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Exploring prescription opioid misuse among college students: a secondary analysis of ACHA National College Health Assessment data (2019–2022)

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ABSTRACT

Background: Prescription opioid misuse (POM) remains a significant public health concern among college students, yet few studies have examined POM prevalence, misuse behaviors among those with prescriptions, and how students access opioids in college settings.

Objectives: Assessing the prevalence of POM, patterns of opioid sourcing (i.e. prescribed vs. illicit), and the trends of misuse of one's own prescription (i.e. higher dosage and/or frequency) among college students.

Methods: Data from the 2019–2022 American College Health Association-National College Health Assessment III survey, including responses from 331,156 students (64.4% cisgender female), were analyzed. Descriptive analyses assessed POM prevalence and misuse patterns, while multivariable logistic regression identified factors linked to illicit opioid sourcing and prescribed opioid misuse (higher dosage and/or increased frequency).

Results: Lifetime POM was reported among 3.9% ($n = 12{,}983$) of students and past three-month POM was reported among 0.7% of all students ($n = 2{,}327$). Of participants with recent misuse, 55.5% used opioids that were not prescribed to them, and 44.5% used their own prescriptions. Among those with prescriptions, 26.0% exceeded the recommended dosage, and 22.7% shortened the dosing interval. Illicit sourcing was more common among gender-diverse students (aOR: 2.72, 95% CI: 1.62–4.71, $p < .0001$) and those with severe psychological distress (aOR: 1.42, 95% CI: 1.11–1.82, $p = .0053$). Misuse of higher dosages (aOR: 2.92, 95% CI: 2.07–4.32, $p < .0001$) and increased use frequency (aOR: 1.79, 95% CI: 1.23–2.63, $p = .0026$) was linked to suicidal risk.

Conclusion: Prescription monitoring, substance use education, and harm reduction strategies to mitigate misuse risks are needed.

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Prescription opioid misuse; college students; ACHA-NCHA; illicit opioid sourcing; mental health

Introduction

The age-adjusted rate of drug overdose deaths in the United States (U.S.) has increased almost fourfold from 8.2 per 100,000 in 2002 to 32.6 in 2022 (1). This increase reflects the ongoing opioid crisis in the U.S., which contributed to 75% of the roughly 107,000 drug-related deaths in 2023 (2). Although public attention has shifted toward synthetic opioids (e.g., fentanyl) (3), prescription opioid misuse (POM) remains a foundational component of the ongoing crisis. The U.S. Substance Abuse and Mental Health Services Administration (SAMSHA) defines POM as "use in any way not directed by a doctor, including use without a prescription of one's own; use in greater amounts, more often, or longer than told to take a drug; or use in any other way not directed by a doctor" (4). While the national opioid dispensing rate and overdose deaths involving prescription opioids has declined in recent years (5–7), deaths involving prescription opioids and illicitly manufactured fentanyl have increased (6), suggesting persistent availability and patterns of misuse. The most reported reason for POM is chronic pain (8), for which opioid treatment is a widely accepted approach. Such misuse can normalize opioid exposure for patients and others through sharing or stockpiling. A 2020 study found that 92.5% of patients who were prescribed opioids had stockpiled pills, and 52.2% of the opioids prescribed remained unused (9). This normalization of POM is a critical precursor to the broader opioid crisis now driven largely by illicit synthetic opioids like fentanyl.

College students face unique pressures that place them at increased risk of POM, including academic demands, increased autonomy over health decisions, and increased exposure to substance use and social networks where prescription opioids may be shared. Young adults (i.e., those aged 18–25), represent 34.5% of the U.S. population with opioid use disorder (10), and

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national data show that young adults continually have the highest prevalence of POM (11). College environments often contribute to shared sourcing networks. In fact, 57.9% of young adults who misused opioids reported sourcing from family or friends, and 41.4% sourced opioids from family or friends for free (12). Similarly, a study reported that over 70% of young adults reported sourcing their medications from close relationships like friends, romantic interests, or family members (13). Counterfeit opioids may place college students at increased risk of fentanyl-laced drugs, which contribute enormously to risking opioid-related overdose rates (14). While limited evidence exists on differences in sourcing between college students with and without prescriptions, demographic analyses showed that nonmedical use was highest among males, White individuals, those in Greek life, and students with lower GPAs or attending competitive colleges (15), underscoring the significance of the diverse college social environment that influences POM.

A recent systematic review found that lifetime POM prevalence rates among college populations range from 4–20% (16), with most studies being restricted to single institutions or geographic regions, limiting external validity. Additionally, all studies were conducted in 2019 and prior. More recent studies (2020–2021) found that 7–22% of college students engaged in past-year POM (17, 18), noting again that these studies were conducted at a single institution or geographic region. While a recent national study examined past-month opioid misuse from 2017–2020 among college students (19), our study builds on this by assessing lifetime misuse with more recent and national data to better understand the pervasiveness of POM in college settings across diverse demographic groups. A recent and large cohort would additionally be able to uncover underexplored aspects of POM among college students, such as patterns of misuse among students prescribed opioids and the sourcing of prescription opioids for college students with and without prescriptions.

The current study, therefore, aims to address three objectives: (1) Identify the prevalence of lifetime and recent (past 3-month) POM among college students across different demographic groups, (2) Assess the sources of POM among college students (i.e., prescribed or illicit), and (3) Examine the proportion of college students with prescribed opioids who engaged in POM by taking either higher or more frequent dosages and associated factors. We hypothesize that there will be significant differences in the prevalence of POM among different demographic groups. We further hypothesize that illicit sources are a significant supplier of prescription opioids for recent non-medical use, and a significant portion of students who have been prescribed opioids misuse their medication by increased dosage or frequency.

Methods

Data source and sample

This cross-sectional study utilized data from the American College Health Association-National College Health Assessment III (ACHA-NCHA III) survey administered between the fall of 2019 through the fall of 2022. During this period, data from 397 institutions were collected. NCHA-III is a nationally recognized web-based survey that assists in collecting comprehensive data about student health, habits, behaviors, and perceptions (20). The survey covers a wide range of health issues including alcohol/tobacco/other drug use, sexual health, mental health, personal safety and violence, and academic difficulties. Only participating institutions that surveyed all students or used a random sampling technique were included. The response rate per semester varied from 11% to 14.1% (21, 22), yielding 334,957 participants in total in the survey period. Only students who answered questions related to POM were included ($n = 331{,}156$). This study used secondary de-identified data and thus ethical approval, and informed consent were not required.

Measures

The first primary outcome (dependent variable) of interest was POM, which was defined as lifetime misuse and misuse in the past 3 months (i.e., recent POM). Both outcomes are derived from individual items from the Alcohol, Smoking, and Substance Use Involvement Test (ASSIST) (23–25). Before taking ASSIST, students are asked to report only nonmedical use of prescription drugs and are provided the following definition: '"*Nonmedical use*" means taking prescription drugs just for the feeling or experience they cause or taking them more often or at higher doses than prescribed.' Lifetime POM use was a binary (yes/no) survey question asking students if they had ever used prescription opioids with examples listed ("morphine, codeine, fentanyl, oxycodone [OxyContin, Percocet], hydrocodone [Vicodin], methadone, buprenorphine [Suboxone], etc) **(Please report nonmedical use only)**." Recent POM was measured using a single item from which asked, "In the past 3 months, how often have you used [prescription opioids ('morphine, codeine, fentanyl, oxycodone [OxyContin, Percocet], hydrocodone [Vicodin], methadone, buprenorphine [Suboxone], etc') **(Please report nonmedical use only)]?**" A binary variable was made to dichotomize the responses, where a response

of "never" indicated no recent POM and responses "once or twice," "monthly," "weekly," or "daily" indicated recent POM. The second primary outcome of interest was the source of prescription opioids among students who engaged in recent POM. This was measured using another item from ASSIST, which asked, "Regarding your use of prescription opioids in the past 3 months, was it prescribed to you?" A binary variable was made to dichotomize the responses, where a "yes" response indicated prescribed and a "no" indicated non-prescribed (i.e. illicit) sourcing. These two terms will be used interchangeably throughout this text. The third primary outcome of interest was the type of POM among students who engaged in recent POM and answered that they had an opioid prescription. This was measured using another item from ASSIST, which asked the following two questions about the use of prescription opioids in the past three months. The first was "Do you ever use MORE of your opioid medication, that is, take a higher dosage, than is prescribed for you?" The second was "Do you ever use your opioid medication MORE OFTEN, that is, shorten the time between dosages, than is prescribed for you?" These questions were leveraged to create a four-part variable for the type of POM (i.e., higher dosage, higher frequency, higher dosage and frequency, neither; Supplemental Table S1).

Exposure (independent) variables of interest included psychological distress, suicidal behavior, eating disorder, sexual harassment, partying hours/week, and number of chronic conditions. Psychological distress was constructed from the Kessler Screening Scale for Psychological Distress (K6) (26, 27), which measures the severity of nonspecific mental illness on a scale of 0–24. Three levels of psychological distress were categorized from score results: no or low psychological distress (0–8), moderate psychological distress (9–12), and serious psychological distress (13–24). For suicidal behavior, students' Suicide Behavior Questionnaire-Revised Screening (SBQR) score was used to dichotomize scores into established thresholds: negative suicidal screening (3–6) and positive suicidal screening (7–18, 28).

To construct a binary indication of an eating disorder, two questions were used. Students were asked (1) "Have you ever been diagnosed by a healthcare or mental health professional with eating disorders?" and (2) "Within the last 12 months, has an eating disorder/problem affected your academic performance?" A "yes" response to (1) and/or a response of "I have experienced this issue, and it negatively impacted my performance in a class" or "I have experienced this issue, and it delayed progress toward my degree" to (2) were flagged as a positive indication of an eating disorder. Sexual harassment was defined as "Within the last 12 months have you had problems or challenges with any unwelcomed sexual advances, requests for favors, and other verbal/physical conduct of a sexual nature?" An answer of "yes" yielded a positive indication of sexual harassment. Partying hours/week was created using the question: "How many hours do you spend in a typical week (7 days) partying?" with 8 options ("0 hours," "1–5 hours," "6–10 hours," "-11–15 hours," "16–20 hours," "21–25 hours," "26–30-hours," "More than 30 hours"). Responses were converted to a continuous variable by taking the mid-point of each option. Number of chronic conditions was created as a continuous variable summing the number of "yes" responses to various conditions from the question: "Have you ever been diagnosed by a healthcare or mental professional with any of the following ongoing or chronic conditions?" Conditions included but were not limited to acne, allergies, heart disease, Tourette's, and cancer.

Demographic factors, including age, gender identity, race/ethnicity, and health insurance were additionally adjusted for, as well as other relevant characteristics (general chronic pain, tobacco use, alcohol use, cannabis use, sense of belonging, GPA, fraternity/sorority involvement, current/veteran armed service member, domestic violence, bullying, discrimination, family difficulty, intimate relationship difficulty, academic year, campus size, and campus locale). All outcomes and correlates of this study are outlined in Supplemental Table S1. Correlate selection was guided by the Problem Behavior Theory (PBT) illustrated in Supplemental Figure S1. The PBT is a developmental framework that explains how risk behaviors emerge from the interaction of personal, behavioral, and environmental systems. PBT has been widely used to understand the systems influencing behavior, including POM (29, 30).

Statistical analyses

Descriptive statistics were used to describe the sociodemographic characteristics of the sample overall and stratified by lifetime POM. Frequencies and percentages were used for categorical variables and means and standard deviations were used for numerical variables. To test associations with lifetime POM, chi-square tests of independence were used for categorical variables, and independent two-sample t-tests were used for continuous variables. Descriptive statistics were replicated to present the characteristics of students by recent POM and again by source (only students who answered questions regarding the source of POM were included).

To further explore the relationship between the non-prescribed sourcing of prescription opioids and the characteristics of college students, we conducted non-parametric regression analyses using weighted

scatterplot smoothing (LOESS) among students who reported recent POM. This approach visually inspected relationships between variables and adjusted for potential models to improve accuracy. Spline functions were used to account for model nonlinearity. Variable selection was performed through backward elimination, using a significance level of 0.1, to prevent overfitting. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were reported to represent associations.

To further address types of misuse, we conducted a three-part sensitivity analysis among students who engaged in recent POM and had prescription opioids prescribed to them. First, we presented descriptive statistics stratified by type of misuse. Second, we used multinomial logistic regression to examine correlates of four mutually exclusive misuse categories: higher dosage only, higher frequency only, both, or neither. Multinomial regression is appropriate here because the dependent variable is categorical with more than two unordered levels, unlike binary logistic regression. Finally, we conducted separate binary logistic regression models to independently assess correlates of higher dosage misuse and higher frequency misuse.

LOESS smoothing and spline functions were used to account for potential nonlinearity. Forward selection with a liberal inclusion threshold of $\alpha = 0.10$ was used to identify relevant covariates for inclusion. However, all final inferential tests were evaluated using a significance level of $\alpha = 0.05$. SAS version 9.4 (SAS Institute, INC) was used for all analyses.

Results

Prevalence and characteristics of POM

Among 331,156 college students, 3.9% ($n = 12{,}983$) reported lifetime POM (Table 1), and 0.7% ($n = 2{,}327$) engaged in POM within the past 3 months (Table 1). Of students that have reported lifetime POM, 17.9% reported POM within the past 3 months. The average participant age was 23.05 years (SD = 6.58), and the majority were cisgender females (64.4%). Students with serious psychological distress (1.2%; $p < .0001$) or a positive suicide screening (1.5%; $p < .0001$) were more likely to report POM within the past 3 months than those without psychological distress (0.4%; $p < .0001$) or negative suicide screening (0.4%; $p < .0001$; Table 1). Higher rates of self-reported past-3-month POM were also observed among students with eating disorders (1.4%; $p < .0001$), family difficulties (1%; $p < .0001$), or intimate relationship difficulties (1.1%; $p < .0001$).

Source of misused prescription opioids

Among students reporting POM in the past 3 months, 55.5% indicated that the opioids that they used were not prescribed to them, while 44.5% reported misuse of their own prescriptions (Table 2). Self-reported illicit sourcing was more common among gender-diverse (76.1%) and transgender (65.1%; $p < .0001$) students, as well as NH Other (62.8%) and NH Biracial or Multiracial (61.7%; $p = .0063$) racial/ethnic groups. Among students with chronic pain, 50.6% reported obtaining opioids through a prescription, while 49.4% sourced them illicitly ($p = .0159$). In contrast, students without chronic pain were more likely to obtain opioids illicitly (56.0%) than via prescription (44.0%; $p = .0159$). Interpersonal difficulties were also associated with self-reported illicit sourcing. Students reporting domestic violence (61.8%; $p < .0001$), family difficulty (58.0%; $p = .0021$), or sexual harassment (59.3%; $p = .0171$) were more likely to report obtaining opioids from illicit sources than those without such experiences (Table 2). Similarly, those without health insurance were more likely to engage in illicit sourcing (65.5% vs. 54.6%, $p = .0123$).

Factors associated with illicit opioid sourcing

Logistic regression models identified gender-diverse students (aOR: 2.72, 95% CI: 1.62–4.71) and those who use cannabis (aOR: 2.01, 95% CI: 1.52–2.67) as having significantly higher odds of illicit opioid sourcing (Table 3). Psychological distress was also associated with self-reported illicit sourcing, with increased odds observed among students with moderate psychological distress (aOR: 1.33, 95% CI: 1.05–1.71) and serious psychological distress (aOR: 1.42, 95% CI: 1.11–1.82). Additionally, students who reported domestic violence (aOR: 1.46, 95% CI: 1.20–1.79) had higher odds of illicit opioid sourcing. The odds of illicit sourcing decreased by 2.2% per year of age (aOR: 0.978, 95% CI: 0.96–0.99). The number of self-reported chronic conditions was also a factor where students with six or fewer chronic conditions had a lower likelihood of illicit sourcing (aOR: 0.94, 95% CI: 0.89–0.99), whereas those with seven or more chronic conditions had a higher likelihood (aOR: 1.10, 95% CI: 1.01–1.19) (Table 3).

Prescription opioid misuse patterns

Among students who reported being prescribed opioids, 26.0% exceeded the recommended dosage, and 22.7% shortened the time between doses (Table 4).

Table 1. Prevalence of lifetime and past 3 months POM by characteristics among college students in the United States: ACHA-NCHA (2019–2022).

	Lifetime POM			POM in the past 3 months			
Characteristic	No	Yes		No	Yes		Total
	n[a] (%[b])	n[a] (%[b])	*p*-value[c]	n[a] (%[b])	n[a] (%[b])	*p*-value[c]	n[a] (%[d])
Total	318,173 (96.1)	12,983 (3.9)		328,829 (99.3)	2,327 (0.7)		331,156 (100)
Categorical Variables							
Gender Identity			**<.0001**			**<.0001**	
Cisgender Female	205,408 (96.7)	7,028 (3.3)		211,181(99.4)	1,255 (0.6)		212,436 (64.4)
Cisgender Male	96,731 (95.2)	4,851 (4.8)		100,775 (99.2)	807 (0.8)		101,582 (30.8)
Gender Diverse	6,478 (93.3)	467 (6.7)		6,853 (98.7)	92 (1.3)		6,945 (2.1)
Transgender	8,386 (93.9)	547 (6.1)		8,802 (98.5)	131 (1.5)		8,933 (2.7)
Race/Ethnicity			**<.0001**			**<.0001**	
AI/AN	6,406 (92.4)	529 (7.6)		6,819 (98.3)	116 (1.7)		6,935 (2.1)
NH Asian or Asian American	45,389 (98.8)	570 (1.2)		45,805 (99.7)	154 (0.3)		45,959 (13.9)
NH Black	15,957 (97.2)	467 (2.8)		16,270 (99.1)	154 (0.9)		16,424 (5)
Hispanic or Latino/a/x	46,136 (96.4)	1,708 (3.6)		47,506 (99.3)	338 (0.7)		47,844 (14.5)
NH Biracial or Multiracial	16,727 (95.3)	817 (4.7)		17,395 (99.1)	149 (0.9)		17,544 (5.3)
NH White	178,649 (95.5)	8,494 (4.5)		185,845 (99.3)	1,298 (0.7)		187,143 (56.5)
NH Other	8,909 (95.7)	398 (4.3)		9,189 (98.7)	118 (1.3)		9,307 (2.8)
Health Insurance			**<.0001**			**<.0001**	
No	11,809 (93.5)	814 (6.5)		12,483 (98.9)	140 (1.1)		12,623 (3.9)
Yes	301,236 (96.2)	11,965 (3.8)		311,072 (99.3)	2,129 (0.7)		313201 (96.1)
General Chronic Pain			**<.0001**			**<.0001**	
No	293,398 (96.5)	10,659 (3.5)		302,198 (99.4)	1,859 (0.6)		304,057 (92.9)
Yes	20,998 (90.8)	2,128 (9.2)		22,725 (98.3)	401 (1.7)		23,126 (7.1)
Tobacco Use[e]			**<.0001**			**<.0001**	
No	219,824 (99)	2,206 (1)		221,419 (99.7)	611 (0.3)		222,030 (67.1)
Yes	98,066 (90.1)	10,765 (9.9)		107,117 (98.4)	1,714 (1.6)		108,831 (32.9)
Alcohol Use[e]			**<.0001**			**<.0001**	
No	90,956 (99.4)	572 (0.6)		91,312 (99.8)	216 (0.2)		91,528 (27.7)
Yes	226,556 (94.8)	12,388 (5.2)		236,840 (99.1)	2,104 (0.9)		238,944 (72.3)
Cannabis Use[e]			**<.0001**			**<.0001**	
No	194,596 (99.3)	1,354 (0.7)		195,528 (99.8)	422 (0.2)		195,950 (59.3)
Yes	122,974 (91.4)	11,601 (8.6)		132,673 (98.6)	1,902 (1.4)		134,575 (40.7)
Eating Disorder			**<.0001**			**<.0001**	
No	272,198 (96.4)	10,015 (3.6)		280,588 (99.4)	1,625 (0.6)		282,213 (85.8)
Yes	43,945 (93.9)	2,847 (6.1)		46,137 (98.6)	655 (1.4)		46,792 (14.2)
Non-Specific Mental Illness[f]			**<.0001**			**<.0001**	
No or low psychological distress	175,337 (96.8)	5,799 (3.2)		180,375 (99.6)	761 (0.4)		181,136 (55.5)
Moderate psychological distress	71,626 (95.8)	3,182 (4.3)		74,190 (99.2)	618 (0.8)		74,808 (22.9)
Serious psychological distress	66,731 (94.6)	3,783 (5.4)		69,645 (98.8)	869 (1.2)		70,514 (21.6)
Suicide Behavior[g]			**<.0001**			**<.0001**	
Negative Suicidal Screening	236,091 (97.3)	6,581 (2.7)		241,682 (99.6)	990 (0.4)		242,672 (73.9)
Positive Suicidal Screening	79,610 (92.7)	6,282 (7.3)		84,601 (98.5)	1,291 (1.5)		85,892 (26.1)
Belonging			**<.0001**			**<.0001**	
No	33,480 (94.4)	1,992 (5.6)		35,014 (98.7)	458 (1.3)		35,472 (10.8)
Yes	283,308 (96.3)	10,914 (3.7)		292,374 (99.4)	1,848 (0.6)		294,222 (89.2)
Failing GPA[h]			**<.0001**			**<.0001**	
No	305,641 (96.1)	12,487 (3.9)		315,926 (99.3)	2,202 (0.7)		318,128 (99.5)
Yes	1,560 (92.8)	121 (7.2)		1,650 (98.2)	31 (1.8)		1,681 (0.5)
Greek Life Member			0.7265			**<.0001**	
No	290,482 (96.1)	11,810 (3.9)		300,310 (99.3)	1,982 (0.7)		302,292 (91.7)
Yes	26,411 (96.0)	1,086 (4.0)		27,194 (98.9)	303 (1.1)		27,497 (8.3)
Current/Veteran Armed Service Member			**<.0001**			**<.0001**	
No	309,658 (96.2)	12,184 (3.8)		319,683 (99.3)	2,159 (0.7)		321,842 (97.9)
Yes	6,338 (90.5)	665 (9.5)		6,888 (98.4)	115 (1.6)		7,003 (2.1)
Domestic Violence			**<.0001**			**<.0001**	
No	268,379 (96.8)	8,866 (3.2)		275,974 (99.5)	1,271 (0.5)		277,245 (83.8)
Yes	49,570 (92.3)	4,110 (7.7)		52,624 (98)	1,056 (2)		53,680 (16.2)
Bullying			**<.0001**			**<.0001**	
No	292,932 (96.3)	11,126 (3.7)		302,243 (99.4)	1,815 (0.6)		304,058 (92.3)
Yes	23,735 (93.1)	1,763 (6.9)		25,027 (98.1)	471 (1.9)		25,498 (7.7)
Discrimination			**<.0001**			**<.0001**	
No	251,667 (96.6)	8,947 (3.4)		259,168 (99.4)	1,446 (0.6)		260,614 (79.1)
Yes	64,990 (94.3)	3,946 (5.7)		68,095 (98.8)	841 (1.2)		68,936 (20.9)
Family Difficulty			**<.0001**			**<.0001**	
No	199,731 (96.8)	6,488 (3.2)		205,185 (99.5)	1,034 (0.5)		206,219 (62.7)
Yes	116,215 (94.8)	6,371 (5.2)		121,347 (99.0)	1,239 (1.0)		122,586 (37.3)
Sexual Harassment			**<.0001**			**<.0001**	
No	288,350 (96.4)	10,615 (3.6)		297,262 (99.4)	1,703 (0.6)		298,965 (90.8)
Yes	28,013 (92.5)	2,262 (7.5)		29,696 (98.1)	579 (1.9)		30,275 (9.2)
Intimate Relationship Difficulty			**<.0001**			**<.0001**	
No	201,306 (97.2)	5,756 (2.8)		206,106 (99.5)	956 (0.5)		207,062 (62.9)
Yes	114,830 (94.2)	7,119 (5.8)		120,625 (98.9)	1,324 (1.1)		121,949 (37.1)

(*Continued*)

Table 1. (Continued).

	Lifetime POM			POM in the past 3 months			
Characteristic	No	Yes		No	Yes		Total
Academic Year			**<.0001**			**<.0001**	
Freshman	65,613 (97.9)	1,427 (2.1)		66,659 (99.4)	381 (0.6)		67,040 (20.3)
Sophomore	55,343 (97.1)	1,630 (2.9)		56,565 (99.3)	408 (0.7)		56,973 (17.3)
Junior	59,150 (96)	2,457 (4)		61,093 (99.2)	514 (0.8)		61,607 (18.7)
Senior	60,072 (94.9)	3,225 (5.1)		62,749 (99.1)	548 (0.9)		63,297 (19.2)
Graduate	72,454 (95)	3,842 (5)		75,907 (99.5)	389 (0.5)		76,296 (23.1)
Other	4,337 (93.2)	316 (6.8)		4,607 (99.0)	46 (1.0)		4,653 (1.4)
Campus Size (# students)			**<.0001**			**.0006**	
<2,500	25375 (99.4)	827 (0.6)		26,040 (99.4)	162 (0.6)		26,202 (7.9)
2,500–4,999	24,441 (95.9)	1,055 (4.1)		25,287 (99.2)	209 (0.8)		25,496 (7.7)
5,000–9,999	53,255 (96.2)	2,129 (3.8)		55,014 (99.3)	370 (0.7)		55,384 (16.7)
10,000–19,999	67,552 (96)	2,827 (4)		69,820 (99.2)	559 (0.8)		70,379 (21.3)
> 20,000	147,550 (96.0)	6,145 (4.0)		152,668 (99.3)	1,027 (0.7)		153,695 (46.4)
Campus Locale (population)			**<.0001**			0.5274	
> 500,000	77,284 (95.6)	3,544 (4.4)		80,249 (99.3)	579 (0.7)		80,828 (24.4)
250,000–499,999	37,163 (96.1)	1,502 (3.9)		38,376 (99.2)	289 (0.8)		38,665 (11.7)
50,000–249,999	121,325 (96.1)	4,921 (3.9)		125,373 (99.3)	873 (0.7)		126,246 (38.1)
10,000–49,999	67,144 (96.3)	2,566 (3.7)		69,221 (99.3)	489 (0.7)		69,710 (21.1)
<10,000	15,257 (97.1)	450 (2.9)		15,610 (99.4)	97 (0.6)		15,707 (4.7)
Study (Survey Period)			**<.0001**			**<.0001**	
2019	36,805 (95.8)	1,617 (4.2)		38,014 (98.9)	408 (1.1)		38,422 (11.6)
2020	60,408 (95.8)	2,620 (4.2)		62,500 (99.2)	528 (0.8)		63,028 (19)
2021	122,495 (95.9)	462 (3.5)		126,941 (99.4)	768 (0.6)		127,709 (38.6)
2022	98,465 (96.5)	3,532 (3.5)		101,374 (99.4)	623 (0.6)		101,997 (38.8)
	Continuous Variables [$\bar{x}$ (sd)]						
Age	22.89 (6.4)	27.15 (8.9)	**<.0001**[i]	23.05 (6.6)	24.38 (8.6)	**<.0001**[i]	23.05 (6.6)
Number of Chronic Conditions	1.49 (1.7)	2.46 (2.7)	**<.0001**[i]	1.52 (1.8)	2.59 (3.3)	**<.0001**[i]	1.53 (1.8)
Hours of Partying/Week	1.73 (3.4)	2.44 (4.6)	**<.0001**[i]	1.74 (3.4)	4.36 (6.2)	**<.0001**[i]	1.76 (3.4)
Hours of Productivity/Week	46.87 (21.8)	43.99 (23.2)	**<.0001**[i]	46.81 (22.3)	50.77 (32.8)	**<.0001**[i]	46.75 (21.9)

Abbreviations: $\bar{x}$, sample mean; SD, sample standard deviation; AI/AN: American Indian/Alaskan Native; NH, Non-Hispanic.
Bold P-values indicate statistical significance at the 5% significance level.
[a]Not all counts add up to total because of missing values.
[b]Row percentage.
[c]Chi-square test for independence.
[d]Column percentage.
[e]Ever used.
[f]Screening for serious mental illness with the Kessler 6 (K6) scale.
[g]Screening for suicidality risk with The Suicide Behaviors Questionnaire – Revised (SBQR).
[h]Failing GPA is denoted as an approximate cumulative grade average of D/F.
[i]Satterthwaite two sample independent t-test.

Multinomial logistic regression models (Table 5) indicated that suicidal risk was a strong correlate of self-reported: increased dosage only (aOR: 3.78, 95% CI: 2.33–6.32), increased frequency only (aOR: 2.33, 95% CI: 1.37–4.01), and both self-reported increased dosage and frequency (aOR: 3.46, 95% CI: 2.30–5.27) compared to neither increasing dosage or increasing frequency. Additionally, students who reported eating disorders showed significantly higher odds of increasing their opioid dosage only (aOR: 2.08, 95% CI: 1.29–3.34), increasing frequency only (aOR: 2.50, 95% CI: 1.45–4.27), and both increasing dosage and frequency (aOR: 2.07, 95% CI: 1.36–3.15). The odds of higher self-reported dosage misuse decreased by 7.9% per year of age (aOR: 0.921, 95% CI: 0.878–0.958), and the odds of self-reported higher frequency misuse decreased by 4.0% per year (aOR: 0.960, 95% CI: 0.922–0.992) (Table 5).

Binary logistic regression analyses showed that transgender identity (aOR: 3.06, 95% CI: 1.49–6.33), suicidal risk (aOR: 2.92, 95% CI: 2.07–4.14), and cannabis use (aOR: 1.91, 95% CI: 1.27–2.96) were significantly associated with self-reported higher dosage misuse (Table 6). Conversely, students who reported feeling a sense of belonging had lower odds of increasing their dosage (aOR: 0.61, 95% CI: 0.41–0.90). Suicidal risk (aOR: 1.79, 95% CI: 1.23–2.63), sexual harassment (aOR: 1.59, 95% CI: 1.08–2.33), cannabis use (aOR: 1.68, 95% CI: 1.08–2.69), and psychological distress (aOR range: 1.62–1.77, 95% CI: 1.03–2.79) were associated with self-reported increased frequency of opioid misuse (Table 7).

Discussion

This study aimed to achieve three primary objectives: (1) to assess the prevalence of lifetime POM among college students across various demographic groups, (2) to evaluate the sources of POM and (3) to examine the extent to which students with prescribed opioids engage in misuse by altering dosage or frequency,

Table 2. Prevalence of opioid sources[a] by characteristics among college students in the United States reporting POM in the past 3 months: ACHA-NCHA (2019 to 2022).

	Opioid source			
Characteristic	Illicit n (%[b])	Prescribed n (%[b])	*p*-value[c]	Total n (%[d])
Total	1,280 (55.5)	1,027 (44.5)		2,307 (100)
Categorical Variables				
Gender Identity			**<.0001**	
Cisgender Female	624 (49.9)	626 (50.1)		1,250 (55.1)
Cisgender Male	475 (59.5)	323 (40.5)		798 (35.2)
Gender Diverse	70 (76.1)	22 (23.9)		92 (4)
Transgender	84 (65.1)	45 (34.9)		129 (5.7)
Race/Ethnicity			**0.0063**	
AI/AN	65 (56.5)	50 (43.5)		115 (5)
NH Asian or Asian American	90 (59.6)	61 (40.4)		151 (6.6)
NH Black	63 (42)	87 (58)		150 (6.5)
Hispanic or Latino/a/x	177 (52.8)	158 (47.2)		335 (14.5)
NH Biracial or Multiracial	92 (61.7)	57 (38.3)		149 (6.5)
NH White	722 (55.8)	572 (44.2)		1,294 (56.1)
NHOther	71 (62.8)	42 (37.2)		113 (4.9)
Health Insurance			**0.0123**	
No	91 (65.5)	48 (34.5)		139 (6.2)
Yes	1,153 (54.6)	960 (45.4)		2,113 (93.8)
General Chronic Pain			**0.0159**	
No	1,035 (56.0)	813 (44.0)		1,848 (82.3)
Yes	196 (49.4)	201 (50.6)		397 (17.7)
Tobacco Use[e]			**<.0001**	
No	259 (42.7)	347 (57.3)		606 (26.3)
Yes	1,019 (60.0)	680 (40.0)		1,699 (73.7)
Alcohol Use[e]			0.9884	
No	117 (55.4)	94 (44.6)		211 (9.2)
Yes	1,160 (55.5)	930 (44.5)		2,090 (90.8)
Cannabis Use[e]			**<.0001**	
No	151 (36.5)	263 (63.5)		414 (18)
Yes	1,127 (59.6)	764 (40.4)		1,891 (82)
Eating Disorder			**0.0279**	
No	866 (53.6)	749 (46.4)		1,615 (71.3)
Yes	381 (58.7)	268 (41.3)		649 (28.7)
Non-Specific Mental Illness[f]			**<.0001**	
No or low psychological distress	356 (46.9)	403 (53.1)		759 (34)
Moderate psychological distress	354 (57.9)	257 (42.1)		611 (27)
Serious psychological distress	524 (60.6)	341 (39.4)		865 (38.7)
Suicide Behavior[g]			**<.0001**	
Negative Suicidal Screening	471 (47.9)	513 (52.1)		984 (43.4)
Positive Suicidal Screening	779 (60.8)	502 (39.2)		1,281 (56.6)
Belonging			0.1019	
No	266 (58.8)	186 (41.2)		452 (19.8)
Yes	1,001 (54.6)	833 (45.4)		1,834 (80.2)
Failing GPA[h]			0.7416	
No	1,205 (55.1)	982 (44.9)		2,187 (98.6)
Yes	18 (58.1)	13 (41.9)		31 (1.4)
Greek Life Member			0.3295	
No	1,080 (54.8)	889 (45.2)		1,969 (86.8)
Yes	173 (57.9)	126 (42.1)		299 (13.2)
Current/Veteran Armed Service Member			*0.0892*	
No	1,193 (55.5)	956 (44.5)		2,149 (95.1)
Yes	53 (47.3)	59 (52.7)		112 (4.9)
Domestic Violence			**<.0001**	
No	637 (50.3)	629 (49.7)		1,266 (54.9)
Yes	643 (61.8)	398 (38.2)		1,041 (45.1)
Bullying			0.7030	
No	992 (54.9)	814 (45.1)		1,806 (79.5)
Yes	260 (55.9)	205 (44.1)		465 (20.5)
Discrimination			0.2415	
No	778 (54.2)	658 (45.8)		1,436 (63.26)
Yes	473 (56.7)	361 (43.3)		834 (36.7)
Family Difficulty			**0.0021**	
No	529 (51.6)	497 (48.4)		1,026 (45.4)
Yes	716 (58)	518 (42)		1,234 (54.6)
Sexual Harassment			**0.0171**	
No	907 (53.6)	785 (46.4)		1,692 (74.7)
Yes	340 (59.3)	233 (40.7)		573 (25.3)

(*Continued*)

Table 2. (Continued).

Characteristic	Opioid source: Illicit n (%[b])	Opioid source: Prescribed n (%[b])	*p*-value[c]	Total n (%[d])
Intimate Relationship Difficulty			0.2816	
No	510 (53.8)	438 (46.2)		948 (41.9)
Yes	738 (56.1)	578 (43.9)		1,316 (58.1)
Academic Year			*0.0549*	
Freshman	217 (57.1)	163 (42.9)		380 (16.8)
Sophomore	223 (55.2)	181 (44.8)		404 (17.8)
Junior	288 (56.4)	223 (43.6)		511 (22.5)
Senior	315 (58)	228 (42)		543 (23.9)
Graduate	185 (47.9)	201 (52.1)		386 (17)
Other	25 (55.6)	20 (44.4)		45 (2)
Campus Size (# students)			0.6393	
<2,500	96 (59.3)	66 (40.7)		162 (7)
2,500–4,999	111 (53.4)	97 (46.6)		208 (9)
5,000–9,999	194 (53)	172 (47)		366 (15.9)
10,000–19,999	305 (55.2)	247 (44.8)		552 (23.9)
>20,000	574 (56.3)	445 (43.7)		1,019 (44.2)
Campus Locale (population)			0.7334	
>500,000	307 (53.7)	265 (46.3)		572 (24.8)
250,000–499,999	155 (54.2)	131 (45.8)		286 (12.4)
50,000–249,999	491 (56.8)	373 (43.2)		864 (37.5)
10,000–49,999	270 (55.3)	218 (44.7)		488 (21.2)
<10,000	57 (58.7)	40 (41.2)		97 (4.2)
Continuous Variables [$\bar{x}$ (sd)]				
Age	23.32 (7.03)	25.68 (9.90)	**<.0001**[i]	24.38 (8.55)
Number of Chronic Conditions	2.55 (3.53)	2.59 (2.96)	0.7505 [i]	2.59 (3.34)
Hours of Partying/Week	5.00 (6.57)	3.53 (5.54)	**<.0001**[i]	4.36 (6.19)
Hours of Productivity/Week	51.94 (34.73)	48.95 (29.35)	**0.0257**[i]	50.76 (32.79)

Abbreviations: x^{-}, sample mean; SD, sample standard deviation; n, sample size.
Bold P-values indicates statistical significance at the 5% significance level.
[a]Opioid sources include either reporting misusing one's own prescription or misusing opioids that were not prescribed to them (illicit).
[b]Row percentage.
[c]Chi-square test for independence.
[d]Column percentage.
[e]Ever used.
[f]Screening for serious mental illness with the Kessler 6 (K6) scale.
[g]Screening for suicidality risk with The Suicide Behaviors Questionnaire – Revised (SBQR).
[h]Failing GPA is denoted as an approximate cumulative grade average of D/F.
[i]Satterthwaite two sample independent t-test.

along with the factors associated with this behavior. The prevalence of lifetime POM among college students was 3.9%, and the prevalence of self-reported recent POM was 0.7%, which was at the lower end of prevalences reported in recent literature (16, 18, 31). Additionally, POM prevalence decreased across the study years. This unexpected finding may be attributable to the declining rates of prescription opioids, as well as increasing rates of illicit opioids (32). Results also suggested that students without prescription were more likely to obtain opioids illicitly, with significant differences observed across diverse student populations. Among students with a prescription, higher dosages and increased frequency of prescribed opioids were common. These patterns highlight the need for comprehensive prevention programs that not only address prescription practices but also focus on reducing the risk factors contributing to illicit opioid use among vulnerable populations.

Shifting patterns of opioid access and misuse

In the current study, we found that nearly 1 in 5 students who have reported lifetime misuse of prescription opioids report recent misuse, highlighting the ongoing risk of sustained opioid misuse among college students. Although the overall three-month prevalence of self-reported misuse (0.7%) appears low, over half (55.5%) of those misusing opioids reported recent use of opioids that were not prescribed to them, reflecting illicit access and indicating a significant trend toward non-medical access. This aligns with recent evidence that approximately 60% of misused prescription drugs among college students were sourced from friends, roommates, and classmates (33). Increasing non-medical access raises concerns about diversion and exposure to counterfeit opioids, such as fentanyl-laced pills, which increase the risk of overdose (34).

Table 3. Adjusted odds ratios and 95% confidence intervals for factors/covariates associated with illicit sourcing of prescription opioids among college students in the United States reporting POM in the past 3 months: ACHA-NCHA (2019 to 2022).

Independent Variables		Illicit Sourcing aOR (95% C.I.)[a]	p-value[b]
Gender	Cisgender female	Ref	
	Cisgender male	1.596 (1.302–1.958)	**<.0001**
	Gender Diverse	2.716 (1.624–4.713)	**<.0001**
	Transgender	1.510 (0.980–2.351)	*0.0618*
Tobacco Usage[c]	Does not use	Ref	
	Does use	1.472 (1.163–1.862)	**0.0013**
Cannabis Usage[c]	Does not use	Ref	
	Does use	2.010 (1.517–2.669)	**<.0001**
Nonspecific mental illness[d]	No or low psychological distress	Ref	
	Moderate psychological distress	1.334 (1.045–1.705)	**0.0208**
	Serious psychological distress	1.420 (1.110–1.818)	**0.0053**
Suicide Behavior[e]	Negative suicide assessment	Ref	
	Positive suicide assessment	1.283 (1.041–1.582)	**0.0196**
Current/Veteran Armed Service Member	No	Ref	
	Yes	0.589 (0.355–0.968)	**0.0368**
Domestic Issues	No	Ref	
	Yes	1.464 (1.197–1.792)	**0.0002**
Family Difficulty	No	Ref	
	Yes	1.240 (1.013–1.516)	**0.0366**
Intimate Partner Challenges	No	Ref	
	Yes	0.796 (0.646–0.980)	**0.0314**
Insurance	Uninsured	Ref	
	Insured	0.623 (0.415–0.924)	**0.0182**
Partying Hours per Week		1.027 (1.008–1.047)	**0.0061**
Age (for an increment of 1 year)		0.978 (0.965–0.990)	**0.0005**
Chronic Conditions[f]	≤6	0.937 (0.891–0.985)	**0.0109**
	≥7	1.095 (1.014–1.192)	**0.0189**
Hours of Productivity/Week	< 80 hours	0.994 (0.988–0.99)	**0.0299**
	≥80 hours	1.002 (0.995–1.009)	0.6532

Bold P-values indicate statistical significance at the 10% significance level.
Opioid sources include either reporting misusing one's own prescription or misusing opioids that were not prescribed to them (illicit).
[a]Adjusted odds ratio and 95% profile-likelihood confidence intervals. Adjusted for listed independent variables only.
[b]Likelihood Ratio test.
[c]Ever used.
[d]Screening for serious mental illness with the Kessler 6 (K6) scale.
[e]Screening for suicidality risk with The Suicide Behaviors Questionnaire – Revised (SBQR).
[f]Modeled with linear splines.

In contrast, our study identified that less than half (44.5%) of the students misusing opioids did so with their own prescriptions, highlighting the need to address potential issues such as inadequate pain management, psychological distress, and the development of dependence. Evidence suggests that the primary reason for POM among college students was to relieve pain (33.9%), with factors including the perception that the pain was temporary, the need for immediate relief, or lack of access to health insurance or other resources (35). Additionally, the finding that 1 in 4 students with prescriptions exceeded their dosage, and 1 in 5 shortened the time between doses, suggests that tolerance or dependence may develop among some students, which could lead to escalation in use (36).

The dual nature of opioid misuse among college students displayed in this study, where one group relies on illicit sourcing and the other misuses their prescribed opioids, further underscores the complexity of addressing the opioid crisis on college campuses. Research has shown that early exposure to prescription pain medications is strongly linked to higher rates of both the illicit use of prescription pain medications and misuse of prescribed opioids later (15). Given the duality of illicit opioid sourcing and the misuse of prescriptions among college students, a one-size-fits-all approach to prevention may be insufficient. While widespread efforts to reduce substance use on college campuses mainly focus on binge drinking (37), student-led opioid-specific strategies to increase knowledge and promote harm reduction on college campuses have been successful (38). Larger efforts should be made to ensure participation in similar programs on college campuses across the country (39). The current study suggests that effective prevention strategies for students who misuse their own prescription opioids could incorporate prescription monitoring, patient counseling, and the promotion of alternative pain management approaches. Given that counterfeit pills contaminated with fentanyl now account for a large

Table 4. Prevalence of increased dosage and increased frequency of prescribed opioid use among college students in the United States reporting POM in the past 3 months who have had their prescription opioids prescribed to them directly: ACHA-NCHA (2019 to 2022).

	Dosage and Frequency of Prescribed Opioids[a]					
Characteristic	Neither n (%[b])	Higher Dosage Only n (%[b])	Higher Frequency Only n (%[b])	Higher Dosage and Frequency n (%[b])	p-value[c]	Total n (%[d])
Total	633 (66.3)	104 (10.9)	73 (7.6)	144 (15.1)		954 (100)
Categorical Variables						
Gender Identity					**<.0001**	
Cisgender Female	409 (69.3)	46 (7.8)	45 (7.6)	90 (15.3)		590 (62.4)
Cisgender Male	197 (66.1)	38 (12.8)	21 (7.1)	42 (14.1)		298 (31.5)
Gender Diverse	9 (42.9)	6 (28.6)	2 (9.5)	4 (19.1)		21 (2.2)
Transgender	12 (32.4)	13 (35.1)	4 (10.8)	8 (21.6)		37 (3.9)
Race/Ethnicity					**0.0337**	
AI/AN	28 (65.1)	4 (9.3)	5 (11.6)	6 (14)		43 (4.5)
NH Asian or Asian American	32 (65.3)	5 (10.2)	8 (16.3)	4 (8.2)		49 (5.1)
NH Black	66 (83.5)	7 (8.9)	1 (1.3)	5 (6.3)		79 (8.3)
Hispanic or Latino/a/x	110 (74.3)	12 (8.1)	8 (5.4)	18 (12.2)		148 (15.5)
NH Biracial or Multiracial	38 (69.1)	5 (9.1)	4 (7.3)	8 (14.6)		55 (5.8)
NH White	337 (62.3)	65 (12)	44 (8.1)	95 (17.6)		541 (56.7)
NHOther	22 (56.4)	6 (15.4)	3 (7.7)	8 (20.5)		39 (4.1)
Health Insurance					**0.0197**	
No	38 (86.4)	1 (2.3)	0 (0.0)	5 (11.4)		44 (4.7)
Yes	584 (65.3)	100 (11.2)	71 (7.9)	139 (15.6)		894 (95.3)
General Chronic Pain					0.2108	
No	511 (67.7)	81 (10.7)	54 (7.2)	109 (14.4)		755 (80.2)
Yes	112 (59.9)	22 (11.8)	18 (9.6)	35 (18.7)		187 (19.9)
Tobacco Use[e]					**0.0083**	
No	237 (72.7)	34 (10.4)	22 (6.8)	33 (10.1)		326 (34.2)
Yes	396 (63.1)	70 (11.2)	51 (8.1)	111 (17.7)		628 (65.8)
Alcohol Use[e]					0.6955	
No	51 (68.0)	9 (12.0)	7 (9.3)	8 (10.7)		75 (7.9)
Yes	580 (66.2)	95 (10.8)	66 (7.5)	135 (15.4)		876 (92.1)
Cannabis Use[e]					**<.0001**	
No	192 (80.3)	18 (7.5)	12 (5.0)	17 (7.1)		239 (25.1)
Yes	441 (61.7)	86 (12)	61 (8.5)	127 (17.8)		715 (74.9)
Eating Disorder					**<.0001**	
No	520 (73.1)	61 (8.6)	42 (5.9)	88 (12.4)		711 (75.2)
Yes	106 (45.3)	42 (18)	30 (12.8)	56 (23.9)		234 (24.8)
Non-Specific Mental Illness[f]					**<.0001**	
No or low psychological distress	314 (81.4)	25 (6.5)	16 (4.2)	31 (8)		386 (41.3)
Moderate psychological distress	149 (62.6)	22 (9.2)	24 (10.1)	43 (18.1)		238 (25.5)
Serious psychological distress	156 (50.3)	54 (17.4)	31 (10.0)	69 (22.3)		310 (33.2)
Suicide Behavior[g]					**<.0001**	
Negative Suicidal Screening	389 (81)	25 (5.2)	26 (5.4)	40 (8.3)		480 (51)
Positive Suicidal Screening	235 (50.9)	77 (16.7)	47 (10.2)	103 (22.3)		462 (49)
Belonging					**<.0001**	
No	88 (51.5)	30 (17.5)	15 (8.8)	38 (22.2)		171 (18)
Yes	540 (69.5)	74 (9.5)	58 (7.5)	105 (13.5)		777 (81)
Failing GPA[h]					0.2739	
No	606 (66.4)	99 (10.8)	68 (7.5)	140 (15.3)		913 (98.8)
Yes	7 (63.6)	2 (18.2)	2 (18.2)	0 (0.0)		11 (1.2)
Greek Life Member					0.2325	
No	562 (67.3)	91 (10.9)	61 (7.3)	121 (14.5)		835 (88.4)
Yes	64 (58.7)	12 (11.0)	10 (9.2)	23 (21.1)		109 (11.6)
Current/Veteran Armed Service Member					0.4835	
No	594 (66.3)	98 (10.9)	65 (7.3)	139 (15.5)		896 (94.9)
Yes	32 (66.7)	5 (10.4)	6 (12.5)	5 (10.4)		48 (5.1)
Domestic Violence					**<.0001**	
No	434 (71.9)	57 (9.4)	35 (5.8)	78 (12.9)		604 (63.3)
Yes	199 (56.9)	47 (13.4)	38 (10.9)	66 (18.9)		350 (36.7)
Bullying					**0.0015**	
No	528 (68.6)	78 (10.1)	49 (6.4)	115 (14.9)		770 (81.3)
Yes	99 (55.9)	25 (14.1)	24 (13.6)	29 (16.4)		177 (18.7)
Discrimination					**0.0003**	
No	439 (70.5)	54 (8.7)	39 (6.3)	91 (14.6)		623 (65.8)
Yes	188 (58.0)	49 (15.1)	34 (10.5)	53 (16.4)		324 (34.2)
Family Difficulty					**<.0001**	
No	332 (71.6)	54 (11.6)	31 (6.7)	47 (10.1)		464 (49.2)
Yes	292 (61.0)	48 (10.0)	42 (8.8)	97 (20.3)		479 (50.8)

(*Continued*)

Table 4. (Continued).

Characteristic	Dosage and Frequency of Prescribed Opioids[a]					
	Neither n (%[b])	Higher Dosage Only n (%[b])	Higher Frequency Only n (%[b])	Higher Dosage and Frequency n (%[b])	p-value[c]	Total n (%[d])
Sexual Harassment					**<.0001**	
No	531 (71.6)	69 (9.3)	50 (6.7)	92 (12.4)		742 (78.4)
Yes	95 (46.6)	34 (16.7)	23 (11.3)	52 (25.5)		204 (21.6)
Intimate Relationship Difficulty					**0.0004**	
No	300 (72.8)	43 (10.4)	26 (6.3)	43 (10.4)		412 (43.6)
Yes	324 (60.9)	60 (11.3)	47 (8.8)	101 (19)		532 (56.4)
Academic Year					**0.0194**	
Freshman	78 (53.1)	28 (19.1)	15 (10.2)	26 (17.7)		147 (15.5)
Sophomore	116 (69.1)	17 (10.1)	10 (6.0)	25 (14.9)		168 (17.8)
Junior	140 (67.6)	15 (7.3)	17 (8.2)	35 (16.9)		207 (21.9)
Senior	144 (66.7)	26 (12.0)	14 (6.5)	32 (14.8)		216 (22.8)
Graduate	131 (69.7)	17 (9.0)	15 (8.0)	25 (13.3)		188 (19.9)
Other	19 (95.0)	0 (0.0)	0 (0.0)	1 (5.0)		20 (2.1)
Campus Size (# students)					0.5914	
< 2,500	42 (71.2)	7 (11.9)	2 (3.4)	8 (13.6)		59 (6.2)
2,500–4,999	56 (60.2)	14 (15.1)	9 (9.7)	14 (15)		93 (9.8)
5,000–9,999	107 (67.3)	12 (7.56)	10 (6.3)	30 (18.9)		159 (16.7)
10,000–19,999	145 (63.3)	27 (11.8)	22 (9.6)	35 (15.3)		229 (24)
> 20,000	283 (68.4)	44 (10.6)	30 (7.3)	57 (13.8)		414 (43.4)
Campus Locale (population)					0.6853	
> 500,000	166 (68.3)	23 (9.5)	17 (7)	37 (15.2)		243 (25.5)
250,000–499,999	79 (62.7)	18 (14.3)	13 (10.3)	16 (12.7)		126 (13.2)
50,000–249,999	236 (68.2)	32 (9.2)	22 (6.4)	56 (16.2)		346 (26.3)
10,000–49,999	129 (63.9)	27 (13.4)	16 (7.9)	30 (14.9)		202 (21.2)
< 10,000	23 (62.2)	4 (10.8)	5 (13.5)	5 (13.5)		37 (3.9)
Continuous Variables [$\bar{x}$ (sd)]						
Age	27.29 (10.75)	22.06 (5.68)	23.07 (8.51)	24.22 (9.09)	**<.0001**[i]	24.38 (8.55)
Number of Chronic Conditions	2.35 (2.65)	3.22 (4.00)	3.18 (3.03)	2.74 (2.30)	**0.0040**[i]	2.59 (3.34)
Hours of Partying/Week	2.93 (4.98)	3.45 (5.16)	3.75 (5.34)	4.27 (5.61)	**0.0311**[i]	4.36 (6.19)
Hours of Productivity/Week	45.74 (25.08)	49.68 (29.81)	53.05 (31.46)	48.44 (27.45)	*0.0837* [i]	50.76 (32.79)

Abbreviations: $\bar{x}$, sample mean; SD, sample standard deviation; n, sample size.
Bold P-values indicates statistical significance at the 5% significance level.
[a]Increased dosage refers to using more of an opioid medication than prescribed and increased frequency refers to using an opioid medication more often than prescribed.
[b]Row percentage.
[c]Chi-square test for independence.
[d]Column percentage.
[e]Ever used.
[f]Screening for serious mental illness with the Kessler 6 (K6) scale.
[g]Screening for suicidality risk with The Suicide Behavior Questionnaire – Revised (SBQR).
[h]Failing GPA is denoted as an approximate cumulative grade average of D/F.
[i]One-way ANOVA.

share of opioid overdose deaths among young adults (40), students who engage in illicit POM must be educated on the dangers of counterfeit drugs and opioid overdose risks. Overdose education and naloxone training could help mitigate overdose by raising awareness about counterfeit opioids.

Relevant demographic characteristics

Interpersonal trauma (IPT), such as domestic violence, sexual harassment, and family difficulties, were strongly linked to opioid misuse in this study and supported by previous literature (41). These findings highlight the role of trauma and social adversity in opioid misuse, suggesting that interventions should incorporate trauma-informed care and counseling services (42). Given the relationship between opioid misuse and exposure to sexual violence, it is critical for universities to routinely screen for sexual violence, as many individuals exposed delay disclosure to treatment providers (43, 44). Moreover, intimate partner violence is highly prevalent among women who use opioids, with studies showing a past-year prevalence of 32–75% (45). Students with a history of trauma may misuse opioids to cope with the emotional aftermath of these experiences. Universities must ensure that students affected by trauma are identified early and provided with appropriate resources to help prevent opioid misuse by addressing its root causes.

Gender-diverse students had higher odds of illicit opioid sourcing, and transgender students were more

Table 5. Adjusted odds ratios and 95% confidence intervals of increased dosage and frequency of prescribed opioids use among college students in the United States reporting POM in the past 3 months who have had their prescription opioids prescribed to them directly: ACHA-NCHA (2019 to 2022).

		Increased dosage/increased frequency for prescribed opioids[a]		
		aOR (95% C.I.)[b]		
Independent Variables		High Dosage Only	High Frequency Only	High Dosage and Frequency
Suicide Behavior[c]	No	Ref.	Ref.	Ref.
	Yes	3.782 (2.328–6.316)	2.325 (1.373–4.008)	3.456 (2.299–5.271)
p-value[d]		**< 0.0001**	**0.0016**	**< 0.0001**
Eating Disorder	No	Ref.	Ref.	Ref.
	Yes	2.084 (1.294–3.335)	2.501 (1.453–4.267)	2.070 (1.355–3.146)
p-value[d]		**0.0027**	**0.0011**	**0.0008**
Age		0.921 (0.878–0.958)	0.960 (0.922–0.992)	0.981 (0.958–1.002)
p-value[d]		**< 0.001**	**0.0121**	*0.0796*

Bold P-values indicates statistical significance at the 5% significance level. Italicized P-values indicates effects on the boundary of significance ($5\% < p < 10\%$).
[a]Modeled with multinomial logistic regression. Reference outcome category is neither.
[b]Adjusted odds ratio and 95% profile-likelihood confidence intervals. Adjusted for listed independent variables only.
[c]Screening for suicidality risk with The Suicide Behavior Questionnaire – Revised (SBQR).
[d]Likelihood ratio test.

Table 6. Adjusted odds ratios and confidence intervals of increased dosage of prescribed opioids among college students in the United States reporting POM in the past 3 months who have had their prescription opioids prescribed to them directly: ACHA-NCHA (2019 to 2022).

Independent Variables		Higher Dosage aOR (95% C.I.)[a]	p-value[b]
Gender	Cisgender female	Ref	
	Cisgender male	1.749 (1.219–2.511)	**0.0024**
	Gender Diverse	1.789 (0.697–4.524)	0.2224
	Transgender	3.056 (1.492–6.334)	**0.0023**
Suicide Behavior[c]	Negative suicide assessment	Ref	
	Positive suicide assessment	2.915 (2.069–4.137)	**< 0.0001**
Sexual Harassment	No	Ref	
	Yes	1.590 (1.090–2.314)	**0.0163**
Cannabis Usage[d]	Does not use	Ref	
	Does use	1.915 (1.267–2.956)	**0.0018**
Belonging	No	Ref	
	Yes	0.607 (0.411–0.900)	**0.0132**
Race/Ethnicity	NH[e] White	Ref	
	AI/AN[f]	0.859 (0.373–1.840)	0.7038
	Hispanic or Latino/a/x	0.709 (0.437–1.129)	0.1493
	NH[e] Asian or Asian American	0.453 (0.192–0.970)	**0.0413**
	NH[e] Biracial or Multiracial	0.572 (0.278–1.113)	0.1018
	NH[e] Black	0.445 (0.218–0.852)	**0.0137**
	NH[e] Other	1.499 (0.643–3.443)	0.3435
Eating Disorder	No	Ref	
	Yes	1.439 (1.002–2.059)	**0.0486**
Age		0.970 (0.949–0.989)	**0.0021**

Bold P-values indicates statistical significance at the 5% significance level.
[a]Adjusted odds ratio with profile-likelihood 95% confidence intervals. Adjusted for listed independent variables only.
[b]Likelihood ratio test.
[c]Screening for suicidality risk with The Suicide Behavior Questionnaire – Revised (SBQR).
[d]Ever used.
[e]Non-Hispanic.
[f]American Indian/Alaskan Native.

likely to engage in both increased dosage and frequency of prescribed opioids among students with a prescription. This is consistent with prior research showing that gender-diverse and transgender individuals face greater substance use risks due to discrimination and marginalization (46, 47). Due to the strong social dynamics associated with substance use among LGBTQ+ students (48), peer-based substance use interventions may be particularly influential in limiting opioid misuse among vulnerable groups (49). To address these disparities, gender-specific cultural factors should be considered in the development of substance use education and counseling programs. Creating inclusive policies and fostering an environment where all students feel supported is essential.

The findings from this study underline the strong link between mental health struggles, including suicidal risk and psychological distress, and POM, which is supported

Table 7. Adjusted odds ratios and confidence intervals of increased frequency of prescribed opioids use among college students in the United States reporting POM in the past 3 months: ACHA-NCHA (2019 to 2022).

Independent Variables		Higher Frequency aOR (95% C.I.)[a]	*p*-value[b]
Suicide Behavior[c]	Negative suicide assessment	Ref	
	Positive suicide assessment	1.790 (1.225–2.628)	**0.0026**
Sexual Harassment	No	Ref	
	Yes	1.587 (1.076–2.327)	**0.0199**
Cannabis Usage[d]	Does not use	Ref	
	Does use	1.684 (1.080–2.694)	**0.0209**
Nonspecific mental illness[e]	No or low psychological distress	Ref	
	Moderate psychological distress	1.771 (1.127–2.791)	**0.0132**
	Serious psychological distress	1.621 (1.028–2.567)	**0.0377**
Race/Ethnicity	NH[f] White	Ref	
	AI/AN[g]	1.163 (0.525–2.415)	0.6985
	Hispanic or Latino/a/x	0.795 (0.474–1.301)	0.3671
	NH[f] Asian or Asian American	0.731 (0.320–1.547)	0.4235
	NH[f] Biracial or Multiracial	0.676 (0.321–1.334)	0.2662
	NH[f] Black	0.255 (0.095–0.576)	**0.0005**
	NH[f] Other	1.330 (0.550–3.056)	0.5156
Eating Disorder	No	Ref	
	Yes	1.572 (1.080–2.278)	**0.0184**
Family Difficulty	No	Ref	
	Yes	1.425 (1.004–2.029)	**0.0209**
Chronic Conditions[h]	≤4	1.247 (1.102–1.413)	**0.0004**
	≥5	0.842 (0.737–0.946)	**0.0029**
Hours of Partying/Week		1.034 (1.003–1.065)	**0.0309**

Bold P-values indicates statistical significance at the 5% significance level.
[a]Adjusted odds ratio with 95% profile-likelihood confidence intervals. Adjusted for listed independent variables only.
[b]Likelihood Ratio Test.
[c]Screening for suicidality risk with The Suicide Behavior Questionnaire – Revised (SBQR).
[d]Ever used.
[e]Screening for serious mental illness with the Kessler 6 (K6) scale.
[f]Non-Hispanic.
[g]American Indian/Alaskan Native.
[h]Modeled with linear splines.

by previous literature (16). Students with higher levels of psychological distress were more likely to engage in both illicit opioid sourcing and misuse, suggesting that some students may be inappropriately self-medicating their psychological distress with prescription medications. This supports prior research highlighting emotional self-medication as a driver of opioid misuse in young adults (16, 49). Additionally, emotional dysregulation has been shown to explain the relationship between negative affectivity and non-medical opioid use (50). These effects were consistent regardless of whether individuals reported pain, suggesting that a focus on emotional dysregulation could be an effective therapeutic strategy to reduce non-medical opioid use in this population (50). Early screening for psychological distress and effective and accessible mental health services, including strategies to manage emotional self-regulation, should be prioritized to address opioid misuse.

Strengths and limitations

A significant strength of this study is its large, diverse sample size, which included 331,156 college students. This robust cohort allows for a comprehensive analysis of POM across various demographic groups and patterns of misuse offers valuable insights into the complexities of opioid misuse on college campuses. Despite these strengths, several limitations must be considered. First, the study relies on self-reported data, which may introduce response biases such as underreporting of opioid misuse due to social desirability or recall bias. Additionally, students self-select to participate in the survey, response rates are low, and survey weights are not included, which could limit the representativeness of the sample. Nonetheless, a previous study using NCHA data found that statistical weighting had minimal impact on the results, with models based on both unweighted and weighted data leading to the same conclusions (51). Furthermore, as with most surveys, numerous barriers exist to accurately assessing opioid misuse (52). While the study provides valuable cross-sectional data, its design precludes the ability to determine causal relationships between the identified factors and POM. Future longitudinal studies are needed to explore causal pathways and the long-term impacts of POM among college students, while considering crucial factors identified in this study, such as psychological

distress, gender identity, and IPT. Finally, although the study adjusts for a broad range of characteristics, it may not capture the full diversity of student experiences and confounders may remain unaccounted for, particularly for less common or intersectional identities, which could be important in understanding the full scope of POM among college students. Future research should continue to distinguish between prescribed and illicit POM among college students as the patterns of misuse and associated risk factors differ by source.

Conclusion

The current study among over 300,000 U.S. college students suggests that there is an ongoing risk of sustained opioid misuse among college students, including prevalent patterns of non-medical access and misuse of one's prescription opioids. Clinical implications for students that misuse their own prescriptions include close prescription monitoring, mental health screening and counseling, and the promotion of alternative pain management. For students engaging in illicit POM, education campaigns on the dangers of illicit opioid use should be implemented, and naloxone should be widely available to reduce overdose from potentially fentanyl-laced drugs on college campuses. Psychosocial differences provide further direction on tailored interventions, including trauma-informed care, gender-specific education and counseling programs, and mental health services aimed at promoting emotional self-regulation.

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Data availability statement

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