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American teens more cautious about using synthetic drugs

ANN ARBOR—The use of synthetic marijuana by the nation's teens dropped substantially this year, and a sharply increasing proportion of them see great risk in using so-called "bath salts."

Both of these drugs are synthetics sold over the counter in many outlets such as gas stations and convenience stores, as well as on the Internet. They have been the subject of great concern because of their serious and unpredictable consequences for the user's health. These and other findings come from the University of Michigan's Monitoring the Future study, which is funded by the National Institute of Drug Abuse.

National samples of 40,000 to 50,000 students in three grades (8, 10 and 12) have been surveyed every year since 1991. Among the most important findings from this year's survey of U.S. secondary school students are the following:

Synthetic Marijuana. The use of synthetic marijuana in the past year has dropped sharply—from 11.3 percent in 2012 to 7.9 percent in 2013 among 12th graders, from 8.8 percent to 7.4 percent among 10th graders, and from 4.4 percent to 4.0 percent among 8th graders (the drop among 12th graders is highly statistically significant, and the drop for the three grades combined is also significant). Synthetic marijuana (sold as K-2, Spice, etc.) has been of increasing concern because of its adverse effects and high rates of use (first documented by this study in 2011). In 2012, synthetic marijuana was the second-most widely used illicit drug among 10th and 12th graders (after marijuana), and the third-most widely used among 8th graders (after marijuana and inhalants).

Synthetic marijuana is made by spraying synthetically produced cannabinoids (chemical elements found in cannabis) on herbs or other plant materials. It is usually sold over-the-counter or on the Internet. In 2011, the Drug Enforcement Administration scheduled (banned) a number of specific chemicals commonly used to make it, but new chemical variations which skirt the regulations continue to appear. A majority of teen users of synthetic marijuana also use regular marijuana.

Bath salts. So-called "bath salts" are among the latest designer drugs to enter the scene. Questions on the use of these powerful and dangerous stimulant drugs have been included since the 2012 survey; that year the annual prevalence rates (the percent who reported any use in the prior 12 months) were 0.8 percent, 0.6 percent and 1.3 percent for grades 8, 10 and 12, respectively. This year, the rates have remained very low at 1 percent, 0.9 percent and 0.9 percent.

In all three grades the proportions of students who say the use of bath salts involves great risk to the user have increased sharply. The investigators say that this very likely helps to explain why the use of these drugs has remained at such low levels. In a single year, the percent indicating that occasional use carries great risk of harm has risen by 13, 17 and 25 percentage points in grades 8, 10 and 12, respectively. This is a very steep rise in this belief, typically not seen over such a short period of time, say the investigators. Unlike synthetic marijuana, which experienced a substantial rise in popularity after entering the scene, use of bath salts has remained quite contained, suggesting that the messages about its dangers have been received.

Like synthetic marijuana, bath salts are frequently sold over the counter under various brand names. They are linked to a number of serious side effects, including paranoia, suicidal thoughts, violent behavior, hallucinations and increased heart rate. Calls to poison control centers about bath salts reportedly jumped from around 300 in 2010 to more than 6,000 in 2011. Since then, the number of calls has fallen to 2,700 in 2012 and continues to decline sharply, quite likely due to widespread publicity about the dangers of bath salts as well as the DEA's scheduling of certain chemicals used to make them.

Any Illicit Drug. The index of any illicit drug use tends to be driven by marijuana, which is by far the most prevalent of the many illicitly used drugs. In 2013, the proportions of students indicating any use of an illicit drug in the prior 12 months are 15 percent, 32 percent, and 40 percent in grades 8, 10 and 12, respectively—higher than a year ago by 1.5, 1.6 and 0.6 percentage points for the same grades (only the change at 8th grade is statistically significant). For the three grades combined, the rate is up by 1.3 percentage points, also a statistically significant increase. The percentages indicating any use in their *lifetime* are 20 percent, 39 percent and 50 percent. In other words, half of America's high school seniors have tried an illicit drug by the time they graduate and four in 10 have used it in just the past year.

"But it should also be noted that fully half of today's seniors have not tried an illicit drug by the end of high school," said Lloyd Johnston, the principal investigator of the study.

Marijuana. In general, the use of marijuana among teens has been drifting higher in recent years following a decade or more of fairly steady decline. In 2013, use among 8th and 10th graders has drifted up further, though not enough to reach statistical significance. Annual prevalence (the percent using once or more in the prior 12 months) has risen from 11.4 percent to 12.7 percent among 8th graders and from 28.0 percent to 29.8 percent among 10th graders, while among 12th graders, use has held steady at 36.4 percent.

"But more noteworthy is the fact that the proportion of adolescents seeing marijuana use as risky declined again sharply in all three grades," Johnston said. "Perceived risk—namely the risk to the user that teenagers associate with a drug—has been a lead indicator of use, both for marijuana and other drugs, and it has continued its sharp decline in 2013 among teens. This could foretell further increases in use in the future."

From 2005 to 2013, the percent seeing great risk from being a regular marijuana user has fallen among 8th graders from 74 percent to 61 percent, among 10th graders from 66 percent to 47 percent and among 12th graders from 58 percent to 40 percent—including significant one-year

declines in all three grades this year. Reported availability of marijuana, after falling for some years, leveled out about five or six years ago.

One interesting finding this year relates to the substantial number of states that have passed medical marijuana laws. Of the 12th graders who say that they have used marijuana in the 12 months prior to the survey *and* who reside in states that passed such laws by the end of the year prior to the survey, a third (34 percent) say that one of their sources of marijuana is another person's medical marijuana prescription. And 6 percent say they get it from their own prescription. It thus appears that state medical marijuana laws provide an additional avenue of accessibility to the drug for teens. These findings are based on self-reports from 12th graders surveyed in the 2012 and 2013 surveys combined.

Daily use of marijuana, which also has been rising in recent years for all three grades, remains essentially flat at relatively high levels between 2012 and 2013. The prior increases were substantial—up by a quarter to one-half compared to the low points reached between 2006 and 2008 for the three grades. Today, one in every 15 high school seniors (6.5 percent) is a daily or near-daily marijuana user. The comparable percentages among 8th and 10th graders are 1.1 percent and 4.0 percent, respectively.

Any Illicit Drug Other than Marijuana. When marijuana is removed from the list of illicit drugs, far fewer students report use of any of the other drugs included in the index (for 12th graders, these include hallucinogens, cocaine, crack and heroin, as well as use of any of the psychotherapeutic drugs—amphetamines, sedatives, tranquilizers or narcotics other than heroin—taken without medical supervision; for 8th and 10th graders, sedatives and narcotics other than heroin are not included). In 2013, 6 percent, 11 percent and 17 percent of the students in the three grades, respectively, report using *any* of these other drugs. Those percentages have dropped gradually since around 1996 or 1997, but without further decline in 2013.

Drugs Declining in Use

Most of the individual illicit drugs show no significant change in use between 2012 and 2013. In addition to synthetic marijuana, only inhalants, salvia, narcotics (other than heroin) and hallucinogens (other than LSD) show evidence of declining this year.

Inhalants. Inhalant use has been in decline for some years and has continued to decline in all three grades in 2013—annual prevalence is down by a statistically significant 0.7 percentage points to 3.8 percent for the three grades combined. The 1.1 percentage point decline in 8th grade—which consistently has the highest rate of use—is also significant. Unlike the case for virtually all other drugs, younger students are the ones most likely to use inhalants. The annual prevalence of use is now 5 percent, 4 percent and 3 percent in grades 8, 10 and 12, respectively.

Salvia. *Salvia divinorum* is an herb in the mint family that can induce relatively short-acting hallucinogenic effects when smoked or eaten. *Salvia* use, first measured in 2009, has shown substantial declines in all grades, but only the decline of 1.0 percentage points in 12th grade this year reaches statistical significance. The annual prevalence rates in 2013 for *salvia* are quite low at 1.2 percent, 2.3 percent and 3.4 percent in grades 8, 10 and 12.

Narcotic Drugs. The use of narcotic drugs other than heroin (most of which are prescription analgesics) has increased sharply in recent years, as have emergency room admissions and overdose deaths involving their use, making this class of drugs of particular concern (use of this general class of drugs is reported only for 12th graders). After showing a considerable rise in use from 1992 to 2000, annual prevalence for this general class of drugs leveled off through 2009, and has since been in decline. The decline continues into 2013, though the one-year decline is not significant (-0.8 percentage points, to 7.1 percent annual prevalence). The peak year of use was 2004 with 9.5 percent annual prevalence.

OxyContin, Vicodin. Two of the most commonly used narcotic drugs are OxyContin and Vicodin. The 12th graders show a significant decrease in Vicodin use and a nonsignificant decrease in OxyContin use in 2013, consistent with the decline in use of the general category of narcotic drugs. The lower grades do not show parallel declines in 2013 for either of these drugs; however, use in both grades is well below recent peak levels. Annual prevalence rates for OxyContin are now 2.0 percent, 3.4 percent and 3.6 percent, and for Vicodin, they are 1.4 percent, 4.6 percent and 5.3 percent in the three grades—rates that are one-quarter to one-half below what they were in recent peak years.

Hallucinogens other than LSD. Use of these drugs for the most part involves the ingestion of hallucinogenic mushrooms (Psilocybin or "shrooms") and use has continued to decline in 2013, though not significantly in any grade nor in the three grades combined. Annual prevalence rates are now down between a third and a half from recent peak levels. In 2013, they are 1 percent, 3 percent and 4 percent in grades 8, 10 and 12.

Drugs Holding Steady in 2013

Quite a number of drugs exhibit little evidence of change in use in 2013. Among them are LSD; amphetamines; Adderall, specifically; Ritalin, specifically; ecstasy; cocaine; crack; heroin; methamphetamine; crystal methamphetamine; sedatives; tranquilizers; Rohypnol; Ketamine; and steroids. In all cases, use is well below recent peak levels. The proportion using any prescription psychoactive drug also is unchanged in 2013, but in this case, use is not far below the peak rate observed in 2005.

LSD. Use of LSD remains at very low levels, which have held for a decade. Annual prevalence is 1.0 percent, 1.7 percent and 2.2 percent, roughly one-fourth of recent peak rates of use. The investigators caution, however, that perceived risk and disapproval of LSD have fallen substantially among 8th graders since the mid- to late-1990s, leaving them more vulnerable to having a recurrence of an epidemic of use, as has happened in the past. The investigators attribute this change to what they have termed "generational forgetting" of the dangers of use, as those who saw the consequences in the last drug epidemic mature out of adolescence and are replaced by youngsters more naïve about the consequences.

Amphetamines. In general, the use of amphetamines outside of medical supervision is at quite low levels compared to most earlier years, and has been declining since the early 2000s among 8th and 10th graders. Among 12th graders, the decline appears to have ended in 2009, and since then there has been some modest increase. Among 8th and 10th graders, the decline has ended this year. The story for 2013 is complicated by the fact that the wording for the amphetamine use

question was updated in some of the questionnaire forms. Based on the data from the forms where the wording remained unchanged between years, no increases are seen among 8th and 10th graders: both show slight, nonsignificant declines in annual prevalence (-0.3 percentage points in 8th and -0.6 in 10th). Among 12th graders, there is a nonsignificant 0.3 percent percentage point increase.

One hypothesis to explain the increase in nonprescribed use at 12th grade between 2009 and 2012 is that amphetamines are being used by older students in particular to help them perform better on tests and to complete assignments. Stories in the media have suggested this, though the issue at the high school level may well have been exaggerated. Previously published results from the 2012 MTF follow-up surveys show amphetamine use rising since 2008 among college students, passing the rates of use among their noncollege peers. This would be consistent with the notion that they are being used for studying, and the investigators speculate that this pattern may have spread down the age spectrum to high school seniors.

Adderall. The stimulant drug Adderall is used in the treatment of ADHD. Use of Adderall without prescription is essentially unchanged at all three grades this year. Usage rates are down only a little from peak levels among 8th and 10th graders. Though there is no increase this year among 12th graders, their annual prevalence in 2013 (7.4 percent) is significantly higher than when use was first measured in 2009 (5.4 percent). This fact would be consistent with the interpretation that older students may use Adderall to assist in studying. Annual prevalence rates in 2013 are 1.8 percent, 4.4 percent and 7.4 percent in the three grades.

Ritalin. Ritalin has been widely used in the treatment of ADHD. Its use outside of medical supervision has generally been in decline in all grades but shows no systematic change in 2013. Annual prevalence is low at 1.1 percent, 1.8 percent and 2.3 percent in the three grades.

Ecstasy. Use of ecstasy has shown little systematic change in 2013 despite the advent of "Molly," which is considered to be a purer form of ecstasy. Nor is there any perceptible change in perceived risk, disapproval, or perceived availability for ecstasy.

"We do not know how many young people recognize the recently arrived Molly as a form of ecstasy, so we cannot be sure that users would include it in answer to a question about ecstasy," Johnston said. "In the forthcoming 2014 survey, our questions on ecstasy use will include 'Molly' as an explicit example to clarify its inclusion."

The annual prevalence of ecstasy use in 2013 is 1.1 percent, 3.6 percent and 4.0 percent in grades 8, 10 and 12, respectively—rates that are down from the 2001 peak levels by between four-tenths and seven-tenths.

Use of Any Prescription Drug without Medical Supervision. The proportion of 12th graders indicating that they have used any prescription drug outside of medical supervision has remained relatively stable since 2008 (this is based on their answers to questions about use without a doctor's orders of amphetamines, tranquilizers, sedatives and/or narcotics). In 2013, 21.5 percent indicate use without a doctor's orders of at least one prescription drug in their lifetime, while

15.0 percent indicate such use in the past year (in 2008 these rates were 21.5 percent and 15.4 percent, respectively) .

The sources of such prescription drugs remain primarily informal networks of friends and, to a lesser extent, relatives. In the years 2009–2013 combined, among past-year users of amphetamines, the most prevalent sources are "given by a friend" (56 percent), "bought from a friend" (43 percent), and "bought from a drug dealer or stranger" (20 percent). Among past-year users of tranquilizers, the same three sources top the list at 55 percent, 39 percent and 24 percent, respectively. Among past-year users of narcotics other than heroin, these three sources are endorsed by 51 percent, 33 percent and 18 percent, respectively—however, the response "from a prescription I had" ranks second at 37 percent. It thus appears that for narcotics other than heroin, having leftover pills from an earlier prescription is a significant source for nonmedically supervised use.

Other illicit drugs holding steady in 2013 include powder cocaine, crack, heroin, methamphetamine, crystal methamphetamine, sedatives, tranquilizers, the club drugs Rohypnol and Ketamine, and anabolic steroids.

Alcohol. The use of alcohol by teens has dropped dramatically over roughly the past two decades—particularly among the youngest teens—and continues to drop in 2013. The 30-day prevalence of alcohol use declines in all three grades in 2013, dropping 0.8, 1.9 and 2.3 percentage points in grades 8, 10 and 12. The 12th-grade decline is statistically significant as is the decline for the three grades combined. All three grades are now at the lowest point that they have been at least since the mid-1990s, and likely longer. Among 8th graders, most of whom are 13 or 14 years old, the proportion who have ever taken "more than just a few sips" of alcohol by 8th grade has fallen by half since the 1990s.

Prevalence of recent binge drinking (having five or more drinks in a row at least once in the past two weeks) has dropped in 2013 by 1.9 percentage points in 10th grade and by 1.6 percentage points in 12th grade, while 8th-grader use remains unchanged. As with 30-day prevalence, all grades are at their lowest points since at least the mid-1990s. The two-week prevalence rates for binge drinking are now at 5.1 percent, 13.7 percent and 22.1 percent in the three grades—down from peak levels by about six-tenths, four-tenths and three-tenths, respectively.

Despite the declines in prevalence of binge drinking, *perceived risk* of that behavior has actually fallen a little in all three grades in 2013. *Disapproval* of binge drinking continues a gradual increase in the upper grades; and *perceived availability* for alcohol continues longer-term declines, which are sharpest in the lower grades.

Tobacco. This year's findings on cigarette use and the use of other tobacco products are presented in a separate companion press release:
<http://www.monitoringthefuture.org/press.html>

Summary. The overall story this year is that young people seem to be getting the message that designer drugs like synthetic marijuana and bath salts are dangerous. The use of most illicit drugs

among the nation's teenagers is either holding steady from last year or showing some modest decline. Alcohol use and binge drinking are continuing their long term declines in 2013, reaching their lowest points in the history of the study.

"Synthetic drugs are particularly dangerous because their ingredients are unknown, they have not been tested for safety, and their ever-changing ingredients can be unusually powerful," Johnston said. "Users really don't know what they are getting and, as the thousands of calls to the nation's poison control centers relating to these drugs indicate, their effects can be very harmful."

One important question for the future is whether the decline in perceived risk of marijuana use will lead to increased marijuana prevalence in the coming years, as it has in the past. Another is whether the legalization of recreational marijuana use in states like Colorado and Washington will affect marijuana attitudes and behaviors among youth more generally.

Tables and figures associated with this release may be accessed at <http://www.monitoringthefuture.org/data/data.html>

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The findings summarized here will be published in a forthcoming volume: Johnston, L. D., O'Malley, P. M., Miech, R.A., Bachman, J. G., & Schulenberg, J. E. (2014). *Monitoring the Future national results on adolescent drug use: Overview of key findings, 2013*. Ann Arbor, Mich.: Institute for Social Research, the University of Michigan. The content presented here is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Drug Abuse, or the National Institutes of Health.