

Prescription Opioid Misuse Associated With Risk Behaviors Among Adolescents



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Introduction: With the ongoing opioid overdose epidemic in the U.S., it is important to explore how prescription opioid misuse correlates with health behaviors that increase the risk for adverse health outcomes among adolescents. The objective of this study is to determine if lifetime nonmedical use of prescription opioids is associated with health risk behaviors among adolescents.

Methods: Data from the 2017 nationally representative Youth Risk Behavior Survey (14,765 high school students in Grades 9–12) were used to explore associations between lifetime nonmedical use of prescription opioids and 29 health risk behaviors. Logistic regression models (adjusted for sex, race/ethnicity, grade, and sexual identity) estimated adjusted prevalence ratios and 95% CIs. Analyses were completed in 2018.

Results: Nonmedical use of prescription opioids was associated with all but 1 of the health risk behaviors included in the analyses. Substance use ranged from adjusted prevalence ratio=2.46 (current alcohol use) to adjusted prevalence ratio=17.52 (heroin use); violence victimization from adjusted prevalence ratio=1.80 (bullied at school) to adjusted prevalence ratio=3.12 (threatened or injured with a weapon); suicidal thoughts/behaviors from adjusted prevalence ratio=2.23 (considered suicide) to adjusted prevalence ratio=3.45 (attempted suicide); and sexual behavior from adjusted prevalence ratio=1.06 (did not use a dual pregnancy prevention method) to adjusted prevalence ratio=3.42 (4 or more sexual partners). Poor academic performance (adjusted prevalence ratio=1.53), receiving an HIV test (adjusted prevalence ratio=1.77), and having persistent feelings of sadness/hopelessness (adjusted prevalence ratio=1.80) were also associated with nonmedical use of prescription opioids.

Conclusions: Nonmedical use of prescription opioids is associated with many health risk behaviors. Opportunities to reduce nonmedical use of prescription opioids include screening pediatric patients for opioid use disorder, improved prescribing practices, and, from a primary prevention perspective, integrated evidence-based health education programs in schools.

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INTRODUCTION

Much of the public health response to the increasing rate of fatal unintentional drug overdoses in the U.S. population^{1,2} has focused on adults.³ Prevention efforts targeted to the adolescent population have been limited.^{4–8} Research has demonstrated that prescription opioid misuse is an important risk factor for heroin use among adolescents.^{9,10}

Nationally representative data on many of the potential behavioral correlates of nonmedical use of

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prescription opioids (NUPO) for adolescents is scarce. The 2017 cycle of the National Youth Risk Behavior Survey (YRBS) provided an opportunity to explore lifetime NUPO (first collected by YRBS in 2017) and associated risk behaviors.¹¹ YRBS includes not only substance use behaviors, but also sexual behaviors, violence victimization experiences, and suicidal thoughts and behaviors—many of which are not available in other substance use surveillance systems inclusive of adolescent populations. Therefore, the objective of this study is to explore behavioral correlates of NUPO among a nationally representative sample of U.S. high school students.

METHODS

Study Population

The National YRBS is a cross-sectional, school-based survey that uses an independent 3-stage cluster sample design to obtain a nationally representative sample of students in Grades 9–12 who attend public and private schools in the 50 states and District of Columbia.¹¹ For 2017, the overall response rate was 60.0%, with a sample of 14,765 students.¹² YRBS data are weighted. More detailed information on the psychometric properties of the YRBS questionnaire as well as information on the YRBS sampling strategies have been published elsewhere.^{11,12} The YRBS was reviewed and approved by an IRB at the Centers for Disease Control and Prevention.

Measures

Lifetime NUPO was assessed with the following question: *During your life, how many times have you taken prescription pain medicine without a doctor's prescription or differently than how a doctor told you to use it? (Count drugs such as codeine, Vicodin, OxyContin, hydrocodone, and Percocet).* Response options were collapsed into the following 2 categories: *zero times* versus *one or more times*. Twenty-eight health behaviors and experiences from domains of substance use, violence victimization, suicidal thoughts and behaviors, sexual behavior, and other health concerns were examined to determine if they were associated with NUPO (Table 1).

Statistical Analysis

To account for the complex sample design of the survey, all analyses were conducted with SUDAAN, version 9.4. Descriptive analyses were conducted to present the distribution of demographic variables by NUPO, with distributions compared using the chi-square test. Associations between the exposure variable of interest (NUPO) and 28 health risk behaviors as outcomes were assessed in separate logistic regression models, which generated adjusted prevalence ratios (APRs) and corresponding 95% CIs. Findings were considered statistically significant if $p < 0.05$ or 95% CIs did not include 1.0. All statistical models included sex, race/ethnicity, grade, and sexual identity as covariates. All analyses were completed in 2018.

RESULTS

The overall prevalence of NUPO among high school students in 2017 was 14.0% (Table 2). The prevalence of NUPO varied significantly by grade ($p < 0.0001$) and sexual identity ($p < 0.0001$). Table 3 presents both the unadjusted prevalence of substance use behaviors by NUPO, as well as the APRs of each substance use behavior by NUPO. In each of the adjusted models, students who engaged in NUPO had a significantly greater likelihood of also engaging in each substance use behavior than students without NUPO (APRs ranged from 2.46 for current alcohol use to 17.52 for lifetime use of heroin).

Students who engaged in NUPO were significantly more likely also to have reported each of the 7 violence victimization experiences (APRs ranged from 1.80 for bullied on school property during the 12 months before the survey to 3.12 for threatened or injured with a weapon on school property) than students without NUPO (Table 4). Students who engaged in NUPO also were more likely to experience each of the 3 suicide behaviors than students without NUPO (APRs ranged from 2.23 for seriously considered attempting suicide to 3.45 for attempted suicide). Students who engaged in NUPO were more likely to be at increased risk for 5 of the 6 sexual behaviors (APRs ranged from 1.06 for not using both a condom and a highly effective hormonal contraceptive method during last sexual intercourse to 3.42 for having 4 or more sexual partners). As for other health concerns, students who engaged in NUPO were more likely to have ever been tested for HIV (APR=1.77, 95% CI=1.50, 2.09), more likely to have poor academic performance (APR=1.53, 95% CI=1.38, 1.70), and more likely to have experienced persistent feelings of sadness or hopelessness (APR=1.80, 95% CI=1.67, 1.94) than students without NUPO.

DISCUSSION

Nearly all health behaviors and experiences within the domains of substance use, violence victimization, mental health, and sexual behavior as well as other health concerns were found to be associated with NUPO. These findings are consistent with other research showing that NUPO is associated with substance use behaviors and depressive symptoms.^{9,10,13,14} This has not been surprising, as problem behavior theory posits that adolescents who engage in a socially defined problem behavior are more likely to engage in other behaviors of concern, perhaps even clustering to form a “risk behavior syndrome.”^{15,16}

Table 1. Health Risk Behaviors Studied in Association With Lifetime Nonmedical Use of Prescription Drugs

Health risk behavior	Questionnaire item	Analytic coding
Substance use		
Current alcohol use	During the past 30 days, on how many days did you have at least one drink of alcohol?	≥1 vs 0 days
Current marijuana use	During the past 30 days, how many times did you use marijuana?	≥1 vs 0 times
Ever used inhalants	During your life, how many times have you sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high?	≥1 vs 0 times
Ever used cocaine	During your life, how many times have you used any form of cocaine, including powder, crack, or freebase?	≥1 vs 0 times
Ever used heroin	During your life, how many times have you used heroin (also called smack, junk, or China White)?	≥1 vs 0 times
Ever used methamphetamines	During your life, how many times have you used methamphetamines (also called speed, crystal, crank, or ice)?	≥1 vs 0 times
Ever used ecstasy	During your life, how many times have you used ecstasy (also called MDMA)?	≥1 vs 0 times
Ever used hallucinogenic drugs	During your life, how many times have you used hallucinogenic drugs, such as LSD, acid, PCP, angel dust, mescaline, or mushrooms?	≥1 vs 0 times
Ever injected any illegal drug	During your life, how many times have you used a needle to inject any illegal drug into your body?	≥1 vs 0 times
Violence victimization		
Sexual dating violence victimization	During the past 12 months, how many times did someone you were dating or going out with force you to do sexual things you did not want to do? (<i>excludes students who did not date or go out with anyone during the past 12 months</i>)	≥1 vs 0 times
Physical dating violence victimization	During the past 12 months, how many times did someone you were dating or going out with physically hurt you on purpose? (<i>excludes students who did not date or go out with anyone during the past 12 months</i>)	≥1 vs 0 times
Forced sexual intercourse	Have you ever been physically forced to have sexual intercourse when you did not want to?	Yes vs no
Bullied on school property	During the past 12 months, have you ever been bullied on school property?	Yes vs no
Electronically bullied	During the past 12 months, have you ever been electronically bullied?	Yes vs no
Threatened or injured with a weapon on school property	During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?	≥1 vs 0 times
Did not go to school because of safety concerns	During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?	≥1 vs 0 days
Suicidal thoughts and behaviors		
Seriously considered attempting suicide	During the past 12 months, did you ever seriously consider attempting suicide?	Yes vs no
Made a suicide plan	During the past 12 months, did you make a plan about how you would attempt suicide?	Yes vs no
Attempted suicide	During the past 12 months, how many times did you actually attempt suicide?	≥1 vs 0 times
Sexual health		
Ever had sexual intercourse	Have you ever had sexual intercourse?	Yes vs no
Had sexual intercourse with 4 or more persons during their life	During your life, with how many people have you had sexual intercourse?	≥4 vs <4 persons
Currently sexually active	During the past 3 months, with how many people did you have sexual intercourse?	≥1 vs 0 persons

(continued on next page)

Table 1. Health Risk Behaviors Studied in Association With Lifetime Nonmedical Use of Prescription Drugs (*continued*)

Health risk behavior	Questionnaire item	Analytic coding
No condom use during last sexual intercourse	The last time you had sexual intercourse, did you or your partner use a condom? (<i>excludes students who were not currently sexually active</i>)	No vs yes
Did not use an effective hormonal contraceptive method at last sexual intercourse	The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy? “Yes” indicates that the student used a highly effective hormonal contraceptive method during last sexual intercourse: birth control pills; an intrauterine device (such as Mirena or ParaGard) or implant (such as Implanon or Nexplanon); or a shot (such as Depo-Provera), patch (such as OrthoEvra), or birth control ring (such as NuvaRing) before last sexual intercourse (to prevent pregnancy, among students who were currently sexually active). “No” indicates that the student used either no method, or some other method that is not effective or nonhormonal (e.g., withdrawal, condom). (<i>excludes students who were not currently sexually active</i>)	No vs yes
Did not use both a condom and a highly effective hormonal contraceptive method during last sexual intercourse	Combines responses from 2 questions: The last time you had sexual intercourse, did you or your partner use a condom? (<i>excludes students who were not currently sexually active</i>) AND The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy? (<i>excludes students who were not currently sexually active</i>)	No vs yes
Other concerns		
Persistent feelings of sadness or hopelessness	During the past 12 months, did you ever feel so sad or hopeless almost every day for 2 weeks or more in a row that you stopped doing some usual activities?	Yes vs no
Ever been tested for HIV	Have you ever been tested for HIV, the virus that causes AIDS? (Do not count tests done if you donated blood)	Yes vs no
Poor academic performance	During the past 12 months, how would you describe your grades in school?	Mostly Ds and Fs vs Mostly As, Bs, and Cs

Table 2. Demographic Characteristics by Lifetime Nonmedical Use of Prescription Opioids Among U.S. High School Students

Demographic characteristics	No lifetime nonmedical use of prescription opioids, n (%)	Lifetime nonmedical use of prescription opioids, n (%)	χ^2
Total	12,459 (86.0)	2,051 (14.0)	
Sex			0.1881
Male	6,034 (49.4)	920 (47.2)	
Female	6,342 (50.6)	1,094 (52.8)	
Race/ethnicity ^a			0.1018
White ^b	5,342 (54.0)	880 (52.5)	
Black ^b	2,336 (13.4)	348 (11.6)	
Hispanic	3,050 (22.4)	530 (24.7)	
Grade			<0.0001
9	3,403 (28.1)	421 (21.3)	
10	3,176 (26.0)	479 (23.7)	
11	3,037 (23.6)	523 (26.6)	
12	2,746 (22.3)	588 (28.3)	
Sexual identity			<0.0001
Heterosexual	10,453 (86.8)	1,499 (77.1)	
Gay or lesbian	251 (2.1)	100 (3.7)	
Bisexual	849 (7.1)	284 (14.0)	
Not sure	485 (4.0)	111 (5.2)	

Note: Boldface indicates statistical significance ($p < 0.05$).

^aRace/ethnicity = "other" is not presented due to limited interpretability of this group.

^bNon-Hispanic.

Another contributing factor that has been proposed is that adverse childhood experiences are associated with a range of negative health risk behaviors and outcomes, including substance use.¹⁷ Early prevention strategies such as those that promote connectedness; teach coping and problem-solving skills; and enhance identification, support, and treatment for people at risk are important components of comprehensive prevention efforts.^{18,19} Primary prevention efforts may not need to focus specifically on opioids. Several

systematic reviews of effective interventions for reducing substance use among youth are generally categorized by the type of drug (i.e., alcohol, tobacco, marijuana, or illicit substance use). Such reviews rarely identify opioid-specific prevention interventions.²⁰ There is a general acceptance that all substance use prevention interventions should be designed to increase protective factors (such as family support and positive peer relationships) and decrease risk factors (such as availability and peers who use drugs).

Table 3. Prevalence and Associations Between Substance Use Behaviors and Lifetime Nonmedical Use of Prescription Opioids

Substance use behaviors	Lifetime nonmedical use of prescription opioids		
	No, %	Yes, %	APR (95% CI)
Current alcohol use ^a	24.3	65.0	2.46 (2.29, 2.64)
Current marijuana use ^a	14.8	50.8	3.18 (2.92, 3.46)
Ever used inhalants	3.7	21.1	5.17 (4.36, 6.12)
Ever used cocaine	1.8	23.3	12.27 (9.30, 16.20)
Ever used heroin	0.4	9.2	17.52 (12.61, 24.34)
Ever used methamphetamines	0.8	12.5	13.90 (9.61, 20.11)
Ever used ecstasy	1.3	20.0	13.04 (10.39, 16.38)
Ever used hallucinogenic drugs	3.0	28.3	8.92 (7.64, 10.42)
Ever injected any illegal drug	0.4	7.8	15.60 (10.68, 22.80)

Note: Boldface indicates statistical significance (95% CI does not include 1.0). All models adjusted for sex, grade, race/ethnicity, and sexual identity. APR interpretation notes: APRs <1 are negatively associated and APRs >1 are positively associated — when CIs do not include 1.

^aOn at least 1 day during the 30 days before the survey.

APR, adjusted prevalence ratio.

Table 4. Prevalence and Associations Between Selected Health Behaviors and Lifetime Nonmedical Use of Prescription Opioids

Selected health behaviors	Lifetime nonmedical use of prescription opioids		
	No, %	Yes, %	APR (95% CI)
Violence victimization			
Sexual dating violence victimization ^{a,b}	5.3	14.9	2.28 (1.83, 2.85)
Physical dating violence victimization ^{a,b}	5.8	17.6	2.56 (2.14, 3.06)
Ever forced to have sexual intercourse	5.7	17.6	2.45 (2.05, 2.94)
Bullied on school property ^a	16.9	32.5	1.80 (1.58, 2.07)
Electronically bullied ^a	13.1	26.7	1.88 (1.66, 2.12)
Threatened or injured with a weapon on school property ^a	4.5	14.6	3.12 (2.50, 3.90)
Did not go to school because of safety concerns ^c	5.4	14.1	2.52 (2.17, 2.93)
Suicidal thoughts and behaviors			
Seriously considered attempting suicide ^a	14.0	36.8	2.23 (2.06, 2.42)
Made a suicide plan ^a	10.7	30.6	2.41 (2.15, 2.71)
Attempted suicide ^a	5.2	20.6	3.45 (2.86, 4.17)
Sexual health			
Ever had sexual intercourse	35.1	66.6	1.81 (1.72, 1.91)
Had sexual intercourse with 4 or more partners during their life	6.9	26.9	3.42 (2.90, 4.04)
Currently, sexually active ^d	24.7	53.0	2.00 (1.84, 2.18)
No condom use during last sexual intercourse ^e	41.8	58.7	1.40 (1.27, 1.53)
Did not use an effective hormonal contraceptive method at last sexual intercourse ^e	69.6	73.1	1.05 (0.98, 1.12)
Did not use both a condom and an effective hormonal contraceptive method during last sexual intercourse ^e	89.7	95.3	1.06 (1.03, 1.09)
Other health concerns			
Persistent feelings of sadness or hopelessness ^a	27.6	55.2	1.80 (1.67, 1.94)
Ever been tested for HIV	8.2	16.1	1.77 (1.50, 2.09)
Poor academic performance ^a	23.4	37.0	1.53 (1.38, 1.70)

Note: Boldface indicates statistical significance (95% CI does not include 1.0). All models adjusted for sex, grade, race/ethnicity, and sexual identity. APR interpretation notes: APRs <1 are negatively associated and APRs >1 are positively associated – when CIs do not include 1.

^aDuring the 12 months before the survey.

^bAmong students who dated in the 12 months before the survey.

^cDuring the 30 days before the survey.

^dHad sexual intercourse with at least 1 person during the 3 months before the survey.

^eAmong students who were currently sexually active.

APR, adjusted prevalence ratio.

Limitations

Several limitations should be considered. Behaviors and experiences ascertained by YRBS are self-reported—it is not possible to determine the extent to which over-reporting or under-reporting of behaviors occurred. It should be noted that there is variation in estimates of nonmedical prescription opioid misuse among adolescents based on the data source, with rates for lifetime use ranging from 6% (2018 Monitoring the Future) to 14% (2017 YRBS).^{21,22} The authors also cannot discount the possibility that some students may have thought of other prescription pain medications while answering the question. These results are not representative of all youth in this age group. Lastly, it was not possible to determine the temporality or direction of

the associations between the measure of NUPO and the health behaviors and experiences included in this cross-sectional study.

CONCLUSIONS

Despite the many complex challenges raised by the opioid epidemic, there are several opportunities to reduce NUPO among adolescents. For example, clinicians can improve their efforts to screen for and treat opioid misuse among their pediatric patients. Additionally, it is important for clinicians to “right-size” a prescription for all patients, as youth may misuse their own prescription but also have accessed prescriptions from relatives or friends.^{23,24}

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SUPPLEMENTAL MATERIAL

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