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Stimulant use to treat pain among safety-net patients with chronic non-cancer pain

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Abstract

Background: Chronic pain affects one-fifth of US adults. Reductions in opioid prescribing have been associated with increased non-prescription opioid use and, chronologically, increased stimulant (methamphetamine and cocaine) use. While non-prescription opioid use is commonly attributed to pain self-management, the role of stimulants in managing pain is unclear.

Methods: We analyzed baseline data from a longitudinal study of patients with chronic non-cancer pain in an urban safety-net healthcare system who had been prescribed an opioid for ≥ 3 of the last 12 months, and had a history of non-prescription opioid, cocaine, or amphetamine use (N=300). We estimated the prevalence and identified correlates of stimulant use to treat pain among a subgroup of patients who reported past-year stimulant use (N=105). Data sources included computer-assisted questionnaire (demographics, substance use, pain), clinical exam and procedures (pain, pain tolerance), and chart abstraction (opioid prescriptions). We conducted bivariate analyses to assess associations between demographics, pain characteristics, non-opioid therapies, substance use, opioid prescriptions, and self-reported symptoms, with reporting using stimulants to treat pain. Demographic variables and those with significant bivariate associations were included in a multivariable logistic regression model.

Results: Fifty-two percent of participants with past-year stimulant use reported using stimulants in the past year to treat pain. Participants who used stimulants for pain reported slightly higher average pain in the past 3 months (median of 8 (IQR: 6–8) vs 7 (7–9) out of 10, p=0.049). In multivariable analysis, female gender (AOR= 3.20, 95% CI: 1.06–9.63, p=0.039) and higher score on the *Douleur Neuropathique 4* neuropathic pain questionnaire (AOR= 1.34, 95% CI: 1.05–1.70, p=0.017) were associated with past-year stimulant use to treat pain.

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Conclusion: Stimulants may be used for pain self-management, particularly for neuropathic pain and among women. Our findings suggest an underexplored motivation for stimulant use in an era of reduced access to prescribed opioids.

Keywords

chronic pain; pain management; stimulants; methamphetamine; cocaine; safety-net clinic

1. Introduction

Chronic pain is prevalent, difficult to manage, and disproportionately affects socioeconomically disadvantaged populations.[1] As of 2016, approximately 20% of U.S. adults suffered from chronic pain and 8% had associated disability.[1] Meanwhile, from 2012–2018, the per capita rate of opioid prescribing declined from 81.3 to 51.4 prescriptions per 100 persons[2] The reduction in opioid prescribing has been associated with increased non-prescription opioid use[3] and, chronologically, increased non-prescription stimulant use.[4–7] While increased non-prescription opioid use often has been attributed to self-management of pain or opioid use disorder, there is less clarity regarding the increase in stimulant use.[8,9]

Clinical and *in vivo* lab studies across a range of pain types suggest that stimulants may possess some analgesic properties.[10–14] Qualitative studies have found that some people living with HIV report using cocaine or methamphetamine to manage their pain.[9,15,16] In addition, the neuropeptide CART (cocaine- and amphetamine-regulated transcript) has been implicated in the regulation of neuropathic pain.[17,18]

To examine a possible relationship between stimulant use and pain management among persons with chronic pain, we performed an exploratory analysis of characteristics associated with reporting stimulant use to treat pain among patients enrolled in the Cohort Study of Opioids, Pain, and Safety in an era of Changing Policy (COPING) study. A clearer understanding of the effects of stimulants as a method of pain self-management is important to ensure that healthcare providers understand motivations for stimulant use and integrate such knowledge into devising effective and safe pain management strategies.

2. Materials and Methods

2.1 Data Source and Sample

We used baseline data from COPING, an ongoing longitudinal cohort study assessing changes in pain, functional status, and substance use in response to changes in prescribed opioid availability among patients with chronic non-cancer pain (CNCP). COPING enrolled 300 patients from a safety net healthcare system in San Francisco that accepts only publicly insured or uninsured patients. Study participants were eligible for the study if they had CNCP, had been prescribed an opioid for at least 3 of the last 12 months prior to enrollment, and had a lifetime history of non-prescription opioid, cocaine, or amphetamine use. CNCP was defined as chronic pain that was not due to active cancer, as identified by review of electronic medical records. Patients could not participate in the study if they were receiving opioids for advanced malignant or end-of-life pain. All participants provided

informed consent prior to participation and were seen at enrollment and annually thereafter. Enrollment visits occurred from March 28, 2017 through March 6, 2019. The study was approved by the University of California San Francisco Institutional Review Board (IRB# 15-18274).

At all visits, participants underwent clinical examination and computer assisted personal interview (CAPI). Experiences of pain were assessed through CAPI and exam, including the *Douleur Neuropathique 4* (DN4)[19] assessment and cold pressor test (CPT).[20] Demographics, substance use, mood, pain management, and prescription opioid use were assessed by CAPI. Participants' electronic medical records were abstracted at enrollment and biannually for information on medical conditions and prescriptions. Participants received $50 for each study visit.

2.2 Measurements

2.2.1 Stimulant Use—Participants were considered to have used stimulants in the past year if they reported any use of methamphetamine/speed, cocaine, or crack cocaine in the prior year on the CAPI. Participants reporting past-year methamphetamine/speed use were asked "In the past one year, did you use methamphetamine or speed to treat pain?" ("Speed" is used locally as a slang term for methamphetamine.) A corresponding question was asked of those reporting cocaine or crack cocaine use. Participants were categorized as using stimulants to treat their pain if they reported "yes" to either question. We also report the number of participants who used prescription stimulants (e.g., Adderall, Ritalin, or Methedrine) not prescribed to them in the past year.

2.2.2 Sociodemographic Characteristics—Sociodemographic characteristics from the CAPI included age (continuous), sex at birth, gender race, ethnicity, highest level of education attained, annual pre-tax income, and ever being homeless. The proportion of participants who reported that they were housed ("in my own house or apartment," "in someone else's house or apartment," or "rented room (hotel or rooming house)") or stayed outside ("car, bus, truck, or other vehicle" or "on the streets") for most of the prior year was reported. We collapsed race into three categories (White, Caucasian, or European American; African American or Black; or Other) due to small numbers in some categories. We similarly collapsed highest level of education into a two-level measurement (high school or GED or less, some college or more) and annual income into three categories ($0–9,999, $10,000–19,999, >$20,000) based on the distribution of participants' responses.

2.2.3 Clinical and Self-Reported Pain Measurements—We used three measurements of pain: the DN4 screening tool, self-reported average pain over the past 3 months (a 0–10 scale), and pain catastrophizing. The DN4 is a screening tool for neuropathic pain, which consists of a patient interview of pain characteristics and a clinical examination with 10 questions.[19,21] The DN4 screening tool was chosen because of the potential role stimulants have in impacting neuropathic pain.[18,22] The CAPI assessed pain characteristics (burning, painful cold, and electric shocks) and pain symptoms (tingling, pins and needles, numbness, and itching) in the same area. Sensory deficits and evoked pain were assessed by clinical examination in the area of the body the participant identified as their

primary pain location. Hypoesthesia was assessed by numbness either when the area was pressed by hand or pricked by the wood end of a cotton-tipped applicator. Allodynia was assessed by pain that was caused or increased by brushing the area with the cotton end of the applicator. Given prior data suggesting a role in neuropathic pain and the limited relevant assessments, DN4 scores were included both continuously and as a binary variable using a cut-off of 4 (<4 no neuropathic pain vs ≥4 neuropathic pain).[21]

Average pain severity over the past 3 months (a 0–10 scale) and pain catastrophizing were self-reported via the CAPI. The Pain Catastrophizing Scale prompted respondents to think about past painful experiences while responding to 13 items that assess pain magnification and rumination, as well as feelings of helplessness related to pain; responses were on a 5-point scale ("not at all," "to a slight degree," "to a moderate degree," "to a great degree," and "all the time"). Scores were summed and total scores of 30 or greater were defined as pain catastrophizing, based on research from the University Centre for Research on Pain and Disability, to create a binary variable of clinical relevance (pain catastrophizing versus none).[23]

2.2.4 Cold Pressor Test—The CPT involved a temperature-controlled circulating water bath set to 2.0°C to measure participants' cold pain threshold and tolerance. Participants were instructed to place their hand flat on the bottom and report when they first felt a dull, achy pain ("cold pain threshold") and then remove their hand from the water when they were unable to tolerate the pain. The "cold pain tolerance" was the full time the hand was submerged.[24,25] The CPT was repeated until the cold pain threshold and total time of hand submersion were within 20% of the prior test, up to 4 trials, with at least 20 minutes between trials. Participants could refuse all or some of the CPT tests, so not all recorded scores were within 20% of the previous test. The cold pain threshold and tolerance, measured in seconds, from participants' final CPT at enrollment were included in this analysis.

2.2.5 Substance Use Covariates—Frequency of stimulant use was collected via two separate questions in the CAPI, assessing methamphetamine/speed use and cocaine or crack cocaine use. Each question had six possible answer options (less than once a month, 1–3 days per month, 1–2 days per week (4 days per month), 3–4 days per week, 5–6 days per week, every day). We first report the proportion of participants reporting each frequency. Then we collapsed responses into two categories (less than weekly versus at least weekly), due to small sample sizes in some categories. We defined the frequency of stimulant use as the higher frequency reported across these two questions. We defined any past year injection (yes/no) as reporting injection of any substance in the past year.

Prescribed opioid dose for pain management was assessed as morphine milligram equivalents (MMEs), converted following guidelines from the US Centers for Disease Control and Prevention and the Australian National Drug and Alcohol Research Centre.[26,27] We used opioid prescription data from medical chart abstraction to calculate daily MME for each participant for the year preceding enrollment and reported the maximum MME during that time. We considered a participant to have had an opioid discontinuation if they had a non-zero MME a year before enrollment and were prescribed no opioids for pain at enrollment.

2.2.6 Post-Traumatic Stress Disorder, Depression, and Psychological Distress—

We included scales in the CAPI measuring post-traumatic stress disorder (PTSD), depression, and psychological distress. Participants were considered to have PTSD if they answered "yes" to at least three of the four items in the Primary Care PTSD Screen (PC-PTSD), a brief screening tool designed for use in medical settings.[28,29] Depression was assessed with the Patient Health Questionnaire-8 depression scale (PHQ8), a valid and widely-used measure assessing the frequency ("not at all," "several days," "more than half the days," "nearly every day") of being bothered by depressive symptoms over the past two weeks.[30] We summed all items to calculate total scores and categorized responses as depressed (≥10) vs not depressed (<10).[31,32] Psychological distress was measured using continuous scores from the Brief Symptom Inventory 18 (BSI-18), an 18-item screen with three subscales (somatization, depression, and anxiety).[33]

2.2.7 Non-opioid Medications and Complementary Therapies—

Participants were asked which non-opioid medications they were prescribed to treat their pain at the time of enrollment on the CAPI. Medications were categorized as "none," "neuropathic pain medications" (lidocaine patch/cream, capsaicin cream, amitriptyline, nortriptyline, gabapentin, pregabalin, valproic acid, topiramate, duloxetine, venlafaxine, cyclobenzaprine, methocarbamol, baclofen, carisoprodol), "medical marijuana," and "other non-opioid medications to treat pain" (acetaminophen formulations without opioids, nonsteroidal anti-inflammatory drugs [NSAIDs], ergotamine, sumatriptan, butalbital formulations, tramadol). Any past-year use of non-medication pain management therapies (chiropractic, physical/occupational therapy, acupuncture, massage therapy, counseling) was also assessed by CAPI.

2.2.8 Statistical Analysis—

We conducted bivariate analyses comparing sociodemographic characteristics by past-year stimulant use and, among those who had used stimulants in the past year, by whether or not they reported using stimulants to treat pain during that year. We also compared substance use, opioid prescriptions, pain characteristics, non-opioid therapies, Brief Symptom Inventory, depression, and PTSD by whether or not participants who used stimulants in the past year had used them to treat pain or not. We report a mean for continuous variables that were normally distributed, and a median for those that had a skewed distribution. Comparisons of categorical variables were made using the Pearson chi-square test and Fisher's exact test for expected cell counts less than five. Continuous variables were compared using t tests for variables with a normal distribution and Wilcoxon rank sum tests for skewed variables.

We used a multivariable logistic regression model to further assess associations between participant characteristics and reporting stimulant use for pain. The model included demographic characteristics (age, gender, race) and pain and mood covariates that were significant in bivariate analyses. We used a post-estimation command to rescale the age variable to report an adjusted odds ratio (AOR) of an increase of 10 years. All analyses were performed in Stata Version 14 (Stata Corp, College Station, TX). A p-value of less than 0.05 was considered statistically significant.

3. Results

Of 440 people who were eligible for the COPING study on pre-screen by phone, 303 came in for a visit, and 300 enrolled (two did not complete enrollment activities and one was found ineligible after consent). The mean age of all COPING participants (N=300) at enrollment was 57 years (standard deviation [SD]±8.2), 61% reported male gender, and 77% had experienced homelessness. Almost half of the cohort was Black/African-American (45%), approximately one-third was White/Caucasian (34%), and the rest reported other or multiracial race (21%); 11% of the cohort self-identified as Latinx/Hispanic.

Approximately one-third (105, 35%) of COPING participants reported illicit stimulant use in the past year. Of these, 37% had used cocaine or crack but no methamphetamine/speed, 31% had used methamphetamine/speed but no cocaine or crack, and 31% had used both in the past year. Eight participants (3%) reported using prescription stimulants that were not prescribed to them in the past year, all of whom also reported using non-prescription stimulants during the same period.

Of the 66 participants who reported using methamphetamine/speed in the past year, 23 (35%) used it less than once a month, 18 (27%) used it 1–3 days per month, 7 (11%) used it 1–2 days per week, 4 (6%) used it 3–4 days per week, 4 (6%) used it 5–6 days per week, and 10 (15%) used it every day. Of the 72 participants who reported using cocaine or crack in the past year, 21 (29%) used it less than once a month, (17) 24% used it 1–3 days per month, 16 (22%) used it 1–2 days per week, 9 (13%) used it 3–4 days per week, 4 (6%) used it 5–6 days per week, and 5 (7%) used it every day.

Those reporting past-year stimulant use were slightly younger (mean age of 56 [SD± 8.5] vs 58 [SD± 7.9], p=0.007) and a higher proportion were HIV-positive (54% vs 25%, p<0.001). Gender was significantly different by past-year stimulant use, with a higher proportion of males (69% vs 56%) and transgender/other gender participants (5% vs 3%) reporting stimulant use than female participants (27% vs 41%) (p=.03). A higher proportion of participants who reported past year stimulant use reported ever being homeless (86% vs 72%, p=0.007); however, the majority (92%) of participants who used stimulants reported being housed for most of the past year and no significant past-year differences were detected across groups. [Supplemental materials]

Fifty-two percent of those reporting past-year stimulant use reported using stimulants to treat their pain. Demographic characteristics by past-year use of stimulants to treat pain are shown in Table 1. Compared to participants who used stimulants in the past year but did not report using them for pain, a higher proportion of participants who used stimulants to treat pain reported higher level of education attained (62% vs 42%, p=0.04) and ever being homeless (93% vs 78%, p=0.03).

Table 2 shows pain characteristics, use of non-opioid medications and therapies, substance use, and self-reported symptoms by past-year use of stimulants to treat pain. Participants who reported using stimulants to treat pain reported slightly higher average pain in the past 3 months (median of 8 [IQR: 7–9] vs 7 [6–8], p=0.049) and DN4 score (mean of 4.45 [SD± 2.28] vs 3.42 [SD± 2.04], p=0.017). A higher proportion of participants who reported

stimulants to treat pain in the past year reported moderate or severe depression (49% vs 28%, p=0.027). We did not detect a difference by CPT in cold pain threshold (median of 7.48 [IQR: 5.21–11.9] vs 8.03 [5.50–10.4], p=0.93) or cold pain tolerance (median of 13.2 [IQR: 7.98–20.7] vs 13.0 [8.61–18.9], p=0.87), when comparing participants who reported stimulant use for pain to those who did not. We did not detect a difference in use of neuropathic pain medications or medical marijuana across groups, but a higher proportion of people who used stimulants for pain reported being prescribed "other" non-opioid medications to treat pain (e.g., acetaminophen, NSAIDS) (42% vs 20%, p=0.016).

In the multivariable regression, DN4 score and female gender were significantly associated with using stimulants to treat pain in the past year, while controlling for age, race, highest level of education attained, ever being homeless, average pain in the past three months, depression, and other non-opioid medications to treat pain in the model. Every increase of one point on the DN4 scale was associated with 1.34 times the odds of reporting stimulants to treat pain (95% CI: 1.05–1.70, p=0.017); participants reporting female gender had 3.20 times the odds of reporting stimulants to treat pain compared to those reporting male gender (95% CI: 1.06–9.63, p=0.039). (Table 3)

4. Discussion

The slight majority of participants with CNCP who used stimulants in the past year reported using them to treat pain. This finding builds upon qualitative data suggesting that stimulants play a role in pain self-management for patients living with HIV and chronic pain,[9,15] and extends that finding to a cohort that includes HIV-negative patients. In the setting of reduced opioid prescribing, stimulants may play a role in self-directed pain management, particularly among patients who have a history of substance use and lack sufficient access to medically-directed pain management. To our knowledge, no other studies have examined the relationship between clinical pain characteristics and using stimulants for pain.

Our findings reveal a potential relationship between neuropathic pain and stimulant use to treat pain. Specifically, we observed an association between the number of neuropathic pain attributes used by participants to describe their pain and their use of stimulants to treat pain. A qualitative study[15] documented methamphetamine use to treat neuropathic pain in a small cohort of HIV-positive men. Notably, half of the HIV-positive participants who used stimulants used stimulants to treat pain, suggesting that HIV-associated pain, which is neuropathic in nature, may be one reason for stimulant use. The previously described role of neuropeptide CART in regulating neuropathic pain further supports the potential benefit of these agents in neuropathic pain syndromes.[17,18] Patients with pain that demonstrates a greater number of neuropathic characteristics may be more likely to use stimulants as a strategy to self-manage pain, although further study is needed.

In our cohort, women who use stimulants were more likely than men who use stimulants to report using them for pain management. Chronic pain with neuropathic characteristics has been found to be more prevalent in women than in men[34–36] but stimulant use for pain was higher in women even when controlling for neuropathic pain characteristics. Previous research has shown that common reasons for methamphetamine use vary by gender, with

women being more likely to use methamphetamine for functional reasons such as energy and productivity than men. Women who use methamphetamine also appear to have greater depression scores and higher rates of depression than their male counterparts. [37] Future studies of stimulant use for the treatment of pain should further explore gender-specific differences and how stimulants may concurrently impact mood among women who use stimulants to self-manage chronic pain.

Considering the links between chronic pain and depression[38] it is possible that stimulants may not only be used to self-manage pain, but to also help alleviate associated mood symptoms. While not significant in the multivariable analysis, in the bivariate analysis we saw a higher proportion of participants who reported moderate to severe depression among people who used stimulants to treat pain in the past year compared to those who used stimulants in the past year but not to treat pain. Previous studies have shown that prescription stimulants could have some efficacy treating depression, especially when prescribed as adjuvants to traditional antidepressants; however, results have been mixed.[41–43] Our findings indicate that non-prescribed stimulants are used to treat pain among people with co-occurring depression. It is possible that stimulants are being used to self-manage chronic pain, depressive symptoms, or both among this group. The use of stimulants in self-management of depression and other mood symptoms deserves further exploration.

Stimulants may also be used to improve daily functional status or help prevent social harms. For example, stimulant use has been shown to have a targeted role among people experiencing homelessness by reducing the need for sleep and thus lowering safety risks associated with living outside.[39,40] It is possible that in this chronic pain population, stimulant use may be associated with improved overall functioning, and that this improvement could reduce experiences of pain.

Our study has several limitations. All study participants were prescribed opioids for chronic pain during the past year, had a history of illicit substance use, and were enrolled in a safety-net health plan from the San Francisco Bay Area. Results may not necessarily be generalizable to all patients with CNCP. Furthermore, results may not be generalizable to other populations with a high prevalence of methamphetamine use that were not sufficiently represented in our cohort, such as people who are transgender.[44,45] Data are self-reported and concern sensitive and illegal behaviors, and thus may be impacted by recall or social desirability bias. The baseline data were cross-sectional, not allowing for full evaluation of the temporality of pain and stimulant use. Finally, we did not measure concurrent or sequential use of opioids and stimulants, and did not ask about how participants' stimulant use to treat pain intersected with their prescribed pain medications. Future studies should investigate polysubstance use for non-medical reasons or for self-medication, and should look at patients longitudinally to understand the temporal relationship between opioid stewardship and stimulant use for pain.

To our knowledge, this is the first report focusing on stimulant use for pain self-management. Our findings provide an opening for providers to engage in discussions with their patients regarding their use of stimulants as possibly part of pain self-management

routines. Understanding individuals' motivations for and benefits from using substances may aid in destigmatizing substance use, which is particularly important as stigma related to substance use can lead to decreased engagement in care and negative health outcomes.[46] Further research exploring the ways that people who use illicit substances manage their own health and symptoms, including through illicit substances, is essential to reduce stigma, support effective provider-patient conversations, and identify unmet needs of people who use stimulants and experience chronic pain.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Baseline Demographic Characteristics Among Participants who Have Used Stimulants in the Past Year by Whether they Used Stimulants to Treat Pain in the Past Year (N=105)

	Participants Who Have Used Stimulants to Treat Pain in the Past Year (n=55)		Participants Who Have Not Used Stimulants to Treat Pain in the Past Year (n=50)		*p*−value
	n	**%**	**n**	**%**	
Age (mean, SD)	55 (8.8)		56 (8.2)		0.41
Assigned Sex at Birth					0.13
Male	36	65%	39	78%	
Female	19	35%	10	20%	
Intersex	0	0%	1	2%	
Gender					0.31
Male	35	64%	37	74%	
Female	18	33%	10	20%	
Transgender and Other	2	4%	3	6%	
Race					0.46
White, Caucasian, or European American	23	42%	16	32%	
African American or Black	19	35%	23	46%	
Other	13	24%	11	22%	
Ethnicity †					0.88
Non-Latino/Non-Hispanic	47	87%	44	88%	
Latino/Hispanic	7	13%	6	12%	
HIV Status					0.47
Negative	27	49%	21	42%	
Positive	28	51%	29	58%	
Education					0.04
HS/GED or less	21	38%	29	58%	
Some college or more	34	62%	21	42%	
Income					0.08
$0–9,999	12	22%	7	14%	
$10,000-$19,999	39	71%	32	64%	
> $20,000	4	7%	11	22%	
Ever Homeless					0.03
No	4	7%	11	22%	
Yes	51	93%	39	78%	

† There was one missing response for ethnicity.

Table 2.

Pain Characteristics, Therapies, Substance Use, and Self-Reported Symptoms Among Participants who Have Used Stimulants in the Past Year by Whether they Used Stimulants to Treat Pain in the Past Year (N=105)

		Participants Who Have Used Stimulants to Treat Pain in the Past Year (n=55)		Participants Who Have Not Used Stimulants to Treat Pain in the Past Year (n=50)		*p*−value
		n	%	n	%	
Pain Characteristics						
Pain on average in past 3 months (mdn, IQR)		8 (7–9)		7 (6–8)		0.049
Pain catastrophizing						0.38
	Score <30	34	62%	35	70%	
	Score ≥30	21	38%	15	30%	
Neuropathic pain score †						0.13
	No neuropathic pain	17	32%	22	47%	
	Neuropathic pain	36	68%	25	53%	
	DN4 score (mean, SD)	4.45	2.28	3.42	2.04	0.017
Cold pressor test †						
	Cold pain threshold (sec) (mdn, IQR)	7.48	(5.21–11.9)	8.03	(5.50–10.4)	0.93
	Cold pain tolerance (sec) (mdn, IQR)	13.2	(7.98–20.7)	13.0	(8.61–18.9)	0.87
Non-Opioid Medications & Complementary Therapies						
Non-opioid medications currently prescribed to treat pain						
	None	13	24%	19	38%	0.11
	Neuropathic pain medications	32	58%	23	46%	0.21
	Medical Marijuana	16	29%	12	24%	0.56
	Other non-opioid medications to treat pain	23	42%	10	20%	0.016
Complementary/Alternative therapies ††						0.82
	None in the past year	32	58%	28	56%	
	Any in the past year	23	42%	22	44%	
Substance Use and Opioid Prescription Medications						
Frequency of stimulant use						0.29
	Less than weekly	24	44%	27	54%	
	At least weekly	31	56%	23	46%	
Past year injection drug use						0.14
	No injection in past year	25	45%	30	60%	
	Injection in past year	30	55%	20	40%	
Heroin use						0.22
	Did not use heroin in past year	31	56%	34	68%	
	Used heroin in the past year	24	44%	16	32%	
Maximum MME in past year (mdn, IQR)		180 (69–305)		164 (68–300)		0.72

		Participants Who Have Used Stimulants to Treat Pain in the Past Year (n=55)		Participants Who Have Not Used Stimulants to Treat Pain in the Past Year (n=50)		*p*−value
		n	**%**	**n**	**%**	
Opioid Prescription Discontinuation						0.65
	Not discontinued in past year	42	76%	40	80%	
	Discontinued in past year	13	24%	10	20%	
Self-reported Symptoms						
Brief symptom inventory (BSI-18)						
	BSI score (mdn, IQR)	16.0 (12–29)		12.5 (5–29)		0.086
	Anxiety items	4.0 (2–5)		3.0 (1–6)		0.33
PTSD on Primary Care PTSD Screen (PC-PTSD)						0.67
	No PTSD	33	60%	32	64%	
	PTSD	22	40%	18	36%	
Depression scale (PHQ-8)						0.027
	No or mild depression (<10)	28	51%	36	72%	
	Moderate or severe depression (≥10)	27	49%	14	28%	

† Five participants did not do the neuropathic pain assessment and eight did not complete the cold pressor test.

†† Complementary/alternative therapies include chiropractic care, physical or occupational therapy, acupuncture, massage therapy, and group or individual counseling.

Table 3.

Results of Multivariable Logistic Regression Analyses of Participant Characteristics Associated with Reporting Stimulant Use to Treat Pain in the Past Year Among Participants Who Used Stimulants in the Past Year (n=100)

Characteristics	AOR	95% CI	*p*−value
Increase in 10 years of age	1.04	(0.54–2.02)	0.90
Gender			
Male gender	ref	ref	ref
Female gender	3.20	(1.06–9.63)	0.039
Transgender/other gender	1.24	(0.14–10.75)	0.85
Race			
White, Caucasian, or European American	ref	ref	ref
African American or Black	0.39	(0.11–1.37)	0.14
Other race	0.64	(0.18–2.31)	0.49
Some college or more	2.02	(0.75–5.45)	0.17
Ever homeless	3.91	(0.98–15.62)	0.054
Average pain	1.18	(0.90–1.55)	0.22
Moderate or severe depression	1.51	(0.56–4.11)	0.42
DN4 score	1.34	(1.05–1.70)	0.017
Other non-opioid medications to treat pain	2.25	(0.80–6.27)	0.12