



# Medical and nonmedical use of prescription benzodiazepine anxiolytics among U.S. high school seniors



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## HIGHLIGHTS

- We examined medical and nonmedical use of prescription benzodiazepines in the United States.
- One in every ten adolescents had lifetime exposure to prescription benzodiazepines.
- Women and White students had the highest exposure to prescription benzodiazepines.
- Any history of nonmedical use can be used to identify high risk for substance abuse.

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## ABSTRACT

**Objectives:** To examine the lifetime prevalence of medical and nonmedical use of prescription benzodiazepine anxiolytics among U.S. high school seniors and to assess substance use behaviors based on lifetime histories of medical and nonmedical use of prescription benzodiazepine anxiolytics.

**Methods:** Nationally representative samples of high school seniors were surveyed during their senior year via self-administered questionnaires. The sample consisted of 11,248 high school seniors (modal age, 18 years) from five independent cohorts (2007–2011). The sample was 52% female, 65% White, 12% African American, 15% Hispanic, and 7% other.

**Results:** The lifetime prevalence of medical use of prescription benzodiazepine anxiolytics was 4.9%, while the lifetime prevalence of nonmedical use was 7.5%. Although lifetime prevalence rates were relatively stable over time, there were notable sex and racial/ethnic differences in medical and nonmedical use behaviors. Among those who were ever prescribed benzodiazepine anxiolytics ( $n = 530$ ), approximately 40.6% reported medical use only, 27.4% reported medical use prior to nonmedical use, and 32.0% reported nonmedical use prior to medical use. The odds of substance use behaviors were greater among those who reported any history of nonmedical use relative to non-users, while the odds of substance use behaviors did not differ between medical users only and non-users.

**Conclusions:** One in every ten U.S. high school seniors has ever had some exposure to prescription benzodiazepine anxiolytics either medically or nonmedically. Benzodiazepine anxiolytics prescribed to adolescents should be closely monitored, safely stored, and properly disposed to reduce nonmedical use due to leftover medication and peer diversion.

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## 1. Introduction

The prescribing of controlled medications (including benzodiazepine anxiolytics) nearly doubled among U.S. adolescents and young adults over the past two decades (Fortuna, Robbins, Caiola, Joynt, &

Halterman, 2010). Although prescription benzodiazepine anxiolytics are highly efficacious when used properly for the treatment of anxiety disorders, one possible consequence of an increase in prescription rates is an increase in the nonmedical use of prescription benzodiazepine anxiolytics and related consequences due to greater availability and abuse potential of these medications (Augustin, 2001; Centers for Disease Control and Prevention, 2010; Griffiths & Weerts, 1997; Johnston, O'Malley, Bachman, & Schulenberg, 2012). Notably, the past-year nonmedical use of prescription benzodiazepine anxiolytics has doubled among U.S. high school seniors over the past two decades

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(Johnston et al., 2012). Furthermore, the estimated number of emergency department (ED) visits involving the nonmedical use of prescription benzodiazepine anxiolytics in the U.S. nearly doubled between 2004 and 2008 (from 143,500 ED visits to 271,700 ED visits) (Centers for Disease Control and Prevention, 2010).

At least one study of secondary public school students in the Detroit metropolitan area indicates that approximately 70% of adolescents prescribed benzodiazepine anxiolytics used their controlled medications correctly as prescribed while about 30% medically used their prescribed benzodiazepine anxiolytics incorrectly (e.g., used too much, intentionally got high, or used their medication to increase other drug effects) (McCabe et al., 2011). The study also found that medical users of controlled medications were significantly more likely to report nonmedical use of prescription medications than individuals never prescribed controlled medications (McCabe et al., 2011). An earlier study of secondary public school students in the Detroit metropolitan area found that most lifetime nonmedical users of prescription benzodiazepine anxiolytics reported a history of medical use of prescription benzodiazepine anxiolytics (McCabe, Boyd, & Young, 2007). Despite findings from these small regional studies, a recent review concluded that there remains a lack of research assessing the medical and nonmedical use of prescription benzodiazepine anxiolytics in national samples of adolescents (Young, Glover, & Havens, 2012).

The transition from adolescence to adulthood represents an important time to examine medical and nonmedical use of prescription benzodiazepine anxiolytics because many individuals become responsible for their own medication management during this developmental period. Notably, adolescents serve as the leading diversion source of controlled medications for their peers and most nonmedical users of prescription benzodiazepine anxiolytics obtain these medications for free from friends (Johnston et al., 2012; McCabe & Boyd, 2005). For example, among collegiate past-year nonmedical users who specified where they obtained prescription benzodiazepine anxiolytics, approximately 84% reported peers (e.g., friends), 14% reported family members (e.g., parent), and 2% reported other sources (e.g., drug dealer) (McCabe & Boyd, 2005). Among nonmedical users in high school who indicated where they obtained prescription benzodiazepine anxiolytics, approximately 58% indicated they were given them for free by a friend (Johnston et al., 2012).

The majority of nonmedical users of prescription benzodiazepine anxiolytics initiate their use during the transition from adolescence to adulthood (McCabe, West, Morales, Cranford, & Boyd, 2007; Substance Abuse and Mental Health Services Administration, 2012). Individuals who initiated nonmedical use of prescription benzodiazepine anxiolytics at 18 years of age or younger in the U.S. were significantly more likely to develop substance use disorders than those who initiated nonmedical use of prescription benzodiazepine anxiolytics later in life (McCabe, West, et al., 2007). To date, there are no known national studies of medical and nonmedical use of prescription benzodiazepine anxiolytics among U.S. high school students. The objectives of the present study were (1) to assess the lifetime prevalence of medical and nonmedical use of prescription benzodiazepine anxiolytics in a national sample of high school seniors and (2) to assess the associations between the history of lifetime medical and nonmedical use of prescription benzodiazepine anxiolytics and other substance use behaviors.

## 2. Methods

### 2.1. Study design

The Monitoring the Future (MTF) study annually surveys a cross-sectional, nationally representative sample of high school seniors in approximately 125 public and private schools in the coterminous U.S., using self-administered paper-and-pencil questionnaires in classrooms. The samples analyzed in this study consisted of high school seniors from five independent cohorts (senior years 2007–2011), and the MTF study

used a multi-stage sampling procedure in each year. In stage 1, geographic areas (or primary sampling units) are selected; in stage 2, schools within primary sampling units are selected (with probability proportionate to school size); and in stage 3, students within schools are selected. Corrective weighting was used in the analyses to adjust for the unequal probabilities of selection that occurred at any stage of sampling. The student response rates for high school seniors ranged from 79% to 85% between 2007 and 2011. Because so many questions are included in the MTF study, much of the questionnaire content is divided into six different questionnaire forms that are randomly distributed. This approach results in six virtually identical subsamples. The medical use of prescription benzodiazepine anxiolytics was only asked on Form 1, so this study focuses on the cross-sectional subsamples receiving Form 1 within each year cohort. Additional details about the MTF design and methods are available elsewhere (Johnston et al., 2012). Institutional review board approval was granted for this study by the University of Michigan Institutional Review Board Health Sciences.

### 2.2. Sample

The study sample included 11,248 individuals who completed questionnaires during the spring of their senior year between 2007 and 2011. The sample represented a target population that was 52% female, 65% White, 12% African American, 15% Hispanic, and 7% other/not reported. The modal age of the individuals in the sample was 18 years of age.

### 2.3. Measures

The MTF study assesses a wide range of demographic characteristics, behaviors, attitudes, and values, and we have selected specific measures from a larger set of questions for the present study including sex (male, female), race/ethnicity (White, African American, Hispanic, other), high school senior cohort year (2007, 2008, 2009, 2010, 2011), school geographical region (Northeast, Midwest, South, West), metropolitan statistical areas as defined by the U.S. Census (yes, no), and standard measures of substance use behaviors (e.g., binge drinking, cigarette use, medical and nonmedical use of prescription medications, marijuana and other drug use).

The medical use of prescription benzodiazepine anxiolytics was assessed by asking respondents whether they had ever taken prescription benzodiazepine anxiolytics (tranquilizers) because a doctor told them to use the medication. Respondents were informed that prescription benzodiazepine anxiolytics are sometimes prescribed by doctors to calm people down or quiet their nerves. The following were listed as examples of prescription benzodiazepine anxiolytics: Ativan®, Klonopin®, Librium®, Serax®, Valium®, and Xanax®. The response options included the following: (1) No; (2) Yes, but I had already tried them on my own; (3) Yes, and it was the first time I took any.

Nonmedical use of prescription benzodiazepine anxiolytics was assessed by asking respondents on how many occasions (if any) in their lifetime they used prescription benzodiazepine anxiolytics (tranquilizers) on their own—that is, without a doctor telling you to take them. The response scale ranged from 1 = no occasions to 7 = 40 or more occasions.

Cigarette use was measured by asking respondents how frequently they smoked cigarettes during the past 30 days. The response scale ranged from 1 = none to 7 = 2 or more packs per day. Binge drinking was measured with a single item focused on the frequency of having five or more drinks in a row during the past 2 weeks. The response scale ranged from 1 = none to 6 = 10 or more times. Marijuana and other drug use—including marijuana, LSD, other psychedelics, crack cocaine, other cocaine, heroin, prescription stimulants, prescription sedatives, and prescription opioids—were measured by asking respondents

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