



## Short communication

# Prescription drug use, misuse and related substance use disorder symptoms vary by educational status and attainment in U.S. adolescents and young adults

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## ABSTRACT

**Background:** Prescription drug misuse (PDM) rates are highest in adolescents and young adults. Little research in these high-risk groups has examined PDM differences by educational status or attainment. This investigation attempted to further our understanding of adolescent and young adult prescription drug use and misuse through examining PDM type (i.e., nonmedical misuse, medical misuse and mixed misuse) and substance use disorder (SUD) symptoms from PDM by educational status/attainment.

**Methods:** Data were from the 2015 National Survey on Drug Use and Health, with 13,585 adolescent and 14,553 young adult respondents. Participants were categorized by educational status separately in adolescents and young adults. Outcomes were rates of past-year prescription drug use, PDM, PDM type, and SUD symptoms, with analyses performed separately by age group and for opioids, stimulants and sedatives/tranquilizers. Analyses used logistic regression and controlled for age, race/ethnicity and sex.

**Results:** In adolescents and across medication classes, the highest rates of any use, PDM, medical misuse, non-medical misuse and presence of two or more SUD symptoms were seen in those with poor school adjustment or not in school. In young adults, opioid-PDM and related outcomes were more prevalent in those not in school, especially high school dropouts. For stimulants, rates were highest in full-time college students and college graduates.

**Conclusions:** These results further suggest the importance of assessing educational status in adolescent and educational attainment in young adult PDM investigations. Adolescents poorly engaged in school or not in school appear especially in need of interventions to limit PDM and associated SUD symptoms.

## 1. Introduction

Prescription drug misuse (PDM) has been described as an epidemic (e.g., Kanouse and Compton, 2015; McClure, 2015), as rates of PDM-related overdose, emergency department and treatment utilization rise (DAWN, 2013; Substance Abuse and Mental Health Services Administration (SAMHSA), 2014). PDM may be especially problematic in adolescents (12–17 years) and young adults (18–25 years), as they consistently have elevated past-year PDM prevalence rates from the most commonly misused medication classes: opioids, stimulants, sedatives and tranquilizers (CBHSQ, 2016b).

Lifetime (Havens et al., 2011; Rigg and Ford, 2014) and past-year (Martins et al., 2015; Schepis and Krishnan-Sarin, 2008) adolescent and

young adult PDM is linked to concerning outcomes, including poorer academic performance, psychopathology, and risky behavior. Nonetheless, the PDM literature in these groups is limited by near exclusive use of school- or college-based samples. When investigated by dichotomous school enrollment, past-year PDM prevalence rates differ in adolescents (Edlund et al., 2015) and young adults (Ford and Pomykacz, 2016; Johnston et al., 2016; Martins et al., 2015; Substance Abuse and Mental Health Services Administration (SAMHSA), 2005, 2009). Despite these findings, no research has followed to investigate whether more fine-grained educational differences affect PDM (e.g., level of educational attainment in young adults not in college).

Similarly, past-year PDM type and PDM-related substance use disorder (SUD) symptoms are under-investigated (McCabe et al., 2013,

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2012). PDM type captures how the medication was misused and includes: *medical misuse* (i.e., use in ways the prescriber did not intend), *nonmedical misuse* (i.e., use without a prescription) or *mixed misuse* (i.e., a combination of medical and nonmedical misuse). PDM type may affect use patterns (McCabe et al., 2013) and SUD symptoms highlight elevated PDM-related consequences (APA, 2013), suggesting both to be important for further study.

While it appears that dichotomous school enrollment corresponds with PDM prevalence, the relationships between educational status/attainment and PDM type prevalence or PDM-related SUD symptoms remain unclear. Also, PDM prevalence rates and prevalence of other PDM variables in more granular and under-studied subgroups [e.g., young adult college graduates or those with poor school adjustment (at-risk for high dropout)] are relatively unknown. Clinically, data on PDM by education status/attainment can be valuable by providing workplace supervisors, clinicians and school professionals with an easily assessed characteristic suggesting more selective prevention and intervention by status/attainment (e.g., different medication classes of concern by group).

This investigation aimed to examine PDM, PDM-related types and SUD symptoms by educational status/attainment in adolescents and young adults, using data from the 2015 National Survey on Drug Use and Health (NSDUH). We hypothesized that PDM and SUD symptom rates would be highest in adolescents not in school and young adults who did not complete high school (HS), given their higher substance use rates (DuPont et al., 2013; Grant et al., 2017). One exception should be stimulant-PDM, which was expected to be higher in college students (Ford and Pomykacz, 2016). Given the limited PDM type data, we did not have a *priori* type hypotheses.

## 2. Methods

The NSDUH produced nationally representative data via an independent, multistage area probability sample. Interviews began with audio computer-assisted self-interviewing (ACASI) for sensitive variables (e.g., PDM); ACASI promotes privacy, honest reporting and data completeness. The 2015 weighted interview response rate was 77.7% in adolescents and 74.5% in young adults; age-based weighted screening response rates (79.7% across ages) were not provided. For more on the NSDUH, see CBHSQ (2016a) and Hughes et al. (2016).

### 2.1. Participants

For 2015, 13,585 adolescents (12–17 years) and 14,553 young adults (18–25 years) completed the NSDUH. In adolescents, the weighted sample was 51.0% male, 53.7% white, 13.9% African-American and 23.1% Hispanic/Latino. In young adults, the weighted sample was 50.2% male, 55.0% white, 14.4% African-American and 21.4% Hispanic/Latino. Online-only Supplemental Tables A and B capture demographic characteristics by educational status/attainment.

### 2.2. Measures

PDM variables were assessed separately by medication class (i.e., opioids, stimulants and sedatives/tranquilizers), with sedatives/tranquilizers aggregated, per previous studies (Schepis and Hakes, 2013; Tetrault et al., 2008). To aid recall, individual drug names were used, and pictures of common medications were provided. In lifetime users of medication class, *past-year prescription use* was assessed. Then, *past-year PDM* was assessed: “The next question asks about using [drug class] in any way a doctor did not direct you to use them. Please think only about your use of the drug in any way a doctor did not direct you to use it, including: using it without a prescription of your own; using it in greater amounts, more often, or longer than you were told to take it; using it in any other way a doctor did not direct you to use it.”

In past-year misusers, PDM type was assessed by asking, “Which of

these statements describe your use of [drug class] at any time in the past 12 months?” Use without a prescription from a prescriber was classified as *nonmedical misuse*. *Medical misuse* included four subtypes: (1) in greater amounts, (2) over a longer period, (3) more often, or (4) in some other way the prescriber did not intend. Participants selected as many of the statements as applied, and the combination of nonmedical misuse and medical misuse was classified as *mixed misuse*. Finally, in past-year misusers, DSM-IV SUD symptoms (APA, 2000) were assessed. The ten DSM-5 (APA, 2013) symptoms were retained, and participants were categorized as having zero, one or two or more SUD symptoms from each medication class. SUD symptom categories were chosen to highlight initial impairment or distress from symptomatic PDM (one symptom; Compton et al., 2013) or symptoms consistent with the DSM-5 SUD diagnosis ( $\geq$  two symptoms; APA, 2013), given the relative equality of SUD symptoms found elsewhere (Dawson et al., 2010; Hasin et al., 2013).

Participants were categorized by *educational status/attainment*. In adolescents, participants were home-schooled; in school, good school adjustment; in school, poor school adjustment; or not in school. *Poor school adjustment* was based on school dropout risk factors (Hammond et al., 2007) and was positive with at least one of: (1) D or worse grades in the last grading period; (2) history of being retained in grade; and/or (3) stating that the respondent “hated going to school.” In young adults, participants were still in HS; full-time in college; part-time in college; college graduate; not in college, HS graduate; not in college, less than HS. *College status* comprised those enrolled in “college or university” and included 2- and 4-year schools and post-baccalaureate schooling.

### 2.3. Analyses

Data were weighted, clustered on primary sampling units, and stratified appropriately. The Taylor series approximation was used, with adjusted degrees of freedom, to create robust variance estimates. Analyses occurred separately by medication class. Initial analyses employed weighted cross-tabulations to estimate prevalence and 95% confidence intervals of past-year medication use and all PDM variables by educational status/attainment. Primary analyses used design-based logistic (PDM prevalence) and multinomial regression (PDM type and SUD symptoms) to examine PDM variable differences by educational status/attainment, controlling for age, race/ethnicity and sex; *post hoc* pairwise comparisons used the same covariates, with Bonferroni-corrected *p*-values. Analyses were performed in Stata 15.0 (StataCorp, 2017).

## 3. Results

### 3.1. Use, PDM, PDM-related types and SUD symptoms in adolescents

For opioids, adolescents not in school had both the highest use and PDM rates, while stimulant and sedative/tranquilizer use and PDM rates were higher in adolescents with poor school adjustment. For PDM-related SUD symptoms, adolescents with poor school adjustment had the highest prevalence of symptomatic PDM (or the lowest prevalence of zero SUD symptoms). The lowest prevalence rates for PDM outcomes were in adolescents with good school adjustment or homeschooled adolescents, who were not included in the statistical tests due to their small sample. PDM type differences were limited, with nonmedical misuse as the most prevalent type. For adolescent outcomes, please see Table 1.

### 3.2. Use, PDM, PDM-related types and SUD symptoms in young adults

In contrast to adolescents, PDM variable patterns differed by medication class between educational subgroups in young adults, with the starker differences between opioids and stimulants. For opioids, rates of any use, PDM, PDM type and SUD symptoms were significantly

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