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Peak ages of risk for starting nonmedical use of prescription stimulants

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ABSTRACT

Background: To produce population-level, year- and age-specific risk estimates of first time nonmedical use of prescription stimulants among young people in the United States.
Methods: Data are from the *National Surveys on Drug Use and Health* 2004–2012; a nationally representative probability sample survey administered each year. Subpopulations included youths aged 12 to 21 years (n = 240,160) who had not used prescription stimulants nonmedically prior to their year of survey assessment. A meta-analytic approach was used to produce population-level age-, year-, and cohort-specific risk estimates of first time nonmedical use of prescription stimulants.
Results: Peak risk of starting nonmedical use of prescription stimulants was concentrated between ages 16 and 19 years, when an estimated 0.7% to 0.8% of young people reported nonmedical use of these medicines for the first time in the past twelve months. Smaller risk estimates ranging from 0.1% to 0.6% were observed at ages 12 to 15 years and 20 to 21 years. Compared with males, females were more likely to have started nonmedical use of prescription stimulants (odds ratio = 1.35; 95% CI, 1.13–1.62), particularly between the ages of 14 and 19. Females showed a peak annual incidence rate of 1% at age 18, while males the same age showed an incidence rate of 0.5%.
Conclusions: Peak annual incidence rates for nonmedical use of prescription stimulants were observed between the ages of 16 and 19 years. There is reason to initiate interventions during the earlier adolescent years to prevent youths from starting nonmedical use of prescription stimulants.

1. Introduction

Many nationally representative studies reporting past-year and lifetime prevalence rates for nonmedical use of stimulants do not differentiate between first time nonmedical use and nonmedical use that persists years after onset (i.e., use of prescription stimulants that were not prescribed to the user or that the user took only for the experience or feeling they caused). Past-year and lifetime prevalence rates for nonmedical use are informative, but ultimately may convey more information about persistence in nonmedical use than the timing of initiation among youth. To produce reliable age-specific incidence rates for nonmedical use (i.e., peak ages of onset), it is necessary to separate first-time users from sporadic or persistent nonmedical users by excluding the latter from the sample, or by separately analyzing data from these two different types of users (Austic et al., in press; Deandrea et al., 2013; Harris et al., 2008; Meier et al., 2012). The present study is one of only a few to estimate peak age of onset for nonmedical use (Austic et al., in press; Deandrea et al., 2013; Meier et al., 2012), and is the only nationally representative study to produce age-specific incidence rates for nonmedical use of stimulants among young people in the United States (US). Age-specific incidence rates for youth provide crucial information needed to design timely and effective primary prevention initiatives because they identify ages of lower risk directly preceding ages of peak risk for starting to misuse another person's prescription or misuse one's own prescription without a physician's knowledge (Deandrea et al., 2013). Nationally representative studies such as the Monitoring the Future have been criticized for lack of specificity in questions asked about different types of prescription stimulants (e.g., just asking about stimulants prescribed to treat attention deficit/hyperactivity disorder (ADHD; Rabiner, 2013). Since 1999, the National Survey on Drug Use and Health (NSDUH) has used a confidential multi-item nonmedical stimulant use assessment featuring color photographs of different formulations of prescription stimulants including but not limited to ADHD medication (Substance Abuse and Mental Health Services Administration (SAMHSA), 2014). While the NSDUH is not without limitations (Boyd and McCabe, 2008), NSDUH

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estimates are strong relative to available alternatives. Each year the NSDUH is administered to a new nationally representative sample of the US population and asks about past-year and lifetime nonmedical use of a broad range of prescription stimulants. In contrast with studies reporting mean age of onset (see results from the 2012 NSDUH study, Substance Abuse and Mental Health Services Administration (SAMHSA), 2013a), the present study uses a meta-analytic approach that treats each NSDUH year's independent sample – from 2004 to 2012 – as a separate study to identify peak ages at which young people in the US are most likely to start nonmedical use of prescription stimulants (i.e., first time nonmedical use in the past-year; Austic et al., in press; Deandrea et al., 2013; Harris et al., 2008; Meier et al., 2012). Based on epidemiological estimates previously published, it was anticipated that the present study would identify a peak risk for first time nonmedical use of prescription stimulants starting during the early college years (McCabe et al., 2014; McCabe and West, 2013).

2. Methods

2.1. Study setting and data collection

Data are from the 2004 through 2012 National Survey on Drug Use and Health (NSDUH) with annual independently drawn nationally representative probability samples of US community residents age 12 years or older. The NSDUH sampling frames include youth who drop out of school and youth who attend school. Participation levels for 12 to 25 year old participants were acceptable, at 70% or better during the years under study (Substance Abuse and Mental Health Services Administration (SAMHSA), 2014). Before any interviews were conducted, all consent processes and survey questions were approved by Research Triangle Institute institutional review boards for the protection of human subjects.

2.2. Study sample

Pooled across years, a total of 250,910 respondents aged 12 to 21 years participated in the 2004 through 2012 NSDUH, and were included in public use files. In the present sample, the mean size of age groups (±standard deviation) was 24,007 ± 3606 and the mean size of year groups was 26,675 ± 770. A confidential multi-item nonmedical stimulant use assessment with color photographs of prescription stimulant compounds identified the newly incident nonmedical users of prescriptions stimulants.

2.3. Study medication items and risk groups

One audio-enhanced, computer-assisted self-interview module provided the following prompt:

> We are not interested in your use of over-the-counter stimulants such as Dexatrim or No-Doz that can be bought in drug stores or grocery stores without a doctor's prescription. Card C shows pictures of some different types of prescription stimulants and lists the names of some others. These pictures show only pills, but we are interested in your 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.

Respondents were asked first about their nonmedical use of three classes of stimulants: (1) methamphetamine, Desoxyn®, or Methedrine®; (2) prescription diet pills such as amphetamines, Benzedrine®, Biphetamine®, Fastin®, or Phentermine; and (3) Ritalin® or methylphenidate. Then they were asked whether they had used any stimulant from the list: Cylert®; Dexedrine®; Dextroamphetamine; Didrex®; Eskatrol®; Ionamin®; Mazanor®; Obedrin-LA®; Plegine®; Preludin®; Sanorex®; and Tenuate (Substance Abuse and Mental Health Services Administration (SAMHSA), 2013a). If they indicated they had used any of these drugs, they were asked which one(s). In addition, respondents were asked if they had "ever, even once, used any type of prescription stimulant that was not prescribed to you or that you took only for the experience or feeling it caused." If they answered, "yes" to this question, they were asked how old they were the first time this happened, and asked to name any other prescription stimulants they had used nonmedically.

Newly incident users were identified by comparing each individual's age on the date of assessment with the age they reported first using any type of prescription stimulant that was not prescribed to them or that they took "only for the experience or feeling it caused." The estimates herein are based upon a subpopulation of 240,160 respondents aged 12 to 21 years whose self-report assessment indicated that they had never engaged in nonmedical use of prescription stimulants before the year in which they were assessed for the NSDUH; 10,750 (4.3%) did not contribute to the study estimates for incidence of use because they had already initiated such use before the year in which they were surveyed. In other words, as of the date of assessment, subpopulations in the estimation sample either were never users (who were still at risk for starting use in a later year) or were newly incident users (who had just started to use for the first time).

2.4. Data analysis

Year- and age-specific incidence rates were estimated with weighting and survey estimation appropriate for the NSDUH complex survey data (Stata, version 13). The meta-analysis summary estimates reported are not simple means, as frequently reported in annual NSDUH reports; they were calculated using a random effects meta-analysis software program that weights each year by the inverse of its variance (Harris et al., 2008). Standard errors for the estimates were all relatively small (<0.1) because of the large NSDUH samples.

Stratum-specific estimates of cumulative incidence proportion can be calculated as a ratio of the number of newly incident users divided by the sum of the number of 'never users' plus the number of newly incident users. With age as a marker of cohort membership, the result is a set of year-by-year and age by age risk estimates, which makes it possible to trace the experience of individual cohorts over time without a repeated measures survey design (Kroutil et al., 2010). For example, one cohort sampled was aged 12 in 2004, aged 13 in 2005, and aged 14 in 2006.

Previous publications describe in detail the approach used to identify newly incident users, past-onset users, and never users (Deandrea et al., 2013; Meier et al., 2012). Additional logistic regression analyses were conducted to predict the probability of subpopulations starting to engage in nonmedical use of prescription stimulants for the first time based on race or sex based on findings from past studies demonstrating race/ethnicity and sex differences in lifetime and past year nonmedical use of prescription stimulants (McCabe et al., 2014; McCabe and West, 2013).

3. Results

3.1. Newly incident user characteristics

Table 1 describes the study sample and reports unweighted frequencies and weighted proportions for subgroupings of newly incident users based on demographic characteristics. The main study estimates given in Table 2 are weighted proportions of newly incident prescription stimulant users. These estimates include a