



ARTICLES

NONMEDICAL USE OF PRESCRIPTION ADHD STIMULANTS AND PREEXISTING PATTERNS OF DRUG ABUSE

Christine T. Sweeney, PhD, MPH¹, Mark A. Sembower, MS², Michelle D. Ertischek, MPH¹,
Saul Shiffman, PhD², Sidney H. Schnoll, MD, PhD¹

¹Pinney Associates, Inc., Bethesda, Maryland, USA

²Pinney Associates, Inc., Pittsburgh, Pennsylvania, USA

Multidrug use is well documented among nonmedical users of prescription stimulants. We sought to provide insight into the drug use patterns of those reporting nonmedical use of prescription attention-deficit hyperactivity disorder (ADHD) stimulants in an attempt to discern whether such use is a first step in a pattern of drug-abusing behavior or, conversely, is a later development accompanied or preceded by a history of drug abuse. A cross-sectional, population-based survey of the U.S. civilian, non-institutionalized population aged 12 years and older was analyzed for lifetime nonmedical use of prescription ADHD stimulants, lifetime nonmedical use of another prescription drug, illicit drug use, and drug use initiation patterns. This included 443,041 respondents from the 2002–2009 National Survey on Drug Use and Health. Lifetime nonmedical use of prescription ADHD stimulants was reported by 3.4% of those aged 12 years and older. Of these, 95.3% also reported use of an illicit drug (i.e., marijuana, cocaine/crack, heroin, hallucinogens, inhalants) or nonmedical use of another prescription drug (i.e., tranquilizers, pain relievers, or sedatives), and such use preceded nonmedical use of prescription ADHD stimulants in 77.6% of cases. On average, 2.40 drugs were used prior to the first nonmedical use of prescription ADHD stimulants. These data suggest that nonmedical use of prescription ADHD stimulants is not commonly an initiating factor leading to the nonmedical use of other prescription medications or abuse of illicit drugs. Rather, nonmedical use of prescription ADHD stimulants appears to be adopted by individuals already engaged in broader patterns of drug abuse and misuse.

KEYWORDS. Attention-deficit hyperactivity disorder, amphetamine, methylphenidate, psychostimulants, substance abuse and dependence

INTRODUCTION

An estimated 9.5% of children aged 4 to 17 years¹ and 4% of adults² in the United States have attention-deficit hyperactivity disorder (ADHD), a neurobiological disorder associ-

ated with learning disorders, psychiatric comorbidity, and substantial education, occupation, and interpersonal impairments.³ Central nervous system stimulants, which include formulations of methylphenidate and amphetamines, are recommended as first-line medications in

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Address correspondence to Christine T. Sweeney, PhD, MPH, Pinney Associates, Inc., 4800 Montgomery Ln., Suite 400, Bethesda, MD 20814. E-mail: csweeney@pinneyassociates.com

the pharmacologic treatment of ADHD and have been demonstrated to be effective in the treatment of ADHD.^{4,5} However, as with other drugs affecting the central nervous system, they have the potential to be misused, abused, and diverted for nonmedical purposes.⁶

Nonmedical useⁱ of prescription ADHD stimulants has been documented among young adults in general and college students in particular, with rates of past-year nonmedical use ranging from 5% to 35% in various studies of college-age individuals.⁷ Kroutil et al.⁸ found the past-year prevalence of nonmedical use of ADHD stimulants to be higher among young adults aged 18 to 25 years (1.3%) than among individuals aged 12 to 17 years (0.9%) or those aged 26 years or older (0.1%).⁸

Several studies have examined the correlates of nonmedical use of prescription stimulants, finding that those who engaged in nonmedical use of prescription stimulants may also have engaged in nonmedical use and abuse of other drugs.^{9–13} For example, in a study of college students, McCabe et al.¹⁰ reported that students who engaged in nonmedical use (defined as “use not under a doctor’s orders”) of at least one of three prescription stimulant brands (Ritalin, Dexedrine, and Adderall) were more likely to report illicit drug use, including use of marijuana, ecstasy, cocaine, and nonmedical use of prescription opioids.¹⁰

This association has also been demonstrated among young adults outside of the college setting. For example, Herman-Stahl et al.¹¹ analyzed young adult’s responses (age range, 18–25 years) to the 2002 National Survey on Drug Use and Health (NSDUH) and found that using marijuana and other illegal drugs increased the odds of both methamphetamine and nonmedical prescription stimulant use. Similarly, Wu et al.¹⁴ found that 16 to 25 year olds reporting prescription stimulant misuse (defined as nonmedical use, use that was not prescribed, or use only for the experience or feeling it caused) were likely to report using three or more illicit drugs at least once in their lifetime.¹⁴

Although multi-drug use is well documented among nonmedical users of prescription stimulants, research to date has typically

been limited to young adults or college students. Furthermore, limited analyses have been performed of drug use initiation patterns (i.e., whether the other drug use occurred before, during, or after the same time period as the nonmedical prescription stimulant use). Using data from the 2002–2004 NSDUH, Colliver et al.¹⁵ examined the order of first nonmedical use of prescription stimulants and other prescription drugs and illicit drugs among lifetime users and found that the age at initial nonmedical use of stimulants was more often earlier than initial use of several other drugs, including crack cocaine, heroin, ecstasy, cocaine, prescription tranquilizers, PCP, and prescription pain relievers. Initial use of alcohol, cigarettes, marijuana, and inhalants preceded initial misuse of stimulants for most users of stimulants and other drugs. However, the broad category of stimulant medications, as measured in the NSDUH and reported by Colliver et al.,¹⁵ is composed of not only ADHD medications, but also prescription diet pills and methamphetamine. We sought to provide insight into the drug use histories of those specifically reporting nonmedical use of prescription ADHD stimulants in an attempt to discern whether nonmedical use of prescription ADHD stimulants was the first step in a pattern of abusing behavior or, conversely, whether it is a later development following a preexisting history of drug abuse. We also sought to examine and compare the demographic characteristics of those reporting nonmedical use of prescription ADHD stimulants, those reporting other drug use, and those reporting no drug use. This study examined the drug use patterns and correlates of those reporting nonmedical use of prescription ADHD stimulants in a general population sample, based on data from the 2002–2009 NSDUH. Unlike prior datasets, which were largely restricted to young adults, the NSDUH affords an opportunity to examine nonmedical use in a broad U.S. population, including adolescents, young adults, and adults.

METHODS

We conducted an analysis of the public use data from the NSDUH, an annual household-based

survey sponsored by the U.S. Substance Abuse and Mental Health Services Administration. The NSDUH collects information on the prevalence, patterns, and consequences of drug and alcohol use and abuse via in-person, computer-assisted interviews from a representative sample of the civilian, noninstitutionalized U.S. population aged 12 years and older. Specifically, NSDUH collects information from residents of households and noninstitutional group quarters (e.g., shelters, rooming houses, dormitories) and from civilians living on military bases. The survey excludes homeless individuals who do not use shelters, military personnel on active duty, and residents of institutional group quarters, such as jails and hospitals. The data used in this analysis are based on information obtained from a total of 443,041 respondents to the 2002 through 2009 surveys. Analysis weights were created so that estimates would be representative of the target population.

The NSDUH solicits information about the nonmedical use of four broad categories of prescription medications: stimulants, pain relievers, tranquilizers, and sedatives. Nonmedical use is defined in the NSDUH as use of these medications without a prescription of the respondent's own or use simply for the experience or feeling the drug caused. The survey includes questions that allow for estimation

of nonmedical use of these broad categories of prescription drugs in the participant's lifetime, the past year, and the past month. The NSDUH also contains detailed questions about the nonmedical use of a large set of specific medications. However, this information is generally limited to use at any time in the individual's life (i.e., lifetime use). Additional information (e.g., age of first use) is generally only obtained for the broad drug categories, not for specific medications.

For questions regarding nonmedical use of prescription stimulants, respondents are presented with a single placard containing pictures of the common dosage forms of several different prescription stimulants and a listing of only the names of some others. The stimulant category includes prescription-type methamphetamine (e.g., Desoxyn), prescription diet pills, and ADHD medications. Our focus was on assessing the nonmedical use of stimulants with specific indications for the treatment of ADHD (Table 1).

Several ADHD medications are presented in one of three groups (Ritalin and Methylphenidate constitute one such group). The remaining medications (including Dexedrine and dextroamphetamine) are presented individually on the placard. Respondents are instructed to review the stimulant

TABLE 1. Prescription Stimulants for ADHD Reported in the NSDUH and Used in the Calculation of Lifetime Nonmedical Use of Prescription ADHD Stimulants

Drug-specific question and open-ended responses	Open-ended responses only ^a
<ul style="list-style-type: none"> • Dexedrine (drug-specific question, open-ended responses) • Dextroamphetamine (drug-specific question, open-ended responses) • Ritalin/methylphenidate (drug-specific question, open-ended responses) • Adderall (drug-specific question from 2006 through 2009, open-ended responses prior to 2006) 	<ul style="list-style-type: none"> • Biphetamine • Dextrostat • Concerta • Metadate CD • Dexmethylphenidate, Focalin • Methylin • Dexamyl • Adderall XR • ADHD/ADD medication; otherwise unspecified

Abbreviations: ADHD = attention-deficit hyperactivity disorder; NSDUH = National Survey on Drug Use and Health.

^aTwo recently approved stimulants for the treatment of ADHD (Daytrana, approved in 2006, and Vyvanse, approved in 2007) were not included in this analysis because they were not available throughout the entire time period of study. However, an examination of NSDUH data revealed no reports of nonmedical use of Daytrana in response to open-ended questions in 2006–2009; <0.01% of respondents reported nonmedical use of Vyvanse in both 2009 and 2008 in response to open-ended questions, although there were no reports of nonmedical use in 2007.

placard and are asked the following for each group:

Have you ever, even once, used [Ritalin or Methylphenidate] that was not prescribed for you or that you took only for the experience or feeling it caused?

For the medications presented individually on the card (including Dexedrine and dextroamphetamine), respondents are told to look at all of the pictured or listed medications and are asked:

Which of the stimulants shown below the red line on Card C have you used when they were not prescribed for you or that you took only for the experience or feeling they caused?

Nonmedical use for the remaining ADHD stimulants (e.g., Biphedamine, DextroStat, Concerta, Dexamyl, dexamethylphenidate/Focalin, Metadate, Methylin) was captured via the following open-ended question:

Have you ever, even once, used any other prescription stimulant, besides the ones shown on Card C when it was not prescribed for you or that you took only for the experience or feeling it caused?

If the respondent answers “yes” to this question, then he or she is asked to state which other prescription stimulant they used. The medications in the previously described questions could also be captured in this open-ended question. Thus, information on the nonmedical use of prescription ADHD stimulants is captured via responses to both close-ended questions that directly ask about nonmedical use of specific ADHD medications and open-ended questions that ask broadly about any other prescription stimulant use.

Prior to 2006, information on nonmedical use of Adderall (any formulation) was captured via the open-ended question about some other stimulant. However, in 2006 a series of questions specifically about Adderall were added to a section of the survey entitled “Special Drugs” in which respondents are asked the following:

Adderall is a prescription stimulant that comes in tablet or capsule form. Adderall tablets and capsules are shown below. Have you ever, even once, used Adderall that was not prescribed for you or that you took only for the experience or feeling it caused?

Those who reported any nonmedical use of Adderall were further asked when they had last used Adderall nonmedically (i.e., within the past 30 days, more than 30 days ago but within the past 12 months, or more than 12 months ago). For our purposes, a person was considered to have engaged in nonmedical use of prescription ADHD stimulants if they reported any nonmedical use of a prescription stimulant specifically indicated for the treatment of ADHD (i.e., any of the medications listed in Table 1) during their lifetime, whether based on a drug-specific, closed-ended question (including the Adderall-specific questions added in 2006) or an open-ended question.

Questions regarding nonmedical use of other prescription medications (i.e., prescription pain relievers, tranquilizers, and sedatives) are asked in a similar manner. Specifically, respondents are shown visual examples of brand name pills and asked:

Have you ever, even once, used [any of the following medications when they were] not prescribed for you or that you took only for the experience or feeling they caused?

Respondents are also asked a follow-up question to assess nonmedical use of other prescription medications:

Have you ever, even once, used any other [prescription medication], besides the ones shown . . . when it was not prescribed for you or that you took only for the experience or feeling it caused?

Respondents who answer this question affirmatively are then asked to provide the names of other prescription medications used nonmedically. The names of up to five other prescription drugs may be provided for each category (pain relievers, tranquilizers, stimulants, and sedatives).

The NSDUH also collects information on age at first nonmedical use for the four broad

categories of prescription drug type (How old were you the first time you used any prescription [pain reliever/tranquilizer/stimulant/sedative] that was not prescribed for you or that you took only for the experience or feeling it caused?). This information is only collected at the category level, and not for specific medications within the broader class. Age at first use of illicit street drugs (e.g., cocaine/crack, inhalants, marijuana/hashish, heroin, and hallucinogens) is also collected.

ANALYSIS

We calculated the percentage of those who reported ever having engaged in nonmedical use of a prescription ADHD stimulant in the NSDUH surveys of 2002–2009. Sample sizes reported are unweighted; all percentages and mean ages that are reported are weighted. Table 1 includes the list of specific ADHD stimulants that were incorporated in this measure. Among those who reported ever having engaged in nonmedical use of prescription ADHD stimulants, we calculated the age at first nonmedical use for the broad category of prescription stimulants (because information on age at first use for specific stimulant medications, including ADHD medications, was not available). Thus, for those who engaged in nonmedical use of prescription ADHD stimulants only (and did not report nonmedical use of any other prescription stimulant medication) the reported age at first use specifically represents the age at first nonmedical use for an ADHD medication. For those who reported engaging in nonmedical use of other stimulants, as well as nonmedical use of prescription ADHD stimulants, it is not possible to determine whether the reported age at first use refers to nonmedical use of an ADHD medication or another type of stimulant medication. In this case, the reported age at first use is only a proxy for age at first nonmedical use of prescription ADHD stimulants.

Among those who reported ever having engaged in nonmedical use of prescription ADHD stimulants, the reported age at first nonmedical use of any other prescription drug class (i.e., tranquilizers, pain relievers, and sedatives)

and age at first use of any illicit drug use were also calculated. The reported average age for first nonmedical stimulant use was compared with the average age for first use of other drugs to determine the proportion of those engaged in nonmedical use of prescription ADHD stimulants for whom initial use of other drugs (marijuana, cocaine/crack, heroin, hallucinogens, and nonmedical use of tranquilizers, pain relievers, and sedatives) occurred prior to their initial nonmedical use of prescription stimulants.

We also examined the following potential correlates of nonmedical use of prescription ADHD stimulants: age, sex, race/ethnicity, marital status, education, employment status, and population density. Chi-square statistics and corresponding *P* values were calculated to compare the demographic characteristics of those reporting nonmedical use of prescription ADHD stimulants with the following two groups: those reporting other nonmedical use or illicit drug use (but no nonmedical use of prescription ADHD stimulants) and those reporting no drug use (meaning no nonmedical use of prescription ADHD stimulants and no nonmedical use of other pharmaceuticals or use of illicit drugs). These statistics were calculated using SUDDAAN version 10.0.1, which accounts for the complex weighting scheme used by the NSDUH.

RESULTS

Over the study, 3.4% of Americans aged 12 years and older reported ever having engaged in nonmedical use of prescription ADHD stimulants. Among those, 16.8% reported nonmedical use of ADHD stimulants exclusively, whereas the remaining 83.2% reported nonmedical use of other stimulants in addition to ADHD stimulants (e.g., prescription diet pills and methamphetamine). Table 2 compares the demographic characteristics of (1) those reporting any lifetime nonmedical use of prescription ADHD stimulants; (2) those reporting other nonmedical use or illicit drug use (including nonmedical use of non-ADHD prescription stimulants for those not reporting any

TABLE 2. Prescription ADHD Stimulants Used to Calculate Lifetime Nonmedical Use (N = 443,041)^a

Characteristic	Nonmedical use of prescription ADHD stimulants (n = 21,465) (3.4% ^b)	Other nonmedical use or illicit use (n = 187,519) (42.9% ^b)	No drug use (n = 234,057) (53.7% ^b)
Age, y			
12–17	8.5 (8.1, 8.9)	6.1 [‡] (6.0, 6.2)	13.7 [‡] (13.6, 13.8)
18–25	33.9 (32.8, 35.0)	15.6 [‡] (15.4, 15.8)	10.1 [‡] (10.0, 10.3)
26–34	16.6 (15.6, 17.7)	18.1 [§] (17.8, 18.4)	11.4 [‡] (11.2, 11.6)
35 or Older	41.1 (39.5, 42.6)	60.2 [‡] (59.8, 60.5)	64.8 [‡] (64.4, 65.1)
Female	42.6 (41.3, 43.9)	46.9 [‡] (46.6, 47.3)	55.8 [‡] (55.4, 56.2)
Caucasian, non-Hispanic	87.0 (86.0, 88.0)	72.8 [‡] (72.3, 73.3)	64.5 [‡] (63.9, 65.0)
Married	31.0 (29.6, 32.5)	50.7 [‡] (50.2, 51.2)	55.9 [‡] (55.4, 56.4)
Education:			
12–17 years old (current students)	8.5 (8.1, 8.9)	6.1 [‡] (6.0, 6.2)	13.7 [‡] (13.6, 13.8)
Less than high school	11.3 (10.5, 12.1)	12.1 (11.8, 12.3)	17.2 [‡] (16.8, 17.6)
High school graduate	23.8 (22.7, 24.9)	28.6 [‡] (28.3, 29.0)	28.2 [‡] (27.8, 28.6)
Some college	30.1 (29.0, 31.2)	26.4 [‡] (26.0, 26.8)	19.2 [‡] (18.9, 19.5)
College graduate	26.4 (25.1, 27.7)	26.8 (26.3, 27.2)	21.8 [‡] (21.4, 22.2)
Unemployed	7.6 (7.0, 8.3)	5.2 [‡] (5.0, 5.4)	3.3 [‡] (3.2, 3.4)
+ 1 million individuals	50.1 (48.6, 51.7)	50.7 (50.1, 51.2)	48.5 [§] (48.0, 49.1)

Abbreviations: ADHD = attention-deficit hyperactivity disorder.

^aReported sample sizes are unweighted; percentages displayed in the table are weighted.

^bTable heading percentages are weighted percentages based on the total sample and summed to 100%.

§ $P < 0.05$; † $P < 0.01$; ‡ $P < 0.001$.

P values are determined by χ^2 tests vs. nonmedical use of prescription ADHD stimulants (i.e., nonmedical use of prescription ADHD stimulants).

nonmedical use of prescription ADHD stimulants); and (3) those reporting no drug use (i.e., no nonmedical use of prescription ADHD stimulants, no nonmedical use of other pharmaceuticals and no use of illicit drugs).

Overall, compared with those reporting other nonmedical use or illicit drug use and those reporting no drug use, those reporting lifetime nonmedical use of prescription ADHD stimulants tended to be younger, male, Caucasian, and unmarried; 57.7% of those reporting lifetime nonmedical use of prescription ADHD stimulants were 26 years and older compared with 78.3% for those reporting other drug use and 76.2% for those reporting no drug use. Compared with the other two groups, a significantly larger percentage of those reporting nonmedical use of prescription ADHD stimulants were men (57.4% vs. 53.1% for other drug users and 44.2% for those reporting no drug use). Of those reporting nonmedical use of prescription ADHD stimulants, 87.0% were Caucasian, Non-Hispanic, versus 72.8% for those reporting other drug use and 64.5% for those

reporting no drug use. Among those reporting nonmedical use of prescription ADHD stimulants, 69.0% were unmarried versus 49.3% for those reporting other drug use and 44.1% for those reporting no drug use.

The majority (95.3%) of those reporting nonmedical use of prescription ADHD stimulants also reported use of at least one illicit drug (i.e., marijuana, cocaine/crack, heroin, hallucinogens, inhalants) or nonmedical use of at least one other prescription drug (i.e., tranquilizers, pain relievers, sedatives, or non-ADHD stimulants). Such use preceded nonmedical use of prescription ADHD stimulants in 77.6% of cases; on average, 2.40 (95% CI = 2.35–2.45) drugs were used prior to nonmedical use of prescription ADHD stimulants. Among those reporting nonmedical use of prescription ADHD stimulants who also reported use of an illicit drug or nonmedical use of another prescription drug, the most commonly reported other drugs were marijuana (90.6%), hallucinogens (68.2%), and prescription pain relievers (66.1%) (Table 3). These users also frequently reported

TABLE 3. Age of First Nonmedical or Illicit Drug Use Among Those Reporting Nonmedical Use of Prescription ADHD Stimulants (n = 21,465)

Drug ^a	Mean age, y (SE)	95% CI for age	Other drug use among those reporting nonmedical use of prescription ADHD stimulants (%)	Other drug use preceding nonmedical use of prescription ADHD stimulants (%)	Average number of drugs used prior to nonmedical use of prescription ADHD stimulants (95% CI)
Any prescription ADHD stimulants	19.45 (0.13)	19.19–19.72	—	—	—
Any other drug use ^b	15.69 (0.09)	15.52–15.86	95.3	77.6	2.40 (2.35–2.45)
Marijuana	15.92 (0.08)	15.76–16.08	90.6	58.7	—
Inhalants	17.48 (0.14)	17.20–17.75	47.2	19.4	—
Hallucinogens	17.95 (0.08)	17.80–18.11	68.2	24.9	—
Prescription pain relievers	19.37 (0.15)	19.07–19.66	66.1	17.6	—
Prescription sedatives	19.72 (0.19)	19.34–20.10	26.8	4.4	—
Cocaine	20.03 (0.12)	19.80–20.27	61.4	13.8	—
Prescription tranquilizers	20.17 (0.14)	19.89–20.44	52.2	10.4	—
Heroin	21.49 (0.30)	20.89–22.09	12.6	1.5	—
Crack	24.59 (0.34)	23.91–25.26	20.5	1.9	—

Abbreviations: ADHD = attention deficit hyperactivity disorder; SE = standard error; CI = confidence interval.

^aIndividual drugs are sorted by increasing age of onset

^bStatistics for any other drug use take into account all other drugs used by each individual: (1) age of first nonmedical use is the minimum age of first nonmedical use among all of the other drugs a person used; (2) any individual who used at least one of the other drugs listed here is included as a yes in the percent other drug use calculation; and (3) any individual who used at least one of the other drugs listed here prior to initial nonmedical use of prescription ADHD stimulants is included as a yes in the percentage of other drug use preceding nonmedical use of prescription ADHD stimulants calculation.

use of cocaine (61.4%) and nonmedical use of prescription tranquilizers (52.2%).

Among those reporting any nonmedical use of prescription ADHD stimulants, the average age at first nonmedical use of a prescription stimulant was 19.45 years (Table 3) compared with an average age of 15.69 years for the initiation of other drug use. Considering those who only reported nonmedical use of prescription ADHD stimulants (i.e., those who did not report nonmedical use of any other stimulant type aside from ADHD stimulants), the reported mean age at first nonmedical use of a prescription stimulant was 21.06 years. Considering those who reported nonmedical use of other prescription stimulants, in addition to nonmedical use of ADHD stimulants, the reported mean age at first nonmedical use of a prescription stimulant was 19.38 years. Reported first use of marijuana (average age = 15.92 years), inhalants (average age = 17.48 years), hallucinogens (average age = 17.95 years), and nonmedical use of prescription pain relievers (average age = 19.37 years) occurred at a younger age compared with the first reported nonmedical use of a prescription stimulant.

DISCUSSION

Our findings suggest that nonmedical use of prescription ADHD stimulants is not commonly the initiating factor leading to the abuse of other drugs. Rather, nonmedical use of prescription ADHD stimulants appears to be adopted by individuals already engaged in broader patterns of drug abuse and nonmedical use.

Extending previous research on the correlates of nonmedical use of prescription stimulants among young adults and college students, we found in a general population sample that those who reported having engaged in nonmedical use of prescription ADHD stimulants also reported having engaged in other drug use. Among those reporting lifetime nonmedical use of prescription ADHD stimulants in our study, 95.3% also reported use of an illicit drug or nonmedical use of another prescription drug class, with such use typically (in 77.6% of cases) preceding nonmedical use of prescription ADHD stimulants. This suggests a broad trend of individuals already engaged in drug abuse and misuse who seek out new drugs as they become available. It does not suggest that prescription stimulants indicated for the

treatment of ADHD have any particular appeal for first-time or naïve nonmedical users of drugs. In fact, available research suggests that individuals who are treated for ADHD are at a lower risk for developing a subsequent substance abuse disorder than those with untreated ADHD.¹⁶

Our study also extends prior research by providing some insight into the patterns of drug use over a user's career. For those reporting both nonmedical use of prescription ADHD stimulants and other drug use, the other drug use preceded nonmedical use of prescription ADHD stimulants in 77.6% of cases, with an average of 2.40 drugs reportedly used prior to the first nonmedical use of prescription ADHD stimulants. Because the NSDUH question about age of first use pertains to all prescription stimulants (not ADHD stimulants specifically), this indicates that nonmedical use of prescription ADHD stimulants first occurred after at least 2.40 other drugs were used non-medically or illicitly. It was not possible to tell how often nonmedical use of prescription ADHD stimulants occurred only after nonmedical use of other prescription stimulants had already been initiated because the NSDUH only characterizes initiation of nonmedical use of the prescription stimulant class, without regard to brand. This likely results in under-counting of drug use preceding nonmedical use of prescription ADHD stimulants. For example, someone who engaged in nonmedical use of prescription diet pills prior to nonmedical use of prescription ADHD stimulants would not be counted as having engaged in nonmedical use prior to non-medical use of prescription ADHD stimulants. Consequently, the data underestimate the extent that drug use preceded nonmedical use of prescription ADHD stimulants.

It is unknown how many of those reporting nonmedical use of prescription ADHD stimulants in our study had also been prescribed the drug legitimately; that is, the data are not able to distinguish between the misuse of ADHD medications by those for whom it is prescribed and nonmedical use by those without a prescription. However, prior research has found misuse among both groups to be associated with multidrug use. For example, in a college sample,

similar proportions of those with and without a prescription for stimulants (16%–18%) reported nonmedical use of stimulants (defined as use of any form of prescription stimulants that were not prescribed for you or that you took only for the experience or feeling they caused or overuse of a medically prescribed stimulant), and lifetime nonmedical use was independently and significantly associated with past year use of marijuana, inhalants, cocaine, hallucinogens, heroin, amphetamines or methamphetamine, ecstasy, prescription analgesics, and prescription tranquilizers.⁹

This study has several limitations. First, results cannot be generalized to those population groups excluded from the NSDUH sampling frame, including homeless individuals who do not use shelters, active military personnel, and residents of institutional group quarters, such as jails and hospitals. The NSDUH only obtains information on lifetime nonmedical use of specific brands of prescription stimulants; it is not designed to estimate current use at the brand-specific level. Because the NSDUH question about age of first use pertains to all prescription stimulants (not ADHD stimulants specifically), it was not possible to tell how often nonmedical use of prescription ADHD stimulants occurred only after nonmedical use of other prescription stimulants had already been initiated. Furthermore, the information on age at first use is based on retrospective self-report, and therefore is subject to recall bias. In addition, the calculated percentage of other drug use preceding nonmedical use of prescription ADHD stimulants could be affected by older adults who may have used other substances in adolescence or early adulthood before the prescribing of stimulants for the treatment of ADHD became more prevalent.

The specific survey question on which estimates of lifetime nonmedical use are based does not allow for differentiation between what might typically be considered abuse of prescription stimulants (e.g., for psychotropic effect) and situations involving use by an individual for whom the medication was not prescribed, even if it was taken only once and for a purpose consistent with the therapeutic effect (e.g., an

adult with suspected ADHD who took the medication prescribed for their child, experienced the medication benefits, and then went on to receive a legitimate prescription after consulting a physician). Finally, the NSDUH does not collect information on motives for nonmedical use, which would provide better understanding of the behavior.

Nonmedical use of prescription ADHD stimulants does not appear to be an initiating factor leading to the nonmedical use of other prescription medications or abuse of illicit drugs. Rather, nonmedical use of prescription ADHD stimulants appears to be adopted by individuals already engaged in broader patterns of drug abuse and misuse.

Note

- i. The definition of nonmedical use can vary by study but is defined by the SAMHSA and in this article as “use that was not prescribed or that you took only for the experience or feeling it caused.”¹⁷ In cases where the term is used in other published article, we specify the exact definition of the term as used by the study authors.

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