens would be more likely to attend) played an important role in its dispersion.

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### *Cocaine*

The percentage of youth who had used cocaine had not returned to 2020 levels by 2023 for 12<sup>th</sup> grade students. Prevalence significantly declined for lifetime, past 12-month, and past 30-day use in 12<sup>th</sup> grade, continuing a downward trend after a nearly 50% drop from 2020 to 2021. In both 10<sup>th</sup> grade and 8<sup>th</sup> grade lifetime prevalence was 1.0%, which compares to a 1.6% prevalence level for both grades in 2020. At such low levels there is little room for prevalence to fall further in future years.

Both past 12-month and past 30-day cocaine use are less than 1% in all grades.

Cocaine grew in popularity among 12<sup>th</sup> graders in the late 1970s, then plateaued at a high level of around 12% annual prevalence in the first half of the 1980s, when most drugs were falling, before plunging by about three quarters by 1991. This drug then followed the common pattern

of an increase in use during the 1990s relapse before showing a period of decline since 2006. The increase had leveled out about three years earlier for 8<sup>th</sup> graders (in 1996) than for 12<sup>th</sup> graders (in 1999), evidence of a cohort effect.

The reduction of adolescent cocaine use to today's low levels is a success story given its considerable popularity in the 1980s, when past-year prevalence among 12<sup>th</sup> graders reached 13% (in 1985). Reasons for this steep decline in cocaine use—in particular the role of perceived risk—are discussed in Chapter 8 in [this MTF report](#).

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### **Crack**

In 2023 past-year use of crack cocaine was at or near historic lows. Annual use levels among 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grade students were all 0.5% or less. Like cocaine, crack use dropped sharply from 1986—when its use was first measured—through 1991. Consistent with other illicit drugs, its prevalence then increased during the 1990s drug relapse, peaked in the late 1990s, and has since declined to today's low levels of use.

Questions on crack cocaine were first introduced into the survey in 1986, when information gathered routinely in MTF showed some indirect evidence of the rapid spread of crack cocaine. For example, we found that the proportion of all 12<sup>th</sup> graders reporting that they had ever smoked cocaine (as well as used it in the past year) more than doubled between 1983 and 1986, from 2.4% to 5.7%. In the same period, the proportion of those who said that they had both used cocaine during the prior year and at some time had been unable to stop using it when they tried doubled (from 0.4% to 0.8%). In addition, between 1984 and 1986, the proportion of 12<sup>th</sup> graders reporting daily use of cocaine also doubled (from 0.2% to 0.4%). We think it likely that the rapid advent of crack use during this period was reflected in all of these changes, though we did not yet have a direct measure of its use.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### **Cocaine Other Than Crack**

Trends in prevalence of cocaine other than crack follow closely the trends for cocaine use overall. In 2023 prevalence had not returned to 2020 levels. In 12<sup>th</sup> grade lifetime prevalence fell further to 1%, which compares to the level of 4% in 2020, before the onset of the pandemic. In 10<sup>th</sup> grade lifetime prevalence increased slightly to 0.9%, which compares to the 2020 level of 1.5%. In 8<sup>th</sup> grade lifetime prevalence has been below 1% since 2021, which leaves little room to fall further.

Both past 12-month and past 30-day cocaine use are near zero prevalence and are below 1% in all grades.

These low levels in 2023 contrast with highs in annual prevalence of 2.5% in 8<sup>th</sup> grade in 1996, 4.4% in 10<sup>th</sup> grade in 1999, and 10% in 12<sup>th</sup> grade in 1987 (when this outcome was first measured).

Questions on cocaine other than crack were first asked of 12<sup>th</sup> grade students in 1987, and prevalence declined precipitously through 1992. Perceived risk rose sharply during that period as the population became more concerned regarding the possibilities of addiction and overdose death from using cocaine.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Heroin*

Past 12-month use of heroin has always been relatively low, with annual prevalence never higher than 2% at any time in the survey for any grade. In 2023 the level of annual use was 0.4% or less in each grade. Prevalence levels of heroin are now at or near all-time lows, after a long decline from a peak established at the end of the 1990s drug relapse period. One unusual pattern specific to heroin is that the late 1990s mark the highest levels of use ever recorded in the study, whereas for most other drugs the all-time highs were set near the beginning of the 1980s. This trend was due in part to the advent of heroin use without a needle.

The increase in heroin use that occurred around 1995 was recognized fairly quickly and gave rise to some ameliorative actions, including an anti-heroin campaign by the Partnership for a Drug-Free America. An increasing number of deaths due to heroin use, including in the entertainment and fashion communities, also received widespread publicity. These factors may well explain the subsequent leveling in use after the near doubling of heroin prevalence that took place in 1995.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Narcotics Other Than Heroin*

Use of narcotics other than heroin without a doctor's orders is reported only for 12<sup>th</sup> grade students. In 2023 lifetime use declined significantly, bringing prevalence to 2.4%, which is the second-lowest recorded by the project (the lowest was 2.3% in 2021). The 2.4% level is more than six times lower than the high of 14% in 2002. Past 12-month use also significantly declined in 2023 to 1%, which ties with 2021 as the lowest level recorded by the survey. Past 30-day use declined, although not significantly, to a level of 0.4%, which is the second-lowest recorded by the survey.

Two patterns make trends in use of these drugs unique. First, peak use came during the 1990s relapse—and not during the 1980s as it did for so many other drugs—suggesting that its rise during the 1990s was more than just a return to drug use patterns of the past and instead represented the emergence of new, unique patterns of use for adolescents. Second, the peak established after the 1990s drug relapse stayed at a stubbornly high level for much longer than most illicit drugs. High levels of use during the 2000s raised concern that use of these types of

prescription drugs had become endemic. The recent decline in prevalence since 2010 shows that efforts to reduce use among adolescents have been successful.

Because the question text on half of the questionnaire forms was updated in 2002 with the inclusion of additional examples of narcotics other than heroin (i.e., OxyContin, Vicodin, and Percocet), we obtained a higher reported level of use with the new version of the question that year (9.4%) than with the previous version of the question (7.0%). (When we make a significant change in the wording of a question, we often use this type of spliced design in which a random half of the respondents to the questionnaire forms containing the drug get the new version and others get the old version in the same year so that we can assess the impact of the wording change.) All questionnaire forms contained the new version of the question in 2003 and thereafter.

In 2023 the list of example narcotics in the survey question included Methadone, Codeine, OxyContin, Percodan, Opium, Demerol, Percocet, Ultram, Morphine, Oxycodone, Tylox, Tramadol, Vicodin, Hydrocodone (Lortab, Lorcet, Norco), MS Contin, and Suboxone.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *OxyContin*

In 2023 the percentage of youth who used the specific narcotic drug OxyContin without a doctor's orders significantly declined in 10<sup>th</sup> and 12<sup>th</sup> grade, and it was 0.8% or lower in all grades.

Use of OxyContin has declined overall since first tracked by the survey in 2002. Its prevalence began a long-term decline in 2009/2010 for 10<sup>th</sup> and 12<sup>th</sup> grade students and in 2013 for 8<sup>th</sup> grade students, resulting in record or near-record lows in 2023.

### *Vicodin*

Use of the specific narcotic drug Vicodin without a doctor's orders had an annual prevalence of less than 1% across the three grades in 2023. Levels of use significantly declined to record lows in 2023 for 12<sup>th</sup> and 10<sup>th</sup> grade students. The low levels in 2023 are the result of a marked decline from peaks before 2010 of 3% in 8<sup>th</sup> grade, 8% in 10<sup>th</sup> grade, and 11% in 12<sup>th</sup> grade.

While there was a large age difference in prevalence in earlier years, there remained practically none in 2023 as prevalence approached zero.

### *Amphetamines*

The percentage of youth who used amphetamines without a doctor's orders trended slightly downward in 2023, with small declines in past 12 month use all less than one percentage point compared to 2022. The decline in 12<sup>th</sup> grade was small from 2.8% in 2022 to 2.1% in 2023, but statistically significant.

Use has declined gradually and substantially over the course of the survey. Across the three grades, lifetime use ranged from 11% to 15% in 1991 and declined to a range of 4% to 6% in

2023. In all three grades, past 12-month use ranged from 2% to 3% in 2023, and past 30-day use from 1% and 2%.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

We believe past prevalence reports among 12<sup>th</sup> grade students in the early 1980s were somewhat exaggerated because some respondents included non-amphetamine over-the-counter diet and stay-awake pills, as well as “look-alike” and “sound-alike” stimulants, in their answers. In 1982, we added new versions of the amphetamine use questions that were more explicit in instructing respondents not to include such nonprescription pills. Between 1981 and 1982, prevalence level reports dropped as a result of this methodological change. In all tables and figures, data for 1975 through 1981 are based on the unchanged questions; data since 1982 are based on the revised questions, providing our best assessments of current prevalence and more recent trends in true amphetamine use. Still, in 1982 annual prevalence among 12<sup>th</sup> graders was 20%.

In 1982 and 1983, the two years for which both adjusted and unadjusted statistics are available, the unadjusted data showed a modest amount of over-reporting. Both statistics suggest that a downturn in 12<sup>th</sup> graders’ use of amphetamines began in 1982 and continued for a decade. For example, between 1981 and 1992 their annual prevalence for amphetamines fell by nearly two thirds, from 20% to 7%, while 30-day use and current daily use both fell by more than two thirds. As with a number of other drugs, the trend lines veered upwards after 1992.

### Ritalin

The stimulant Ritalin is used to treat attention deficit hyperactivity disorder (ADHD). Prevalence of use without a doctor’s orders in the last 12 months edged lower in 2023 for all three grades, and was less than 1% in each.

Prevalence has declined substantially since first tracked by the survey in 2001. From 2001 to 2023 it declined from 2.9% to 0.6% in 8<sup>th</sup> grade, from 4.8% to 0.5% in 10<sup>th</sup> grade, and from 5.1% to 0.6% in 12<sup>th</sup> grade.

### Adderall

In 2023 nonmedical use of the amphetamine Adderall in the past 12 months declined in all three grades, significantly so in 12<sup>th</sup> grade.

In 12<sup>th</sup> grade the prevalence of 1.7% is the lowest since the survey first started tracking use of this substance in 2009. Levels of 2023 use were also low in 8<sup>th</sup> and 10<sup>th</sup> grade, at 1.7% and 2.1%, respectively.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Methamphetamine*

Use of methamphetamine has declined to near-zero prevalence over the past two decades, with lifetime use at or below 0.6% in 2023. This marks a steep decline from 1999 lifetime prevalence levels (when they were first tracked), which were at 4.5%, 7.3%, and 8.2% in 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grades, respectively.

### *Crystal Methamphetamine*

Lifetime prevalence of crystal methamphetamine use in 12<sup>th</sup> grade has been less than 1% since 2020, leaving little room to fluctuate in response to environmental influences.

Annual prevalence among 12<sup>th</sup> graders fell from 3.0% in 2002 to 0.3% in 2023. Its similarity to crack cocaine (both are in chunks and are burned) may have played a role in this decline, because crack came to be seen as very dangerous to use, and the concern may have generalized to crystal meth.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Sedatives*

Use of sedatives (barbiturates) without a doctor's orders in 2023 edged down slightly for lifetime and past 12-months use, and significantly declined for past 30-day use. Use was at the lowest level recorded by the survey for all three reporting intervals.

Prevalence declined after the highs of the 1990s drug relapse but for some years remained substantially higher than they were before the relapse began. By 2023 annual prevalence was at a historic low at 1.5%. As with many other substances, prevalence increased during the 1990s drug relapse, but a long-term decline did not start until 2005, which is nearly a decade later than the decline seen for most other drugs. This pattern of sustained, high levels past the 1990s is found for misuse of many of the prescription drugs, and was seen for the class "narcotics other than heroin." Trends over the past fifteen years, however, indicate that a long-term decline has been taking place.

Prior to the increase in use in the 1990s, past 12-month use had declined very appreciably from its highest reading of 16% in 1976 to 3% in 1992.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Tranquilizers*

In 2023 the percentage of youth who used tranquilizers without a doctor's orders declined in all grades for lifetime, past 12-month, and past 30-day use. In 12<sup>th</sup> grades these declines were statistically significant for past 12-month and past 30-day use. As a result of the declines in all grades, the substantial decreases in prevalence that took place during the pandemic in 2021 largely persisted into 2023.

In 2001 the survey question on tranquilizers was modified to include Xanax as an example of a tranquilizer, and the discontinuity in the graph for that year marks the slightly higher prevalence estimate that resulted from this question change.

Among 12<sup>th</sup> and 10<sup>th</sup> grade students, tranquilizer use increased during the 1990s; the increase was sustained well into the 2000s, which is a trend typical for the general category of prescription medication misuse.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Rohypnol*

Rohypnol, a “club drug,” was added to MTF in 1996.

In 2023 prevalence is less than 1% in all grades for past 12-month use. Lifetime and past 30-day use, which are measured in 8<sup>th</sup> and 10<sup>th</sup> grade, were also below 1% in 2023.

As a questionnaire space economy measure, in 2002 the standard triplet question (asking about lifetime, past 12-month, and past 30-day use of Rohypnol) was replaced with a tripwire question asking only about use in the past 12 months. (This change was made at 12<sup>th</sup> grade only.) As a result of this change in the structure and location of the question, trend data since 2002 may not be directly comparable to data prior to 2002, as noted by the discontinuity in the graph.

### *Ketamine*

Prevalence of past-12 month ketamine use among 12<sup>th</sup> grade students has been below 2% for the past decade and in 2023 stood at 1%. This “club drug” was added to the survey in 2000. It showed little change in its usage levels through 2002. Since then use has declined in all grades. Because of the very low levels of use of this drug by 2011, questions about its use were dropped from the questionnaires administered to 8<sup>th</sup> and 10<sup>th</sup> graders.

### *GHB*

Prevalence of past-12 months GHB use among 12<sup>th</sup> grade students has been below 1.5% for the past decade and in 2023 stood at 0.3%. Since 2017 prevalence has hovered around 0.4%.

### *Alcohol*

In 2023 alcohol use significantly declined in 12<sup>th</sup> grade for lifetime, past 12-month, past 30-day, and daily use. It also significantly declined in 10<sup>th</sup> grade for lifetime use. These trends contrast with last year, when 12<sup>th</sup> grade alcohol use increased for lifetime, past 12-month, and daily use.

This year’s decline in 12<sup>th</sup> grade alcohol use is consistent with a delayed effect of the pandemic. Students in 12<sup>th</sup> grade in 2023 are members of the cohort that were just starting high school and were in 9<sup>th</sup> grade in 2020, when the majority of U.S. school buildings closed as a result of the pandemic. While in 9<sup>th</sup> grade this cohort had the largest decreases among students in all



grades for substance use, including alcohol.<sup>1</sup> To the extent that forestalled initiation of substance use for one year can potentially lower adolescents' levels of substance use for the rest of their lives,<sup>2</sup> this year's decrease in alcohol use in 12<sup>th</sup> grade may stem from the lowered levels of alcohol initiation in this cohort three years earlier.

The significant decreases in alcohol use in 2023 in 12<sup>th</sup> grade are part of a long term, overall decline that has taken place since the year 2000 in all three grades. From 2001 to 2023 past 12-month prevalence has decreased from 73% to 46% in 12<sup>th</sup> grade, from 65% to 31% in 10<sup>th</sup> grade, and from 43% to 15% in 8<sup>th</sup> grade.

Unlike most other drugs, alcohol use showed only a modest increase during the 1990s relapse, exhibiting more of a pause in its long-term decline.

Binge drinking was lower in 2023 than in 2022 for all three grades, but these decreases were statistically significant. Binge drinking is defined as consuming five or more drinks in a row during the past two weeks,

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### **Been Drunk**

Prevalence of being drunk had not returned to 2020 levels by 2023. In 12<sup>th</sup> and 10<sup>th</sup> grade both past 12-month and past 30-day use dropped substantially during the pandemic in 2021 and in 2023 these levels declined further, with a statistically significant decline in past 30-day use in 12<sup>th</sup> grade. In 8<sup>th</sup> grade these prevalence levels have changed little since 2015.

Annual prevalence of being drunk has been in a long-term decline, which began first among 8<sup>th</sup> graders after 1996, then among 10<sup>th</sup> graders after 2000, and in 12<sup>th</sup> grade after 2004, suggesting a cohort effect.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

The survey text for this item reads “On how many occasions (if any) have you been drunk or very high from drinking alcoholic beverages?”

### **Alcoholic Beverages With Caffeine**

Annual use of alcoholic beverages containing caffeine significantly increased from 2022 to 2023 in 8<sup>th</sup> grade, from 4.7% to 7.5%. In general, 8<sup>th</sup> grade levels have been hovering at about 6% since 2016.

<sup>1</sup> Miech, R., Patrick, M. E., & Keyes, K. (2023). [Declines in adolescent substance use after the COVID-19 pandemic onset: The role of initiation in grades 7 and 9](#). *The Journal of Adolescent Health, 73*(5), 838–844.

<sup>2</sup> U.S. Department of Health and Human Services (HHS), Office of the Surgeon General, Facing Addiction in America. [The Surgeon General's Report on Alcohol, Drugs, and Health](#). Washington, DC: HHS, November 2016.



In 10<sup>th</sup> and 12<sup>th</sup> grade prevalence was little changed in 2023. Overall, use levels in these grades have declined substantially since first tracked in 2011. Annual prevalence among 12<sup>th</sup> and 10<sup>th</sup> grade students has decreased more than 50% overall.

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### *Flavored Alcoholic Beverages*

In 2023, use of flavored alcoholic beverages (also known as “alcopops” or “malternatives”) in the past 12 months had returned to pre-pandemic levels in 12<sup>th</sup> grade. Specifically, prevalence was 38% in 2019 (the last measurement before the pandemic), declined to 32% in 2021, and then returned to 38% in 2022 and similarly 36% in 2023. (2020 prevalence levels are not reported for 12<sup>th</sup> grade due to low sample size that resulted from curtailed data collection due to the pandemic.)

In 10<sup>th</sup> and 8<sup>th</sup> grade past 12-month prevalence declined slightly and did not return to 2020 levels. It is possible that 12<sup>th</sup> grade students had more opportunities and more autonomy to use flavored alcoholic beverages in 2023 than did their peers in younger grades.

Use of these products has declined substantially since the project first began tracking them in 2004. This decline is apparent in trends for lifetime, past 12-month, and past 30-day use in all three grades. For example, past 30-day use has declined dramatically over the course of the survey, in 8<sup>th</sup> grade from 15% in 2004 to 3% in 2023, in 10<sup>th</sup> grade from 25% in 2004 to 8% in 2023, and in 12<sup>th</sup> grade from 31% in 2004 to 18% in 2023.

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### *Beer*

In 2023 prevalence of beer drinking in the past 12 months and the past 30 days had not returned to pre-pandemic levels in any of the three grades. Beer drinking for both these intervals declined substantially in 2021 during the pandemic, and in 2023 levels declined slightly further or stayed level.

In the long term, beer use has declined substantially in all grades. From 1991 to 2023 lifetime use decreased in 12<sup>th</sup> grade from 82% to 42%, in 10<sup>th</sup> grade from 74% to 27%, and in 8<sup>th</sup> grade from 59% to 14%. Substantial long-term declines have also taken place for past 12-month, past 30-day, and in all grades these prevalence levels are at or near the lowest recorded by the survey.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns. (2020 prevalence levels not reported in 12<sup>th</sup> grade because of low sample size that resulted from curtailed data collection during the pandemic.)

### Liquor

Use of hard liquor is asked only of 12<sup>th</sup> grade students. In 2023 prevalence edged downward for lifetime, past 12-month, past 30-day use, as well as for binge drinking. With these small decreases prevalence was at the lowest recorded by the survey for lifetime and past 12-month use, and second-lowest for past 30-day use. Nevertheless, prevalence remains substantial, with one out of every five 12<sup>th</sup> graders reporting use of liquor in the past 30 days.

A decline in liquor consumption among 12<sup>th</sup> graders actually began after about 1980 but was interrupted in the late 1990s by the relapse phase in the use of most drugs, including alcohol. After about 2002 the long-term decline in alcohol use resumed.

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### Wine

Wine consumption is asked only of 12<sup>th</sup> grade students. In 2023 prevalence edged downward slightly for lifetime, past 12-month, and past 30-day use. Prevalence was near record lows in 2023, following a substantial overall decline since 2000. Specifically, from 2000 to 2023 lifetime prevalence declined from 64% to 35%, past 12-month from 45% to 23%, and past 30-day from 16% to 7%.

In 1988 MTF added a question on wine coolers, which had the effect of sharply reducing self-reported wine use. (Up to that point many users of wine coolers likely reported such use under wine.) Prevalence of wine use rose somewhat during the 1990s drug relapse but continued a long-standing decline in 2001.

As with liquor, the longer term decline in wine consumption that began in the late 1980s was interrupted in the 1990s during the relapse phase in drug and alcohol use.

Binge drinking with wine has been higher than with liquor. It declined substantially in the late 1980s, suggesting that wine coolers accounted for reported binge drinking until wine coolers were separated into their own category.

### Cigarettes

The percentage of adolescents who had ever smoked a cigarette did not significantly change from 2022 to 2023, although it trended slightly downward in all three grades. Overall, cigarette prevalence in 2023 is at or near the lowest ever recorded by the survey since the start of the survey in 1975.

The intense public debate in the late 1990s over cigarette policies likely played an important role in bringing about the very significant downturn in adolescent smoking over the past two decades. MTF helped to give rise to that debate, as it publicly reported in the first half of the 1990s that the level of smoking among U.S. adolescents was rising sharply—results that were widely covered in the national media. Other subsequent developments likely have contributed, including (a) increases in cigarette prices, brought about in part by the tobacco industry settlement with the states and by state-level taxing decisions; (b) substantially increased

prevention activities, including antismoking ad campaigns in a number of states; (c) the removal of certain types of advertising (including billboards) as well as the Joe Camel campaign nationwide; (d) the initiation of a national antismoking ad campaign by the American Legacy Foundation, which was created as a condition of the tobacco Master Settlement Agreement of 1998; and (e) efforts by the Food and Drug Administration (FDA) and states to reduce youth access to cigarettes.

An important milestone occurred in 2009 with passage of the Family Smoking Prevention and Tobacco Control Act, which gave the U.S. Food and Drug Administration the authority to regulate the manufacturing, marketing, and sale of tobacco products. New efforts by the FDA have undoubtedly contributed to the continuing decline in use of cigarettes and their reported availability by 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders.

In earlier years, efforts to reduce adolescent smoking did not meet with as much success. Between 1984 and 1992 smoking prevalence was little changed among 12<sup>th</sup> grade students despite increasingly restrictive legislation with regard to smoking debated and enacted at state and local levels, as well as prevention efforts made in many school systems. These results suggest that the successful reduction of adolescent smoking, as we have seen in recent decades, requires a concerted, national, multi-pronged effort.

During the 1990s trends in cigarette smoking generally moved in concert across 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grades—and not in the usual, staggered pattern indicative of a cohort effect. The prevalence of current smoking began to rise among 8<sup>th</sup> and 10<sup>th</sup> graders after 1991 and among 12<sup>th</sup> graders after 1992, and until 1996 moved steadily upward in all three grades. In 1996, current smoking peaked in grades 8 and 10 and then peaked a year later among 12<sup>th</sup> graders. It is interesting that cigarettes, which normally reflect cohort differences, began to exhibit a secular trend in the same historical period that illicit drugs, which normally exhibit secular trends, began to show cohort effects.

Of particular importance is the fact that in all three grades in 2023 the prevalence of smoking half-a-pack or more per day is down from peak levels by more than 90%.

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### *Vape Nicotine (E-Cigarettes)*

The percentage of students who vaped nicotine in 2023 decreased in all grades for lifetime, past 12-month, and past 30-day use. In 12<sup>th</sup> grade the declines were statistically significant for all three reporting intervals. In 10<sup>th</sup> grade the declines were statistically significant for past 12-month and past 30-day use.

These declines reflect the lasting effect of processes set into place three years earlier. The 12<sup>th</sup> grade students of 2023 were in a cohort that started high school in 9<sup>th</sup> grade during 2020, when most U.S. school buildings closed as a result of the pandemic. While in 9<sup>th</sup> grade these students

initiated nicotine vaping at record low levels,<sup>3</sup> which had a lasting effect. When these students were in 12<sup>th</sup> grade in 2023 the percentage who vaped nicotine in the past 12 months and first ever vaped in 9<sup>th</sup> grade was a striking 36% lower than in it had been for 12<sup>th</sup> grade students in 2022, whose 9<sup>th</sup> grade experience was not disrupted by the pandemic.<sup>4</sup> These low levels of initiation in 9<sup>th</sup> grade for the 2023 12<sup>th</sup> grade cohort accounted for most of their decline in nicotine vaping.<sup>4</sup>

Similarly, most of the decline in past 12-month nicotine vaping for 10<sup>th</sup> grade students in 2023 resulted from lasting, lower levels of initiation three years earlier in 7<sup>th</sup> grade, which is the start of junior high school.<sup>4</sup>

Despite the recent declines in use, the prevalence of nicotine vaping remains one of the highest among all adolescent substances. In 2023 its past 12-month prevalence levels of 11% in 8<sup>th</sup> grade and 18% in 10<sup>th</sup> grade are second only to alcohol. Nicotine vaping's prevalence of 23% in 12<sup>th</sup> grade ranks third behind alcohol and marijuana use. These high rankings are largely due to the very sharp increases in the prevalence of nicotine vaping between 2017 and 2019.

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### *Vape Marijuana (Cannabis)*

In 2023 the percentage of students who vaped marijuana changed little in all three grades. As a result, the substantial decreases in prevalence that took place during the pandemic onset in 2021 in 8<sup>th</sup> and 10<sup>th</sup> grade largely persisted into 2023. This pattern was apparent for lifetime, past 12-month, and past 30-day use.

In 12<sup>th</sup> grade prevalence levels did not decline as much as they did in the lower grades during the pandemic in 2021, and annual use levels in 12<sup>th</sup> grade have hovered at around 20% since 2019. This pattern differs from overall marijuana use, for which prevalence levels decreased in 2021 and this decrease persisted into 2022 and 2023.

Large increases in marijuana vaping in previous years were not accompanied by increases in overall marijuana use. These results suggest that marijuana vaping is not increasing the pool of adolescent marijuana users. It could substitute for combustible marijuana use, it could serve as a way for marijuana users to avoid detection by adults (because vaped marijuana does not have the distinctive smell of combustible marijuana), and/or it could be a way for users to supplement their combustible marijuana use.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

<sup>3</sup> Miech, R., Patrick, M. E., & Keyes, K. (2023). [Declines in adolescent substance use after the COVID-19 pandemic onset: the role of initiation in grades 7 and 9](#). *The Journal of Adolescent Health*, 73(5), 838–844.

<sup>4</sup> Miech, R. (2023). Changes in U.S. adolescent nicotine vaping prevalence from 2022 to 2023: the role of reduced initiation three years earlier during the onset of the pandemic. Under review.

### *Vape Flavoring*

The percentage of youth who report that they vaped “just flavoring” in their lifetime and in the past 12 months did not return to 2020 levels by 2023. Nevertheless, this behavior remains somewhat common, with nearly one in five 12<sup>th</sup> graders reporting that they vaped ‘just flavor’ in their lifetime and more than one in ten reporting having done so in the last 12 months.

Practically all youth who report vaping ‘just flavoring’ also report vaping nicotine (as indicated by very low prevalence in the “Vape flavoring without nicotine” tables and graphs). Most adolescents who vape “just flavoring” are doing so as a supplement to their nicotine vaping and not as a substitute for it.

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### *Vape Flavoring Without Nicotine*

In 2017 MTF started asking students if they vaped “just flavoring.” A substantial prevalence of this outcome could raise at least two potential scenarios. First, it could be possible that a portion of youth believed they were not vaping nicotine when in fact they were. Second, if students truly were vaping only flavoring, then the recent large increases in adolescent vaping may be less alarming than it at first appeared—to the extent that adolescents are not being exposed to the addictive chemical nicotine.

These two potential scenarios are not supported by the results. The finding that in 2023 1% of students or less in all grades report vaping flavoring exclusively without nicotine in the past 30 days indicates that practically all students who report vaping “just flavoring” are also vaping nicotine.

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### *Smokeless Tobacco*

The percentage of youth who used smokeless tobacco during the past 30 days was at or near record lows in 2023. In 12<sup>th</sup> grade prevalence was 2.5% (the record low was in 2021 at 2.2%), in 10<sup>th</sup> grade it was 2.3% (the record low was in 2021 at 1.7%), and in 8<sup>th</sup> grade it was 1.6% (the record low was in 2022 at 1.2%).

Lifetime use was also at or near record lows in 2023, at 8% in 12<sup>th</sup> grade, 6% in 10<sup>th</sup> grade, and 5% in 8<sup>th</sup> grade.

Daily use of smokeless tobacco is at near-negligible levels, with a prevalence of 0.5% or less in all grades.

Trends in smokeless tobacco stand out as very different from trends for adolescent use of other drugs. Unlike almost all other substances, use of smokeless tobacco did not increase during the 1990s relapse but actually declined for nearly 10 years, beginning around 1994. Further, smokeless tobacco is one of few substances for which prevalence increased after 2007,

although this increase among 10<sup>th</sup> and 12<sup>th</sup> grade students was not lasting. Finally, the trends show little in the way of cohort effects, given that trends have moved in parallel and not in staggered fashion for all three grades. These results suggest that the factors leading to use of smokeless tobacco are much different from the drivers of use of other drugs.

Questions about the use of smokeless tobacco were first introduced in 1986, omitted in 1990 and 1991, and then reintroduced in 1992. Through 2010, the examples of smokeless tobacco provided in the question were snuff, plug, dipping tobacco, and chewing tobacco; because of new forms of smokeless tobacco entering the market, snus and dissolvable tobacco were added to the examples in 2011. The introduction and promotion of new smokeless products, including snus, may well have contributed to the increase in use seen in all grades that peaked around that time.

### *Snus*

In 2023 prevalence of snus use in the past 12 months stood at 0.3%, 1.3%, and 1.8% for 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders. In 8<sup>th</sup> grade the 0.3% marks a significant decline from 1.0% the previous year.

Snus is a variation on smokeless tobacco, as are some other dissolvable tobacco products, that literally dissolve in the mouth. Questions on snus were added to the 12<sup>th</sup> grade survey in 2011 and to the 8<sup>th</sup> and 10<sup>th</sup> grade surveys in 2012. Past year prevalence had been falling quite sharply in the upper grades since the introduction of those questions. The upper grades have tended to have considerably higher levels of use—at least until 2018.

Clearly snus has lost most of its appeal to teenagers, possibly in part due to the sharp increases in the popularity of vaping.

### *Large Cigars*

Smoking large cigars, which has not been particularly common among secondary school students, has declined overall since 2014 in all three grades. Since 2019 a steep decline in prevalence of 30-day use has taken place among 12<sup>th</sup> grade students, falling by more than half from 4.5% in 2019 to 1.8% in 2023. The trend has also been downward in 8<sup>th</sup> and 10<sup>th</sup> grades, which in 2023 have a 30-day prevalence levels of 1% in 8<sup>th</sup> grade and 0.3% in 10<sup>th</sup>.

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### *Flavored Little Cigars*

Use of flavored little cigars in the past 30 days declined slightly (but not significantly) in all three grades in 2023 and extended the substantial decreases in prevalence that took place in 2021 during the pandemic.

Overall prevalence has declined markedly since this measure was added to the survey in 2014. Specifically, from 2014 to 2023 prevalence in 12<sup>th</sup> grade fell from 12% to 2%, in 10<sup>th</sup> grade from 7% to 1%, and in 8<sup>th</sup> grade from 4% to 1%.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Regular Small Cigars*

Use of regular (unflavored) small cigars during the past 12 months significantly dropped in 10<sup>th</sup> grade in 2023 and held steady in 8<sup>th</sup> and 12<sup>th</sup> grade. Prevalence has declined markedly overall since first tracked in 2014, and 2023 levels are record lows, all below 2%.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *Cigarillos (Small Cigars)*

The percentage of 12<sup>th</sup> grade students who used a cigarillo (also known as a small cigar) in the past 12 months was 4% in 2023, which is a non-significant decline from the 6% level in 2022. The 2023 level is the second lowest recorded by the study since it began tracking cigarillos in 2010, when prevalence was about four times higher at 23%.

### *Tobacco Hookah*

A hookah is a device to inhale combustible tobacco and consists of a long, flexible tube through which users inhale tobacco smoke that has passed through water and is thereby cooled. In 2023 the percentage of 12<sup>th</sup> grade students who used a hookah in the past 12 months declined slightly to 2.7%, which is the second lowest level recorded by the survey, which first measured hookah use in 2010. Use increased from 2010 to 2014 but has been steadily declining since, with 2023 prevalence about eight times lower than the high of 23% recorded in 2014.

### *Nicotine Pouch*

Starting in 2023 the survey included a question on the use of nicotine pouches. Specifically, the question asked “The next questions ask about small, white pouches that contain nicotine which users place in their mouth. Nicotine pouches are different from other smokeless tobacco products such as snus, dip, or chew, because they do not contain any ground tobacco leaf. Common brands include Zyn, On!, or Velo. Please do not include other types of tobacco pouches, such as snus pouches or smokeless tobacco pouches when answering the following questions.” The survey then asked about lifetime, past 12-month, and past 30-day use.

Prevalence was low, with lifetime use at 4% in 12<sup>th</sup> grade, 3% in 10<sup>th</sup> grade, and 1% in 8<sup>th</sup> grade. Past 30-day use, which is commonly referred to as “current use,” was low at 1.4% or less in all three grades. MTF will continue tracking these new products in the coming years to see if they gain popularity among adolescents.

### *Steroids*

In 2023 lifetime prevalence of anabolic steroid use was 1% in all grades. In general, lifetime, past 12-month, and past 30-day use have decreased, sometimes unevenly, since highs in the early 2000s.

Anabolic steroids, sometimes used for muscle development including in body building, were rendered illegal to purchase or sell without a prescription in the Anabolic Steroids Control Act



of 1990. Prevalence of use fell among 12<sup>th</sup> graders for a couple of years thereafter, but then increased some. Use for all grades peaked around 2002 and have since declined substantially.

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### Creatine

Creatine is not a hormone or a drug but a nutrient found in the skeletal muscle of most animals. It is used to reduce the recovery time of muscles, to increase muscle mass, and to thereby enhance performance for high-intensity, short-duration exercises. It is readily available over the counter, which undoubtedly helps to explain the substantial levels of use we have found among teens.

Past 12-month use maintained the large increases that took place last year, from 2021 to 2022. All grades levels are at the highest recorded since the project first began tracking use of this substance in 2001. Prevalence in 2023 was 12% in 12<sup>th</sup> grade, 11% in 10<sup>th</sup> grade, and 5% in 8<sup>th</sup> grade.

These results are consistent with the possibility of an increase in the proportion of adolescents involved in fitness and weightlifting during the pandemic. Lasting increases since 2021 also took place for the performance-enhancing drug androstenedione, which is sometimes used with creatine.

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### Androstenedione

Androstenedione, a precursor to testosterone, is a performance-enhancing substance that was scheduled by the Drug Enforcement Administration early in 2005, making its sale and possession no longer legal.

In 12<sup>th</sup> grade, past 12-month prevalence was 1.4% in 2023, and maintained most of the large increase that took place last year, when it jumped to 1.9% in 2022 from 0.6% in 2021. The current higher levels in 2023 are a departure from the long-term decline that started at 3.0% in 2001 and decreased to 0.5% by 2019.

These results are consistent with the possibility of a lasting increase in the proportion of 12<sup>th</sup> grade students involved in fitness and weightlifting during the pandemic. Lasting increases also took place since 2021 for the performance-enhancing drug of creatine.

The survey stopped tracking this drug among 8<sup>th</sup> and 10<sup>th</sup> graders after 2014, when prevalence levels were less than 1% in these grades.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

## ***Legal Stimulants***

### **Diet Pills**

Use of diet pills, which are over-the-counter stimulants, were at the lowest level ever recorded by the survey in 2023 for lifetime, past 12-month, and past 30-day use.

The 1.1% level for past 12-month use in 2023 is more than five times lower than the peak of 21% recorded in 1982, when diet pills were first included on the survey. After 1983, prevalence fell quickly over the next ten years to 8% in 1993; this was a particularly positive development because nearly all of these diet pills contained phenylpropanolamine, which the Food and Drug Administration has since determined has health risks for the user and in 2005 removed them from over-the-counter sale. Use stabilized through the mid-1990s at around 9.4%, rose after 1998 to reach 15.1% in 2002, and then declined to today's low of 1.1% in 2023.

### **Stay-Awake Pills**

Use of stay-awake pills, which are over-the-counter stimulants, were at or near the lowest level ever recorded by the survey in 2023 for lifetime, past 12-month, and past 30-day use among 12<sup>th</sup> graders.

The 2023 prevalence of 0.8% for past 12-month use is more than twenty times lower than the peak level of 26% in 1988. Since then prevalence of stay-awake pills has gradually declined somewhat irregularly with no periods of sustained increases.

### **OTC Cough/Cold Medicine**

There are a number of over-the-counter drugs that can be used to relieve symptoms from coughing or having a cold. Several of them, like Robitussin and Tylenol, contain dextromethorphan (DXM). When taken in large doses, its side effects can mimic those of some illegal drugs, like hallucinations and sensory changes. Teens can buy them to use for these purposes and risk a number of dangerous side effects.

Not all cough and cold medications contain DXM, of course, but because a number of them do, we track the more general class to get an indication of changes in DXM abuse. The survey questions asks students if they have taken nonprescription cough or cold medicines "to get high."

In 2023 past 12-month prevalence changed less than one percentage point in each of the three grades. In 8<sup>th</sup> grade the current level of 4% is toward the higher end of the range that varies from the low of 2% recorded in 2015 and the high of 4.6% recorded in 2020.

In 10<sup>th</sup> grade a decline in 2023 brought prevalence to 3%, which is exactly half of the 6% high recorded in 2009.

In 12<sup>th</sup> grade prevalence held steady at 2.4%, which is the second-lowest level recorded by the survey (the lowest level was 1.7% in 2021).

Note that in recent years the grades have tended to reverse the order of their prevalence levels, with the 8<sup>th</sup> graders tending to have the highest prevalence and the 12<sup>th</sup> graders the lowest. The only other class of drugs that currently show such a pattern is inhalants.

### Energy Drinks

Energy drinks are non-alcoholic beverages that usually contain high amounts of caffeine, and include brands such as Red Bull and Monster. MTF asks about daily use of these drinks.

Prevalence has followed a U-shaped curve, with higher levels when first tracked in 2010, a steady decline until about 2015, and then a subsequent reversal as prevalence increased thereafter. In 2023 levels of daily use in 12<sup>th</sup> and 10<sup>th</sup> grade were at the highest levels recorded by the survey, at 17% and 18%, respectively. In 8<sup>th</sup> grade prevalence declined slightly in 2023 after five years of steady increases, and was at 13%.

The wording for this question is “‘Energy drinks’ are non-alcoholic beverages that usually contain high amounts of caffeine, including such drinks as Red Bull®, Full Throttle®, Monster®, and Rockstar®. They are usually sold in 8- or 16-ounce cans or bottles. About how many (if any) energy drinks do you drink PER DAY, on average?”

### Energy Shots

Energy “shots” usually come in 2 or 3 ounce containers and include brands such as 5-Hour Energy and Redline. MTF asks about daily use of energy shots.

Daily use of these substances has not systematically trended over the past decade. In all three grades prevalence has hovered at around 3% to 4%. When first tracked 8<sup>th</sup> grade students had the highest levels of use—at 7% in 2011—but by 2014 these levels had declined to 4% and have fluctuated around this level since. This lack of change in consumption of energy shots in recent years contrasts with the substantial increase of use in energy drinks.

The text for this question is: “Energy drinks are also sold as small “shots”, that usually contain just 2 or 3 ounces (5-hour ENERGY®, Redline®, etc.). How many (if any) energy drink shots do you drink PER DAY, on average?”

### Energy Drinks or Shots

Energy drinks and energy shots contain high levels of caffeine. Trends in daily use of these products follow a U-shaped curve, with higher levels when the project first began tracking them in 2010, a steady decline until about the year 2015, and then a reversal as prevalence subsequently increased. This trend is driven mainly by use of energy drinks and not by use of energy shots which have not systematically trended in the past decade.

## ***Legal Use of Drugs for the Treatment of ADHD Taken Under Medical Supervision***

### ADHD Either Type

Medical use of either stimulant or non-stimulant drugs to treat ADHD changed little from 2022 to 2023 in 12<sup>th</sup> and 10<sup>th</sup> grade, for both lifetime and 30-day use. Consequently, the increases in use that occurred last year persisted into 2023.

In 8<sup>th</sup> grade use edged lower in 2023 for both lifetime and 30-day use. These declines eroded the substantial increases in use since the pandemic, although prevalence levels remain above those recorded before the pandemic onset in 2020.

In all three grades, prevalence increases after the pandemic onset in 2021 and 2022 reversed a decline that had led both lifetime and 30-day prevalence to be at or near the lowest level recorded by the survey in 2020.

It is possible that the need for treatment of ADHD increased during the pandemic due to adolescents experiencing more stress during the pandemic. Another possibility is that sheltering at home during the pandemic may have made any attention issues of adolescents more salient to their parents.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *ADHD Stimulant*

Medical use of stimulant drugs to treat ADHD was one of the few substances with increasing prevalence after the pandemic onset, in 2021 and 2022. For lifetime use the increases since the pandemic persisted in 10<sup>th</sup> and 12<sup>th</sup> grade into 2023. In 8<sup>th</sup> grade they did not, although the decline by two percentage points was not statistically significant. Levels were 8% in 8<sup>th</sup> and 10<sup>th</sup> grade, and 11% in 12<sup>th</sup> grade.

Past 30-day use declined by about one percentage point in all grades, although this decline was not statistically significant. Levels were 5% or less in all three grades.

It is conceivable that there was an increase in the need for treatment during the pandemic due to adolescents being under more stress during the pandemic. Another possibility is that sheltering at home during the pandemic may have made any attention issues of adolescents more salient to their parents.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### *ADHD Non-Stimulant*

Medical use of non-stimulant type drugs for the treatment of ADHD are sometimes prescribed when stimulants have proven ineffective or not well tolerated.

In 2023 lifetime use of these drugs held steady, with only slight declines of less than one percentage point in all three grades.

Past 30-day use declined significantly in 12<sup>th</sup> grade, from 3.5% in 2022 to 2.0% in 2023. With this decline the level decreased from the highest ever recorded by the survey to a level that is about average of those from previous years. In 10<sup>th</sup> and 8<sup>th</sup> grade it changed little.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

## **DRUGS NO LONGER TRACKED ANNUALLY**

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The drugs listed below did not appear on the 2023 MTF surveys. In most cases prevalence levels fell so low that survey questions on the drug were removed to make room for questions on other drugs, as well as to reduce respondent burden. In some cases, as with “electronic vaporizers,” questions were removed to make place for updated terminology and measures.

### **JUUL**

Questions about use of the vaping device JUUL were not asked in 2022 because the FDA has removed them from the U.S. market.<sup>5</sup>

Prior to 2022 prevalence of the vaping device JUUL declined dramatically. Both past 12-month and past 30-day prevalence declined about 50% in just one year in all three grades from 2020 to 2021.

This decline likely stemmed from both national policies aimed at reducing nicotine vaping prevalence among adolescents, as well as the COVID-19 pandemic.

One policy to reduce tobacco use in general is the “Tobacco 21” law, which went into force on December 20, 2019. This law raised the age of sale for all tobacco products in the U.S. from 18 to 21. It is specifically designed to reduce adolescent access to vaping devices and other tobacco products.

In addition, in 2020 the FDA placed restrictions on flavoring of cartridge-based vaping systems and banned flavors popular among adolescents such as mint and fruit. These restrictions went into force on February 7, 2020, four days before the first school was surveyed in MTF that year. This ban likely has had a continuing effect.

At the same time, these large declines took place during the COVID-19 pandemic, when social distancing policies were implemented specifically to reduce social interactions outside of the home. These policies included school building closures, reductions and/or cancellations of after school group activities, and physical distancing policies requiring people to stay six feet from others. For many, these policies likely reduced adolescents’ access to vaping devices and cartridges, as well as their opportunities to use them free from adult supervision.

All results from 2020 are from surveys completed before March 15, 2020, when national social distancing policies were implemented and the survey halted due to pandemic concerns.

### **Heroin Use Without a Needle**

The percentage of youth ever using heroin without a needle fell to near-zero levels in 2021, and those questions were removed from the survey to make room for questions on other drugs.

<sup>5</sup> US Food & Drug Administration. (2022, June 23). [FDA denies authorization to market JUUL products.](#)

The advent of new, very pure, heroin that could be used without a needle played a significant role in raising heroin prevalence to its all-time peak in the mid-1990s. Since then its use has declined to record lows.

### *Heroin Use With a Needle*

The percentage of youth ever using heroin with a needle fell to near-zero levels in 2021 and was removed from the survey to make room for questions on other drugs.

Heroin use with a needle among students is quite rare, and lifetime use was never higher than 2% when tracked between 1995 and 2021.

### *Bath Salts*

Questions on "bath salts" (synthetic cathinones) were added to the survey in 2012 out of concern that these particularly toxic drugs would gain popularity among adolescents. As it turns out, annual prevalence has been low and never higher than 1.3% in any grade. In 2018, prevalence was 0.9% or less in all grades, and the survey questions were removed to make room for questions on other drugs. These questions will be added back to the survey in future years if a concern arises that adolescent use of bath salts is making a comeback.

### *Amyl and Butyl Nitrites*

Amyl and butyl nitrites, one class of inhalants, became somewhat popular in the late 1970s, but their use has been almost eliminated in the years since. The annual prevalence level among 12<sup>th</sup> grade students was 6.5% in 1979 but only 0.9% in 2009. Because of this decrease in use, and to allow for the addition of other questions, the questions on nitrite use have not been included in the study since 2010. These questions will be added back to the survey in future years if a concern arises that adolescent use of these nitrites is making a comeback.

When nitrites were included in the definition of inhalants, they masked the increase that was occurring in the use of other inhalants, because their use was declining at the same time that the use of the other inhalants was increasing.

### *Methaqualone (Quaaludes)*

Use of methaqualone (brand name Quaalude) without a doctor's orders had a past 12-month prevalence among 12<sup>th</sup> graders of 0.4% in 2012, after which it was no longer included on the survey to make room for questions on other drugs. Previously, use of this drug rose sharply from 1978 until 1981. Starting in 1982 use began to decline, helping to account for the overall adjusted sedative index resuming its decline that year. Annual prevalence for methaqualone plummeted from 7.6% in 1981 to 0.2% by 1993; it then inched up a bit during the drug relapse phase in the 1990s to 1.1% in 1996, where it remained in 1999. By 2012 it was down to 0.4%, a tiny fraction of its peak level.

### *Provigil*

Questions on use of Provigil (a prescription stay-awake drug used for narcolepsy, shift work, etc.) were added to the 12<sup>th</sup> grade questionnaires in 2009. In 2011, 1.5% used this drug without a doctor's orders in the past 12 months, suggesting that this drug had not made serious inroads among youth in terms of non-medically-supervised use. Given the low use, questions on

Provigil were no longer included on the survey starting in 2012. These questions will be added back to the survey in future years if a concern arises that adolescent use of Provigil is making a comeback.

### *Bidis*

A question about bidis, a type of flavored cigarette imported from India, was included in the MTF questionnaires for the first time in 2000, with a single tripwire question asking about the frequency of use in the past year. Some observers had been concerned that bidis might become popular among U.S. youth, but that does not seem to have been the case. The 2010 proportion of 12<sup>th</sup> graders using bidis during the past year was only 1.4%. Thirty-day and daily use would be appreciably lower. Given the low prevalence levels, the question on bidis was dropped from 8<sup>th</sup> and 10<sup>th</sup> grade questionnaires in 2006 and from 12<sup>th</sup> grade questionnaires in 2011. These questions will be added back to the survey in future years if a concern arises that adolescent use of bidis is making a comeback.

### *Kreteks*

A question about kreteks, a type of clove cigarette that was usually imported from Indonesia, was added in 2001 to the list of tripwire questions that ask only about past 12-month use.

Because the prevalence levels turned out to be low, this question also was dropped in 2006 from the 8<sup>th</sup> and 10<sup>th</sup> grade questionnaires to make room for other questions. In 2014, only 1.6% of 12<sup>th</sup> graders reported any use of kreteks in the prior 12 months, and the question has not been included on the survey since then. These questions will be added back to the survey in future years if a concern arises that adolescent use of kreteks is making a comeback.

### *Salvia*

Salvia is an herb with hallucinogenic properties, common to southern Mexico and Central and South Americas. Although it currently is not a drug regulated by the Controlled Substances Act, several states have passed legislation to regulate its use, as have several countries.

When first measured in 2009 prevalence among 12<sup>th</sup> grade students was 5.7% for past 12-month use. Since then its prevalence has dropped considerably and in 2022 was 0.8% in 8<sup>th</sup> grade, 10<sup>th</sup> grade, and 12<sup>th</sup> grade. This question was dropped from the survey in 2023 due to low prevalence.

### *Synthetic Marijuana*

Synthetic marijuana has been branded as “K2” and “Spice,” among other names. When products such as these first appeared on the market some of their novel chemical compositions fell outside of regulated substances and were available for purchase at convenient stores and gas stations, even though use could have serious health consequences.

When first assessed in 2011 the past 12-month prevalence of synthetic marijuana was 11%. The Drug Enforcement Agency (DEA) scheduled various forms of synthetic marijuana in March 2011, which subsequently reduced their availability. Prevalence among adolescents subsequently dropped markedly, falling to 1.8% among 12<sup>th</sup> grade students in 2021.



Questions on this substance were dropped in 2023 because of low prevalence, and also out of concern that some adolescents were confusing use synthetic marijuana with marijuana vaping.

### *Dissolvable Tobacco*

Dissolvable tobacco can be sold as lozenges, strips, or sticks. As the name implies, most dissolve in the mouth and do not require spitting or discarding of the product.

Questions on these products added to the 12<sup>th</sup> grade survey in 2011 and the 8<sup>th</sup> and 10<sup>th</sup> grade surveys in 2012 out of concern that they may become popular among adolescents. This concern was not realized, and past 12-month prevalence has always been less than 2% in all grades. These questions were discontinued in 2023 as a result of low prevalence.

### *Wine Coolers*

Wine coolers are sweet, carbonated, alcoholic beverages. The survey first included questions on these products for 12<sup>th</sup> grade students in 1988, and past 12-month prevalence was 69%. Since then, prevalence has declined substantially, to 21% in 2022.

Use of these products is also assessed with survey questions on the broader topic of “flavored alcoholic beverages,” which include wine coolers, hard seltzers, and ready-to-drink cocktails. Questions on wine coolers were dropped in 2022 because they no longer warranted specialized attention as prevalence has fallen more than 50% since their heyday in the 1980s.

## **SUMMARY OF TRENDS**

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As these varied patterns of use show, the overall proportion of U.S. adolescents using any substance in their lifetime has changed over the years, and the mix of drugs they use has changed even more. A number of drug classes showed dramatic declines (particularly in the 1980s), some showed substantial increases (particularly in the late 1970s and again in the 1990s), and some remained fairly stable. Further, the periods in which they either increased or decreased varied considerably, although between 1992 and 1996—the “relapse phase” of the epidemic—the use of many drugs increased and by 1997 the use of most had stabilized. Afterwards most have declined in use to some degree, sometimes very sharply, as was seen with LSD and MDMA; however, this was not true of all illicitly used drugs—in particular the prescription type drugs such as narcotics other than heroin, sedatives, and tranquilizers continued to increase well into the 2000s before they began their current declines, making them an important part of the nation’s drug problems.

Recent years have seen new increases and decreases in adolescent drug use. Vaping of nicotine and marijuana surged in prevalence in 2018 and 2019. This surge was then followed by a large, overall decline in adolescent drug use after the onset of the pandemic from 2020 to 2021 that resulted in some of the largest one-year declines recorded by the survey. Whether these declines persist among affected cohorts in the coming years—and whether persistence of the declines varies by substance—is of central importance for drug theory and policy. These findings demonstrate once again the ever-changing nature of adolescent substance use and, consequently, the need to continually monitor and address emerging trends.

**Author Note: Further content to this chapter will be added in the coming months.**

Chapter 6:  
Data is forthcoming May 31, 2024

Chapter 7:  
Data is forthcoming May 31, 2024

Chapter 8:  
Data is forthcoming May 31, 2024

Chapter 9:  
Data is forthcoming May 31, 2024

Chapter 10:  
Data is forthcoming May 31, 2024



Appendix A:  
Data is forthcoming May 31, 2024

Appendix B:  
Data is forthcoming May 31, 2024

Appendix C:  
Data is forthcoming May 31, 2024

Appendix D:  
Data is forthcoming May 31, 2024



**Monitoring the Future website:  
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