Addictive Behaviors 65 (2017) 296–301

Contents lists available at ScienceDirect

Addictive Behaviors

journal homepage: www.elsevier.com/locate/addictbeh

Medical and nonmedical use of prescription sedatives and anxiolytics: Adolescents' use and substance use disorder symptoms in adulthood

Sean Esteban McCabe Ph.D. [a,*], Philip Veliz Ph.D. [b], Carol J. Boyd Ph.D. [c], John E. Schulenberg Ph.D. [d]

[a] University of Michigan, Institute for Research on Women and Gender, Substance Abuse Research Center, Ann Arbor 48109, MI, USA
[b] University of Michigan, Institute for Research on Women and Gender, Ann Arbor 48109, MI, USA
[c] University of Michigan, School of Nursing, Department of Psychiatry, Institute for Research on Women and Gender, Ann Arbor 48109, MI, USA
[d] University of Michigan, Institute for Social Research, Department of Psychology, Ann Arbor 48106, MI, USA

HIGHLIGHTS

- One-fifth of adolescents report medical or nonmedical use of sedatives/anxiolytics.
- Nearly half of adolescent medical sedative/anxiolytic users report nonmedical use.
- Adolescents' medical use without nonmedical use did not predict adult SUD symptoms.
- Adolescents' nonmedical use of sedatives/anxiolytics predicted adult SUD symptoms.

ARTICLE INFO

Article history:
Received 26 May 2016
Received in revised form 24 July 2016
Accepted 13 August 2016
Available online 15 August 2016

Keywords:
Longitudinal
Medical use
Nonmedical use
Sedative
Anxiolytic
Substance use disorders

ABSTRACT

Objectives: This study assessed the longitudinal associations between medical and nonmedical use of prescription sedatives/anxiolytics (NMPSA) during adolescence (age 18) and substance use disorder (SUD) symptoms during adulthood (age 35).
Methods: Multiple cohorts of nationally representative samples of U.S. high school seniors (n = 8373) were surveyed via self-administered questionnaires and followed longitudinally from adolescence (age 18, 1976–1996) to adulthood (age 35, 1993–2013).
Results: An estimated 20.1% of adolescents reported lifetime medical or nonmedical use of prescription sedatives/anxiolytics. Among adolescents who reported medical use of prescription sedatives/anxiolytics, 44.9% also reported NMPSA by age 18. Based on multivariate analyses that included age 18 sociodemographic and other substance use controls, medical use of prescription sedatives/anxiolytics without any history of NMPSA during adolescence was not associated with SUD symptoms in adulthood relative to adolescents with no prescription sedative/anxiolytic use. In contrast, adolescents with a history of both medical and nonmedical use of prescription sedatives/anxiolytics and adolescents who reported only NMPSA had between two to three times greater odds of SUD symptoms in adulthood relative to adolescents with no prescription sedative/anxiolytic use and those who reported only medical use of prescription sedatives/anxiolytics.
Conclusions: One in every five U.S. high school seniors reported ever using prescription sedatives/anxiolytics either medically or nonmedically. This study provides compelling evidence that the medical use of prescription sedatives/anxiolytics (without any NMPSA) during adolescence is not associated with increased risk of SUD symptoms in adulthood while any NMPSA during adolescence serves as a signal for SUDs in adulthood.

1. Introduction

There has been an increase in the prescribing of sedative/hypnotic and tranquilizer/anxiolytic medications in the United States (U.S.) during the past two decades (Fortuna, Robbins, Caiola, Joynt, and Halterman, 2010; Skaer, Robison, Sclar, and Galin, 2000; Witek, Rojas, Alonso, Minami, and Silva, 2005; Zito et al., 2003). Despite the short-term efficacy of prescription anxiolytics and sedatives for the treatment of anxiety and sleep disorders, there are substantial concerns about the abuse potential of these controlled medications including the high prevalence of diversion and nonmedical use of prescription sedatives and anxiolytics (NMPSA), and the increase in adverse consequences such as U.S. emergency department visits and overdose deaths associated with NMPSA (Compton and Volkow, 2006; Fenton, Keyes, Martins,

* Corresponding author at: University of Michigan, Institute for Research on Women and Gender, Substance Abuse Research Center 204 S. State St., Ann Arbor 48109, MI, USA.
E-mail address: plius@umich.edu (S.E. McCabe).

http://dx.doi.org/10.1016/j.addbeh.2016.08.021
0306-4603/

and Hasin, 2010; Johnston, O'Malley, Bachman, Schulenberg, and Miech, 2015; Jones and McAninch, 2015; Kokkevi, Fotiou, Arapaki, and Richardson, 2008; McCabe, Boyd, and Young, 2007; McCabe et al., 2011; Miech, Johnston, O'Malley, Bachman, and Schulenberg, 2015; SAMHSA, 2012; 2013; 2014).

Approximately 9% and 13% of U.S. young adults have reported lifetime nonmedical use of prescription sedatives and anxiolytics, respectively (Johnston et al., 2015). While at least four cross-sectional or regional studies have examined the relationships between medical use of prescription sedatives/anxiolytics and NMPSA during adolescence (Boyd, Austic, Epstein-Ngo, Veliz, and McCabe, 2015; Kokkevi et al., 2008; McCabe et al., 2007; McCabe and West, 2014), a systematic review concluded there is a need for longitudinal research examining temporal patterns of NMPSA associated with substance use disorders (SUDs) in adulthood (Young, Glover, and Havens, 2012). At least two cross-sectional studies found that adolescents reporting medical use of prescription anxiolytics without a history of nonmedical use of prescription anxiolytics did not have significantly greater odds of past-year substance use behaviors relative to their peers who have never used prescription anxiolytics (McCabe et al., 2007; McCabe and West, 2014). In contrast, past-year substance use behaviors were more prevalent among adolescents who reported NMPSA compared to those who never used prescription sedatives/anxiolytics (McCabe et al., 2007; McCabe and West, 2014). Adolescents prescribed sedatives/anxiolytics in the past were more likely to use someone else's sedatives/anxiolytics during a three-year period (Boyd et al., 2015). Since >25% of young adults in the U.S. meet DSM-5 criteria for a past-year SUD (Grant et al., 2015, 2016), an important question is whether adolescents' medical and/or nonmedical exposure to sedatives/anxiolytics increases the risk for developing SUDs in adulthood.

The majority of adolescents who report NMPSA engage in concurrent or simultaneous polysubstance use (McCabe, Cranford, Morales, and Young, 2006; McCabe et al., 2007; Schepis, West, Teter, and McCabe, 2016), creating major challenges to isolating drug-specific-related problems resulting from NMPSA. For instance, nearly 73% of adolescent past-year nonmedical users of prescription anxiolytics simultaneously co-ingested these medications with at least one other substance, primarily cannabis and alcohol (Schepis et al., 2016). As a result, attempts to examine substance-related problems associated with NMPSA must control for a wide range of substances for assessing the risk of developing SUDs. Other common risk factors for NMPSA and SUD include age (i.e., 18–34 years), sex, race/ethnicity, parental education, geographical regional location, urbanicity, truancy and other problem behaviors, family history of SUD, substance-related consequences, and anxiety and mood disorders (Blanco et al., 2007; Grant et al., 2015, 2016; Havens, Young, and Havens, 2011; Johnston et al., 2015).

We hypothesize that the medical use of prescription sedatives/anxiolytics (when necessary) without NMPSA offers adolescent patients an appropriate opportunity to manage their anxiety and sleep disorders/symptoms and thus, reduces the likelihood of later adult SUD symptoms. We further hypothesize individuals who initiate any NMPSA during adolescence (with or without medical use) are at substantially greater risk for later adult SUD symptoms based on the abuse potential of these medications and related problem behaviors, including polysubstance use.

2. Material and methods

2.1. Study design

This prospective study used national panel data from the Monitoring the Future (MTF) study (Bachman, Johnston, O'Malley, Schulenberg, and Miech, 2015; Johnston et al., 2015). Based on a three-stage sampling procedure, MTF surveys nationally representative samples of approximately 17,000 U.S. high school seniors each year using questionnaires administered in classrooms during the regular school day. Stage 1 is the selection of geographic areas; stage 2 is the selection of schools; and stage 3 is the selection of students within each school. Approximately 2400 high school seniors are randomly selected for biennial follow-ups each year and surveyed biennially using mailed questionnaires through age 30; they are also followed up at age 35 by mail.

The study period for respondents at age 35 was between 1993 and 2013 (12th grade cohorts 1976–1996). The response rates at baseline ranged from 77% to 86% during the study period; most all non-response was due to the given student being absent from school (<1% refuse to participate). The MTF panel oversamples drug users from the 12th grade sample to secure a population of drug users to follow into adulthood. The overall weighted response rate for the longitudinal sample from baseline (12th grade) to age 35 was 54%. Given potential non-response bias, this study incorporates nonresponse adjustments (i.e., attrition weights) to the panel weights (i.e., unequal probabilities of selection into the panel sample) that explicitly account for key factors in the MTF that have been shown to be associated with nonresponse at future follow-ups (e.g., Johnston et al., 2015; McCabe et al., 2014; Schulenberg et al., 2015). The project design and sampling methods are described in greater detail elsewhere (Bachman et al., 2015; Johnston et al., 2015; Schulenberg et al., 2015).

2.2. Sample

As illustrated in Table 1, the weighted longitudinal sample included 8373 individuals (52.9% female and 47.1% male). The racial/ethnic distribution was 73.5% White, 11.9% Black, 6.4% Hispanic, and 8.1% multiracial or from other racial/ethnic categories.

2.3. Measures

The MTF study assesses a wide range of behaviors, attitudes, and values. Based on previous research, we selected specific measures for these analyses from the age 18 surveys to include as controls (Blanco et al., 2007; Colliver, Kroutil, Dai, and Gfroerer, 2006; Havens et al., 2011; Johnston et al., 2015; McCabe and West, 2014; Miech et al., 2015; Schulenberg et al., 2015; Young et al., 2012), including baseline cohort year, sex (i.e., male and female), race/ethnicity (i.e., White, Black, Hispanic, and other race), parental education (i.e., at least one parent has a college degree or higher or neither parent has a college degree), U.S. Census geographic location (i.e., Northeast, Midwest, South and West), truancy (number of whole days of school skipped in past-month), urbanicity based on metropolitan statistical area (MSA) (i.e., large MSA, other MSA, and non-MSA), annual alcohol, cannabis, and other drug use (i.e., cocaine, heroin, LSD, other hallucinogens, inhalants, nonmedical use of prescription opioids, and nonmedical use of prescription stimulants), and substance-related consequences (i.e., received a ticket or was in an accident while under the influence of alcohol, cannabis, or other drugs).

Medical and nonmedical use of prescription sedatives/anxiolytics at baseline (age 18) used four separate questions measuring lifetime medical use by asking respondents if they had ever taken prescription sedatives or anxiolytics because a doctor had told them to use them and lifetime nonmedical use by asking respondents if they had taken sedatives or anxiolytics on their own—that is, without a doctor telling them to take them. Respondents were prompted that these medications are prescribed by doctors to help people relax or get to sleep and cannot be sold without a prescription. Respondents were also provided a list of several examples of prescription sedatives and anxiolytics such as Valium® and Librium®. Based on these questions, a variable with four mutually exclusive categories was constructed to include the following for lifetime use of prescription sedatives and anxiolytics at baseline: (1) no medical or nonmedical use, (2) medical use only, (3) medical and nonmedical use, (4) nonmedical use only.

Substance use disorder (SUD) symptoms at age 35 were measured with questions based on the DSM criteria for alcohol use disorder