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The relationship between past 12-month suicidality and reasons for prescription opioid misuse

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Abstract

Background: Understanding reasons for prescription opioid misuse can help elucidate prevention efforts. The goal of the current study is to assess associations of reasons for prescription opioid misuse subtypes and suicide-related variables. We also assessed whether prescription opioid misuse differentiates ideators from those who go on to attempt suicide.

Methods: Using data from the 2015–2017 National Survey of Drug Use and Health (N=45,074), prescription opioid misuse subtypes were as follows: (a) Pain only, (b) Other reasons, and (c) Mixed reasons (i.e., pain and at least one other reason). Logistic regressions examined associations of misuse subtypes and past 12-month suicide-related variables (ideation, planning, attempts) relative to non-misusers. Logistic regression analyses were also conducted among the subset reporting ideation to assess whether prescription opioid misuse differentiated ideators with no attempt from ideators with an attempt.

Results: In adjusted models, the Pain only and the Other reasons subtypes were associated with ideation and planning, but not attempts. The Mixed reasons subtype had higher odds of suicide ideation and planning compared to those not misusing prescription opioids and the Pain only misuse subtype. The Mixed reasons subtype had higher odds of a suicide attempt only when compared to those not misusing prescription opioids. Prescription opioid misuse was also associated with suicide attempts among the subset of ideators.

Conclusions: Findings indicate people misuse prescription opioids for various reasons, and misuse subtypes are associated with past 12-month suicidality. Addressing pain and other reasons for misuse together through use of evidence-based treatments may help mitigate suicide risk.

Keywords

suicide ideation; suicide attempts; prescription opioid misuse; motives; subtypes

1. Introduction

Opioid-related deaths have contributed to the decreased life expectancy in the United States (Dowell *et al.* 2017). It was estimated that almost 50,000 opioid overdoses occurred in 2017, which was more than a four-fold increase from 2002 (Ahmad *et al.* 2017). Similarly, the number of suicides involving opioids nearly tripled from 1999 to 2014 (Braden *et al.* 2017). Higher doses of prescription opioids and co-prescriptions with benzodiazepines further enhance suicide risk and are associated with increased risk of suicide attempts (Ilgen *et al.* 2016; Im *et al.* 2015; Park *et al.* 2015; Xiang *et al.* 2012). Additionally, past 12-month prescription opioid misuse, greater frequency of misuse, and persistence of misuse are each associated with past 12-month suicide ideation and suicide attempts (Ashrafioun *et al.* 2017; Kuramoto *et al.* 2012). Prescription opioid misuse is also associated with higher rates of depression, substance use disorders, and medical comorbidity (Fink *et al.* 2015; Fischer *et al.* 2012; Martins *et al.* 2012; McCabe *et al.* 2008); each of which are also associated with suicide (Borges and Loera, 2010; Turecki and Brent, 2016).

The Substance Abuse and Mental Health Services Administration (SAMHSA) started assessing reasons for prescription opioid misuse as part of their National Survey of Drug Use and Health (NSDUH) in 2015 as a way to inform assessments of substance use prevention and treatment needs (Lipari *et al.* 2017). There are a variety of reasons for prescription opioid misuse, including, but not limited to, self-medication (e.g., using prescription opioids outside of a doctor's prescription, such as in greater doses, to treat one's pain or sleep), experimentation (e.g., to see how one feels after using the prescription opioid), recreational use (e.g., for the intense intoxication the prescription opioid can induce), and to help address emotional problems. For example, in analyses from another national survey, McCabe and Cranford (2012) found that among high school seniors who misused prescription opioids, 41% used for experimentation, 26% used to relax, 14% used to get high, 11% used for pain relief, and 7% used for affect regulation. Overall, 39% used to self-medicate, 48% used for both self-medication and recreation, and 13% used for recreational purposes only. Most respondents endorsed several reasons for prescription opioid misuse. While these estimates are in adolescents, a recent report indicated that misusing for pain relief was by far the most common reason for misuse among adults (63.4%), while getting high (11.7%) and relaxation (10.9%) were the next most common reasons endorsed (Lipari *et al.* 2017).

Some research has sought to understand further how the reasons for drug misuse is associated with negative consequences. For example, McCabe and colleagues (2009; 2013) found that individuals misusing prescription opioids for pain management versus using for recreational purposes and mixed purposes (i.e., for intended and non-intended purposes) were less likely to binge drink, screen positive for alcohol and drug problems, and use marijuana. Furthermore, those misusing prescription opioids to self-medicate did not differ in substance use and substance-related problems compared to those who were using prescription opioids as prescribed. These studies suggest that those who are misusing prescription opioids, but for their intended purpose (e.g., receiving prescription opioids from a friend, but using for pain), are similar to those using prescription drugs without misuse, and have a less severe clinical profile than those misusing prescription drugs for reasons

other than their intended purposes (e.g., receiving prescription opioids from a friend and using to get high) or for mixed purposes (e.g., for pain and to get high).

A greater understanding of reasons for prescription opioid misuse may also enhance suicide prevention strategies. For example, many of the reasons for prescription opioid misuse are associated with suicide risk even outside the context of prescription opioid misuse. For example, pain, emotional problems, sleep disturbance, substance abuse, heightened arousal or agitation are independently associated with suicidal thoughts and behaviors (Bentley *et al.* 2016; Bohnert *et al.* 2017; Bradley *et al.* 2011; Demidenko *et al.* 2017; Ilgen *et al.* 2013; Pigeon *et al.* 2012).

These independent risk factors are likely impacted by the presence of prescription opioid misuse via multiple channels. Biologically, they are associated with prolonged stress response and several have been found to blunt responses to pleasurable cues, which in turn lead to an increased vulnerability to suicidal behavior (Elman, Borsook, and Volkow, 2013; Garland *et al.*, 2013). Second, prescription opioid use may represent a coping strategy to address the potential despair created from those concerns (i.e., pain, emotional problems, sleep disturbance, substance abuse, heightened arousal or agitation) (Bohnert and Ilgen, 2019). Third, when considered in the context of the Three Step Theory of Suicide (Klonsky and May, 2015), suicidal ideation develops through the combination of emotional pain and hopelessness, and the severity of ideation is dependent on the extent to which individuals feel connected to others. Individuals experiencing suicidal ideation then act on such thoughts and attempt suicide when they have sufficient capability to do so. Prescription opioid misuse, and many of the reasons for misuse may independently contribute to being hopeless and socially isolated. Furthermore, prescription opioids and even medications to address some of the factors noted above (e.g., emotional problems, sleep disturbance) provide practical means by which to attempt suicide. Individuals with these life stressors may have an acquired capability because they have habituated to factors such as fear and pain associated with dying.

While considering the Three Step Theory and risk factors of suicide more broadly, it is important to consider the ideation-to-action framework (Klonsky and May, 2014). Specifically, research should not just focus on differentiating attempters from non-attempts, but should also focus on differentiating attempters from ideators who have not attempted suicide. This can help identify potential groups that are more sensitive to transitioning from only thinking about suicide to acting on it.

Despite these findings, there is little research investigating the reasons for prescription opioid misuse and their relationship to suicide-related variables (i.e., suicide ideation, suicide planning, and suicide attempts). For example, it is unclear if a subtype of misusing for pain only would be associated with a suicidality more or less than subtypes of misusing for other reasons or for mixed reasons. To address this gap, the current study assessed associations of reasons for prescription opioid misuse, relative to individuals using prescription opioids without misuse, and suicide-related variables in a nationally representative sample. Specifically, respondents reporting prescription opioid misuse were categorized into three subtypes: (1) Pain only (i.e., pain was the only reasons reported for

misuse), (2) Other Reasons (i.e., other reasons and not pain were reported for misuse), and (3) Mixed (i.e., pain and at least one other reason was reported for misuse). We expected that each of the misuse subtypes would have higher odds of reporting suicide ideation, planning, and attempts relative to respondents who reported using prescription opioids without misuse. Additionally, we expected that respondents in the Other Reasons and Mixed subtypes would have higher odds of reporting suicide ideation, planning, and attempts relative to those in the Pain only subtype. To advance the literature on the ideation-to-action framework, we also conducted exploratory analyses to assess whether misusing prescription opioids was associated with suicide attempt among those reporting suicide ideation.

2. Methods

2.1. Data source and study population

Data from the 2015, 2016, and 2017 NSDUH were used in the current analyses and were accessed through SAMHSA's data website (Substance Abuse and Mental Health Services Administration, 2018). These were the first three years in which the survey included questions about reasons for prescription opioid misuse. Data from the NSDUH is collected through interviews conducted in a random sample of households across the United States. Participants were compensated \$30. Participants comprised all respondents aged 18 years or older who reported prescription opioid use in the past 12 months (Center for Behavioral Health Statistics and Quality, 2016). The pooled 2015, 2016, and 2017 NSDUH dataset consisted of 170,319 unique respondents, with 241,579 excluded because they were younger than 18 years of age, and an additional 83,181 because they denied using prescription opioids in the past 12 months. An additional 485 respondents were excluded because a response for one or more of the covariates was missing ($n = 471$ for lifetime depression; $n = 7$ for suicide planning or suicide attempts; $n = 7$ for general health rating), leaving a total of 45,074 unique participants included in the present analyses. This study received exempt status from the University of Rochester Institutional Review Board.

2.2. Variables

2.2.1. Suicide-related variables—Respondents were asked yes-no questions regarding if they had seriously thought about trying to kill themselves (i.e., suicide ideation), made any plans to kill themselves (i.e., suicide planning), and tried to kill themselves (i.e., suicide attempts) in the past 12 months. A positive endorsement of suicide ideation prompted the item on suicide planning and a positive endorsement of suicide planning prompted the item on suicide attempts.

2.2.2. Prescription opioid use and misuse—Respondents were provided with a comprehensive list of prescription pain relievers (hereafter referred to as prescription opioids) and asked which, if any, they had used in the past 12 months. The dataset then provided a recoded variable that differentiated those who had used prescription opioids without misuse or misused them. Misuse was defined as taking a prescription opioid in a way that was inconsistent with how a doctor directed them to take it (i.e., using without a prescription; using greater amounts, more often, or longer than directed; any other way). Respondents who indicated that they had misused prescription pain relievers were

subsequently asked to identify the reasons for their last misuse after being presented a list of nine reasons. These included: to relieve physical pain; to relax or relieve tension; to experiment or to see what they're like; to feel good get high; to help with my sleep; to help me with my feelings or emotions; to increase/decrease the effect of some other drug ; because I am hooked or have to have them; and for some other reason. Those reporting misuse were categorized into three subtypes based on the reasons for misuse they endorsed: (1) Pain only (i.e., pain was the only reasons reported for misuse), (2) Other Reasons (i.e., at least one reason other than pain was endorsed) and (3) Mixed (i.e., pain and at least one other reason was endorsed). While using to help with sleep or emotions could be conceptualized as self-medication, we elected to not include these with pain only because they are not directed reasons for using prescription opioids.

2.2.3. Depression and substance use disorders—Respondents were considered to have lifetime and a past 12-month major depressive episode if they reported experiencing at least five out of nine major depression symptom criteria in their lifetime and in the past 12 months, respectively, with at least one of the criteria being depressed mood or loss of interest in daily activities. Participants were classified as having an alcohol or drug use disorder if they met the DSM-IV criteria for alcohol abuse/dependence or drug abuse/dependence, respectively.

2.2.4. General health—Participants rated their overall health with one of the following responses: poor, fair, good, very good, and excellent. Responses to this item were recoded in NSDUH's dataset into the following categories: poor/fair, good, very good, and excellent.

2.2.5. Demographic characteristics—Data on the following demographics were collected: age (18–25 years, 26–34 years, 35–49 years, 50–64 years, 65 years or older), gender (male, female), race/ethnicity (White/Caucasian, Black/African American, Native American/Alaskan, Asian, Native Hawaiian/Other Pacific Islander, More than one race, Hispanic), marriage (Married, widowed, separated, divorced, never married), and education (less than high school, high school graduate, some college/associate's degree, college graduate).

2.3. Data analyses

Frequencies were first calculated for the overall sample, for those using prescription opioids without misuse, and each of the three misuse subtypes to describe the sample. Unadjusted logistic regression analyses were conducted to assess bivariate relationships between the misuse subtypes as the independent variable (Pain only, Other reasons, Mixed) and each suicide-related variables (suicide ideation, planning, and attempts) as dependent variables. Three adjusted logistic regression analyses were conducted to assess relationships between the misuse subtypes as the independent variable and each of the suicide-related variables as the dependent variables after accounting for demographics, health rating, depression, and substance use disorders. Using prescription opioids without misuse and the Pain only subtype were both examined as references in both unadjusted and adjusted analyses. For the exploratory analyses, we were seeking to assess if prescription opioid misuse differentiated ideators with no attempt from ideators with an attempt. The sample was restricted to only

those who reported at least suicide ideation. Two adjusted logistic regressions assessed the association of (1) any prescription opioid misuse, and (2) reason for misuse subtype as independent variables and suicide attempt as the dependent variable after accounting for the same variables noted above. All analyses adjusted for complex sampling design using the complex survey module on SPSS® Version 20.

3. Results

3.1. Prevalence of reasons for prescription opioid use and prevalence of suicide-related variables

Prescription opioid misuse was reported by 12.1% of the sample. Among those reporting misusing prescription opioids, one reason for misuse was endorsed by 68.2% of the sample, 14.3% reported two, and 15.9% reported three or more reasons. A small number of people who reported prescription opioid misuse did not report a reason (1.7%). Pain was the most common reason at 70.1%. The weighted proportions for each of the groups in the study were as follows: using prescription opioids without misuse – 77.9%; misusing for pain only – 5.8%; misusing for reasons other than pain – 3.4%; misusing for mixed reasons – 2.7%. See Table 1 for the breakdown of specific reasons for misuse within each of the misuse subtypes. The prevalence of past 12-month suicide ideation, planning, and attempts were 6.0%, 1.9%, and 0.9%, respectively.

3.2. Characteristics by medical use and reasons for prescription opioid misuse

Respondents using prescription opioids without misuse were mostly older, married, and nearly a third had a college degree (see Table 2). Past 12-month depressive episode, alcohol use disorder and drug use disorder were relatively uncommon. Conversely, people misusing prescription opioids for pain had a relatively even age distribution up to 64 years, and had substantially higher prevalence of a past 12-month depressive episode, alcohol use disorder, and drug use disorder. People misusing prescription opioids for other and mixed reasons had even higher prevalence of alcohol and drug use disorders. They tended to be younger, were less likely to be married, and were more likely to have a major depressive episode in the past 12 months. Table 2 depicts key characteristics for those using prescription opioids without misuse and for each prescription opioid misuse subtypes.

3.3. Relationship between suicide-related variables across prescription opioid misuse subtypes

Compared to using prescription opioids without misuse, each of the misuse subtype was associated with significantly higher rates of past 12-month suicide ideation, suicide planning, and suicide attempts in unadjusted analyses (Table 3). For example, the odds ratios (OR) were approximately double for the Pain only subtype (suicide ideation OR = 1.98, 95% Confidence Interval [CI] = 1.68–2.33; planning OR = 2.15, 95% CI = 1.68–2.74; attempts OR = 2.23, 95% CI = 1.50–3.32). Relative to the Pain only subtype, both Other reasons and Mixed subtypes has two to three times higher the odds of suicide ideation (Other reasons OR = 2.25, 95% CI 1.80–2.80; Mixed OR = 2.96, 95% CI = 2.40–3.65), planning (Other reasons OR = 2.67, 95% CI = 1.98–3.60; Mixed OR = 3.23, 95% CI = 2.30–

4.52), and attempts (Other reasons OR = 2.99, 95% CI = 1.89–4.76; Mixed OR = 3.06, 95% CI = 1.99–4.72).

In the logistic regression models adjusting for key covariates (See Table 4), the Pain only subtype was significantly associated with suicide ideation (aOR = 1.37, 95% CI = 1.10–1.70), planning (aOR = 1.35, 95% CI = 1.05–1.73), but not attempts (aOR = 1.24, 95% CI = 0.84–1.82). The Other reasons subtype and Mixed subtype had significantly higher odds of suicide ideation, planning, and attempts relative to the using prescription opioids without misuse group (See Table 4 for aOR and 95% CI). When compared to the Pain only, the Mixed subtype had significantly higher odds of suicide ideation (aOR = 1.59, 95% CI = 1.21–2.10) and planning (aOR = 1.61, 95% CI = 1.09–2.36), but not attempts (aOR = 1.45, 95% CI = 0.88–2.38). There were no significant differences between the Pain only subtype and the Other reasons subtype across suicide-related variables (See Table 4).

3.4. Prescription opioid misuse and suicide attempts among ideators

Exploratory analyses were conducted to assess the association of prescription opioid misuse and suicide attempt among those reporting ideation (not pictured). There was a small, but significant association between odds of reporting a past-year suicide attempt relative to those using prescription opioids without misuse (OR = 1.28, 95% CI 1.04–1.58). We also found that misusing for reasons other than pain was associated with increased odds of a suicide attempt with no such findings for those misusing for pain only and for those misusing for pain (OR = 1.03, 95% 0.65–1.62) and other reasons (OR = 1.35, 95% CI 0.98–1.87).

4. Discussion

Among only those who had reported using prescription opioids in the past 12 months, prescription opioid misuse for pain only, for other reasons, and for mixed reasons (i.e., pain and other reasons) were each associated with higher suicidality. Additionally, in partial support of the hypotheses, the mixed subtype was significantly associated with greater odds of suicide ideation and planning, but not suicide attempts relative to the Pain only subtype. There were no significant differences between the Pain only subtype and the Other reasons subtype.

This study is the first, to our knowledge, to assess the relationship between prescription opioid misuse subtypes and suicide-related variables in a nationally representative sample. People misusing prescription opioids generally had a riskier profile than those using without misuse, with higher rates of past 12-month substance use disorders and major depressive episodes. We did, however, control for depression, substance use disorders, and health ratings highlighting these subtypes were independently associated with past 12-month suicide-related variables. Overall, the findings suggest that people misuse opioids for a variety of reasons, each are associated with suicidality; however, when pain is combined with other reasons for misuse, the odds of suicidality are increased to a greater extent.

The Pain only subtype was the most common misuse subtype, perhaps not surprisingly given that it is the intended use for prescription opioids. Prior research has demonstrated that individuals who misuse opioids for pain often present with comparable psychiatric and

substance use profiles as those who are not misusing their prescription opioids (McCabe *et al.* 2013). The current analyses, however, indicated that misuse for pain was associated with suicide ideation and planning, even after accounting for psychiatric, substance use, and demographic characteristics. With pain conditions and pain severity being independent indicators of suicide risk (Ilgen *et al.* 2010; Ilgen *et al.* 2013), it is possible that these respondents are not receiving adequate pain relief which is contributing to their suicide ideation and planning.

The literature generally indicates that those misusing prescription opioids for pain relief have a less severe clinical profile than those misusing for other reasons (Banta-Green *et al.*, 2009; Bohnert *et al.*, 2013; McCabe *et al.*, 2009;2013a;b). Our study provides additional nuance such that only those misusing for mixed reasons (and not Other reasons) were more likely to report suicide ideation and planning relative to the Pain only misuse subtype. Furthermore, the Pain only subtype was significantly different from those using prescription opioids without misuse. In another study of adults and misuse subtypes, Bohnert *et al.* (2013) found that those misusing prescription opioids for reasons other than pain were more likely to have an overdose history, use other substances, have mental health problems, but there was no difference for suicide ideation among the subtypes. One possibility is that the current analyses were performed among the population of individuals nationally who reported past-year prescription opioid use, whereas the other study was among patients in one residential treatment.

The Mixed subtype was associated with greater odds of suicidality relative to both the Pain only subtype and those using prescription opioids without misuse. These findings may reflect that individuals may turn to prescription opioid misuse in response to multiple stressors or misuse may reflect a lack of adaptive coping strategies available or accessible. Addressing misuse may become more difficult as the function in which the prescription opioid is serving becomes more complex, and the reasons for opioid misuse may exacerbate this problem. For example, research indicates that opioid therapy for pain is associated with the onset and recurrence of depression and anxiety (Martins *et al.* 2012; Scherrer *et al.* 2016a; Scherrer *et al.* 2016b), and there is some evidence that opioids can increase pain sensitivity and worsen sleep quality (Cheatle and Webster, 2015). Previous research indicates comorbid chronic pain and insomnia is associated with suicidality relative to chronic pain only (Tang and Crane, 2006). In addition, these individuals may be taking a variety of medications (e.g., sedatives and benzodiazepines) to cope with several of the other reasons for misuse, placing them at even greater risk (Park *et al.* 2015).

The findings of the current study also provide an advance in ideation-to-action framework. While, a recent meta-analysis (May and Klonsky, 2016) found that drug use disorders differentiate attempters from ideators, the current study is the first to our knowledge finding that prescription opioid misuse specifically differentiated attempters from ideators. When considered in the context of the Three Step Theory of Suicide (Klonsky and May, 2015), individuals using or misusing prescription opioids both have practical capability of attempting suicide because they have access to potentially lethal means (i.e., prescription opioids). It may be that those misusing prescription opioids have acquired the capability for suicide through habituated fear and pain associated with death. Depression, substance use

disorders, and poorer health were more common among those misusing prescription opioids. Individuals misusing opioids may have viewed a suicide attempt as an option to escape from the emotional and physical pain they were experiencing (Tang and Crane, 2006). Additional research is needed to understand the specific factors within individuals misusing prescription opioids that facilitate the transition to acting on thoughts of suicide.

Medication-assisted treatment and other evidence-based treatments for opioid use disorders may provide an opportunity to address the addiction-related problems while also alleviating some of the other reasons for misuse. This might be considered in conjunction with one or several other treatments to address the reasons underlying opioid misuse. For example, non-pharmacological approaches to pain management and non-opioid analgesics are now recommended as first-line treatments for pain management (Dowell *et al.*, 2016). Furthermore, patients may be directed towards Cognitive Behavioral Therapy (CBT) for depression or anxiety to cope with emotional distress instead of using prescription opioids. Mindfulness-based interventions may also provide both relaxation and ways to cope with emotions, which in turn may be effective in reducing suicide risk (Chesin *et al.* 2016). Given the association between number of reasons for misuse and suicide ideation, planning, and attempts, interventions that target multiple reasons within the same intervention, perhaps with direct suicide prevention interventions, may be a more robust risk mitigation strategy (Department of Veterans Affairs, 2018). This study represents an important step in understanding the relationship between prescription opioid misuse and suicide ideation, planning, and attempts. Targeting prescription opioid misuse may be a key strategy in reducing suicide risk. Equipping individuals who are misusing prescription opioids with positive coping strategies to address reasons for misuse has the potential to mitigate suicide risk. These strategies could be incorporated into safety planning and care coordination. Increased knowledge regarding reasons for prescription opioid misuse can facilitate a greater understanding among clinicians as to the function that the prescription opioid is serving and promote discussion with the patient to identify safe and effective alternatives.

Findings from this study should be considered within the context of limitations. The data are based on cross-sectional, self-report survey data, which affect our ability to make assertions about causal or temporal relationships and are subject to memory and social desirability biases. For example, suicidality may have preceded prescription opioid use. Another important limitation is that not all respondents received questions about suicide planning and suicide attempts. Individuals only were asked about suicide planning if they endorsed suicide ideation, and individuals were only asked about suicide attempts if they endorsed suicide planning. Therefore, there may be individuals who attempted suicide during the study period, but were not asked about planning or attempt because they denied suicide ideation. Additionally, by simply adding the number of reasons for misuse, it assumes that they are equally associated with suicidality. Future research could target how several reasons for misuse may interact with one another to increase risk. However, this study is strengthened by the large sample size and the nationally-representative data. As 2015 was the first year in which the NSDUH surveyed reasons for prescription opioid misuse, these findings should be replicated in subsequent analyses. Future research should also assess this relationship within subpopulations (e.g., rural vs. urban; older adults) and across various combinations of reasons for misuse.

In conclusion, additional research is needed to assess the potential for addressing reasons for prescription opioid misuse as suicide risk mitigation strategies. Identifying particular subtypes of prescription opioid misuse may provide some additional nuance in addressing risk and narrowing one's approach to address misuse and suicide risk. In addition, prescription opioid misuse may also facilitate the transition from just thinking about suicide to acting on those thoughts; further highlighting the importance of preventing prescription opioid misuse and addressing suicide risk prior regardless of one's history of suicidality.

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Table 1.

Composition of reason for prescription opioid misuse subtype by reasons for misuse

Reason for misuse	Overall (n = 7,048) ^a	Pain only ^b (n = 3,024) ^a	Pain and other ^c (n = 1,663) ^a	Other reasons ^d (n = 2,361) ^a
Pain	71.3%	100%	100%	0%
Relaxation	25.7%	0%	65.7%	37.7%
To get high	20.2%	0%	34.5%	43.0%
Sleep	15.2%	0%	44.6%	17.9%
Emotions	10.0%	0%	24.4%	15.7%
Experimentation	5.2%	0%	6.4%	13.2%
Hooked	3.7%	0%	8.0%	6.5%
Affect another drug's effects	2.4%	0%	4.2%	5.0%
Other reasons	3.6%	0%	4.2%	9.3%

All percentages are weighted.

^aRepresents unweight n;^bPain was only reason selected for prescription opioid misuse;^cPain and at least one other reason was endorsed for prescription opioid misuse;^dPrescription opioid misuse for reasons other than pain

Table 2.

Characteristics of persons using prescription opioids in the past 12 months overall, without misuse, and persons by reasons for misuse

Characteristics	Overall % (% error) 100% (N = 47,094) ^a	Without misuse ^b % (% error) 87.9% (n = 38,026)	Pain only ^c % (% error) 5.8% (n = 3,024)	Mixed ^d % (% error) 2.7% (n = 1,663)	Other reasons ^e % (% error) 3.4% (n = 2,361)
<u>Age group</u>					
18–25 years	12.2% (0.2%)	10.6% (0.2%)	17.1% (0.9%)	25.6% (1.3%)	36.1% (1.5%)
26–34 years	15.5% (0.2%)	14.3% (0.2%)	22.4% (1.1%)	29.4% (1.7%)	26.2% (1.2%)
35–49 years	25.0% (0.3%)	24.8% (0.3%)	28.9% (1.3%)	24.5% (1.4%)	22.7% (1.0%)
50–64 years	27.4% (0.3%)	28.6% (0.4%)	23.6% (1.6%)	16.3% (1.6%)	12.3% (1.5%)
65 years or older	19.8% (0.3%)	21.8% (0.4%)	8.0% (0.9%)	4.2% (0.9%)	2.6% (0.7%)
Female	55.2% (0.3%)	56.6% (0.4%)	47.3% (1.1%)	47.1% (1.7%)	39.4% (1.3%)
<u>Race/Ethnicity</u>					
White	68.5% (0.4%)	68.5% (0.4%)	65.4% (1.4%)	74.2% (1.7%)	69.3% (1.2%)
Black	12.3% (0.3%)	12.6% (0.3%)	10.3% (0.7%)	9.8% (0.9%)	10.1% (0.8%)
Hispanic	12.9% (0.2%)	12.6% (0.3%)	19.0% (1.1%)	10.1% (1.1%)	14.0% (1.0%)
Married	50.8% (0.4%)	52.9% (0.5%)	44.5% (1.3%)	29.7% (1.8%)	25.6% (1.6%)
College degree	27.6% (0.4%)	28.3% (0.4%)	24.4% (1.3%)	23.2% (1.4%)	21.4% (1.6%)
<u>Overall health</u>					
Excellent	14.7% (0.3%)	14.8% (0.3%)	14.6% (1.0%)	11.9% (1.2%)	16.0% (1.3%)
Very Good	32.9% (0.4%)	32.6% (0.4%)	34.4% (1.6%)	34.9% (1.5%)	36.2% (1.4%)
Good	32.4% (0.3%)	32.3% (0.4%)	32.4% (1.2%)	33.7% (1.7%)	31.3% (1.2%)
Fair/Poor	20.0% (0.4%)	20.3% (0.4%)	18.7% (1.2%)	19.5% (1.5%)	16.4% (1.1%)
<u>Depressive episode</u>					
Past-year	10.4% (0.2%)	9.3% (0.2%)	13.3% (0.9%)	26.5% (1.5%)	20.9% (1.2%)
Lifetime	18.5% (0.3%)	17.0% (0.3%)	22.9% (1.1%)	41.1% (1.8%)	31.5% (1.3%)
Alcohol use disorder ^f	7.9% (0.2%)	5.9% (0.2%)	13.5% (0.7%)	27.8% (1.8%)	33.8% (1.3%)
Drug use disorder ^f	5.1% (0.1%)	1.9% (0.2%)	16.0% (1.0%)	38.5% (1.5%)	42.5% (1.5%)
<u>Suicide factors^f</u>					
Suicide ideation	6.0% (0.2%)	4.8% (0.1%)	9.1% (0.6%)	22.9% (1.4%)	18.4% (1.1%)
Suicide planning	1.9% (0.1%)	1.4% (0.1%)	2.9% (0.4%)	8.9% (1.0%)	1.4% (0.1%)

Characteristics	Overall % (% error)	Without misuse ^b % (% error)	Pain only ^c % (% error)	Mixed ^d % (% error)	Other reasons ^e % (% error)
Characteristics	100% (N = 47,094)^a	87.9% (n = 38,026)	5.8% (n = 3,024)	2.7% (n = 1,663)	3.4% (n = 2,361)
Suicide attempt	0.9% (0.1%)	0.6% (0.6%)	1.4% (0.3%)	4.2% (0.6%)	4.2% (0.6%)
Attempt among ideators ^g	15.0% (0.9%)	13.3% (1.0%)	15.6% (2.6%)	18.5% (2.5%)	22.6% (2.6%)

^aWeighted percentage and unweighted *n*;

^bUsing prescription opioids without misuse;

^cPain was only reason selected for prescription opioid misuse;

^dPain and at least one other reason was endorsed for prescription opioid misuse;

^ePrescription opioid misuse for reasons other than pain;

^fPast 12 months; Unweighted number of ideators was 3,306 and unweighted number of those reporting a suicide attempt among those with ideation was 705

Table 3.

Unadjusted logistic regression analyses of assessing associations prescription opioid misuse categories and suicide-related variables

Characteristic	Unadjusted OR (95% CI) for SI	Unadjusted OR (95% CI) for SP	Unadjusted OR (95% CI) for SA
Pain only			
vs. Without misuse	1.98 (1.68–2.33)	2.15 (1.68–2.74)	2.23 (1.50–3.32)
Mixed			
vs. Without misuse	5.85 (4.98–6.90)	6.94 (5.49–8.77)	6.85 (5.15–9.09)
vs. Pain only	2.96 (2.40–3.65)	3.23 (2.30–4.52)	3.06 (1.99–4.72)
Other reasons			
vs. Without misuse	4.44 (3.77–5.24)	5.75 (4.61–7.14)	6.71 (4.83–6.71)
vs. Pain only	2.25 (1.80–2.80)	2.67 (1.98–3.60)	2.99 (1.89–4.76)

OR = Odds Ratios; CI = Confidence Intervals; SA = Suicide Attempt; SI = Suicide ideation; SP = Suicide Planning.

Note. Individuals reporting prescription opioid use without misuse and misuse for pain only are the reference categories for each of the three models (SI, SP, SA)

Table 4.

Adjusted logistic regression analyses of assessing associations prescription opioid misuse categories and suicide-related variables

Characteristic	Adjusted OR (95% CI) for SI	Adjusted OR (95% CI) for SP	Adjusted OR (95% CI) for SA
Pain only			
vs. Without misuse	1.37 (1.10–1.70)	1.35 (1.05–1.73)	1.24 (0.84–1.82)
Mixed			
vs. Without misuse	2.18 (1.75–2.71)	2.16 (1.64–2.85)	1.79 (1.25–2.58)
vs. Pain only	1.59 (1.21–2.10)	1.61 (1.09–2.37)	1.45 (0.88–2.38)
Other reasons			
vs. Without misuse	1.67 (1.29–2.15)	1.83 (1.35–2.48)	1.61 (1.02–2.55)
vs. Pain only	1.22 (0.90–1.66)	1.36 (0.95–1.95)	1.30 (0.76–2.24)

OR = Odds Ratios; CI = Confidence Intervals; SA = Suicide Attempt; SI = Suicide ideation; SP = Suicide Planning.

Note. Individuals reporting prescription opioid use without misuse and misuse for pain only are the reference categories for each of the three models (SI, SP, SA). Adjusted models included demographics, lifetime and past 12-month depression, past 12-month alcohol use disorder, past 12-month drug use disorder, and overall health rating