Published in final edited form as:

Drug Alcohol Depend. 2020 January 01; 206: 107681. doi:10.1016/j.drugalcdep.2019.107681.

Pain, Psychological Flexibility, and Continued Substance Use in a Predominantly Hispanic Adult Sample Receiving Methadone Treatment for Opioid Use Disorder

Kristen D. Rosen^a, Megan E. Curtis^{a,b}, Jennifer Sharpe Potter^a

^aThe University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX, 78229, USA

^bDepartment of Psychology, University of Texas at San Antonio, 1 UTSA Circle, San Antonio, TX 78249, USA

Abstract

Background: We explored pain, psychological flexibility, and continued substance use among 100 adults treated with methadone for opioid use disorder (OUD). All participants had co-occurring chronic pain.

Methods: Participants recruited from a community treatment center between 2009 and 2010 completed an interviewer-facilitated assessment. Chronic pain severity and interference, psychological flexibility (mindfulness, acceptance, values success), past 30-day substance use, and demographics were reported. We modeled a zero-inflated negative binomial regression to examine 1) the probability that an individual does not use illicit substances and 2) illicit substance use frequency among those expected to use. Pain severity and mindfulness were included as predictors in the logit (zero inflated) model. Pain interference, acceptance, and values success were included as predictors in the negative binomial (count) model. We controlled for age and gender in both models.

Results: Participants were predominantly (84%) Hispanic, and 64% used an illicit substance least once in the past 30 days. Greater degree of mindfulness significantly predicted the probability that an individual does not continue to use illicit substances ($OR = 1.59, p < 0.05$). Lower degree of values success significantly predicted greater illicit substance use frequency among those likely to use ($IRR = 0.72, p < 0.01$). No other variables were associated with continued substance use.

Corresponding Author: Jennifer Sharpe Potter, Department of Psychiatry, The University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX, 78229, USA, potterjs@uthscsa.edu.

Contributors

Jennifer Sharpe Potter designed the study and provided critical review of the manuscript. Kristen Rosen collected data, conducted statistical analyses, and wrote the first draft of the manuscript. Megan Curtis managed the literature, provided critical review of the manuscript, and contributed to subsequent drafts. All authors contributed to and approved the final manuscript.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Conflict of interest
No conflict declared.

Conclusions: Findings suggest psychological flexibility is associated with continued substance use in this predominantly Hispanic sample of adults treated for OUD with co-occurring chronic pain. Study findings may have implications for how to address the treatment needs of this complex population.

Keywords

opioid use disorder; medication assisted treatment; chronic pain; psychological flexibility; mindfulness; Hispanic

1.0 Introduction

Non-withdrawal physical pain is a unique and important reason for continued substance use among patients receiving medication for opioid use disorder (OUD) (Weiss et al., 2014). Although medication (e.g., methadone) and some illicit substances (e.g., heroin) may provide analgesic effect, substance use, more broadly, has been observed among individuals treated for OUD who have co-occurring pain (Potter et al., 2008). For some, learned association and cognitive vulnerability due to long-term opioid use may establish precedence for continued substance use to relieve pain (Volkow et al., 2018). Still, others learn to pursue adaptive pain management strategies, despite their condition (Guildford et al., 2018). The cognitive process of persisting in or retreating from maladaptive behaviors (e.g., substance use) while experiencing discomfort (e.g., pain) is termed psychological flexibility (Feliu-Soler et al., 2018; Hayes et al., 2006).

Psychological flexibility reflects an individual's capacity for awareness and acceptance of their present state without attempts to avoid or control aversive experiences (Hayes et al., 2006; McCracken and Vowles, 2007). This is postulated to be motivated by an implicit bias toward maintaining congruency with personal values and goals (McCracken and Yang, 2006). Three psychological flexibility processes related to pain-related functioning are: mindfulness, acceptance, and values (McCracken and Vowles, 2007). Briefly, mindfulness refers to non-judgmental awareness and sustained attention on the present (Fletcher and Hayes, 2005). Acceptance reflects willingness to experience discomfort in service of value-directed behaviors (Hayes et al., 2006). Values are guiding principles anchored to an individual's goals across a range of life domains, such as family and health (Hayes et al., 2006).

Psychological flexibility appears to be an important factor in pain-related functioning and substance use recovery. For example, functional interference occurs when pain management strategies focus on controlling pain symptoms rather than maintaining congruency with personal values (Feliu-Soler et al., 2018). Among chronic pain patients, psychological flexibility is inversely related to prescription opioid use and pain-related distress (Guildford et al., 2018). Similarly, low pain acceptance is associated with increased opioid use among individuals receiving treatment for a substance use disorder (Lin et al., 2015). Low mindfulness is also associated with continued substance use among both psychiatric and OUD treatment-seeking patients (Garland et al., 2015; Levin et al., 2014).

Although pain may be associated with poor OUD treatment outcomes (Larson et al., 2007; Potter et al., 2010), extant research does not adequately characterize pain-related psychological processes that may contribute to illicit substance use. Further, there is limited understanding of pain and substance use among diverse ethnic populations. For example, it is not fully understood why Hispanic adults characterize pain differently compared to non-Hispanic white adults, and report lower opioid use, but not lower overall illicit substance use (Hollingshead et al., 2016a, 2016b). In this report, we examined pain, psychological flexibility (mindfulness, acceptance, values), and continued substance use among a predominantly Hispanic adult sample treated for OUD with co-occurring chronic pain. We expected substance use would be associated with greater pain severity and interference and lower degree of psychological flexibility.

2.0 Materials and methods

2.1 Study design

We conducted a cross-sectional analysis exploring chronic pain, psychological flexibility, and continued substance use among individuals receiving methadone treatment for OUD. Participants (n=100) completed a one-hour interviewer-facilitated assessment. Recruitment and data collection took place at a community substance use treatment center. Study methods and materials were approved by the University of Texas Health Science Center at San Antonio Institutional Review Board.

2.2 Participants

Adults (≥ 18 years old) prescribed methadone for OUD were recruited. Eligibility criteria included significant chronic, non-malignant pain (i.e., lasting ≥ 3 months with a pain severity rating of ≥ 5 on a 0-10 scale); illicit opioid use at least once within the past 12 months; and treatment stability (receiving methadone for ≥ 1 year). Although we did not restrict eligibility by race or ethnicity, majority of the clinic population was Hispanic. All participants were English-speaking and provided informed consent. Participants received a \$40 gift card for completing assessments.

2.3 Recruitment

Participants were recruited over 49 weeks between 2009 – 2010 using a combination strategy (e.g., presentations, flyers, word of mouth, referrals). A recruiter was available on-site, during peak medication dispensing hours, to answer questions and conduct pre-screen interviews. Informed consent was obtained from eligible participants prior to beginning the assessment.

2.4 Measures

Assessments were completed in a private office at the treatment center. Treatment center policy required patient escorts; thus, the interviewer was present while participants completed self-administered surveys. Participants were assured assessment responses were confidential and would not be shared with treatment center staff. Data were collected using paper and pencil, then entered into an electronic database. Higher scores on each measure

corresponded with a greater degree of the construct indicated. Demographic information was collected from all participants.

2.4.1 Substance use—Substance use frequency was obtained using the Timeline Followback (TLFB; Sobell et al., 1996), a valid and reliable calendar-based interview method of tracking daily substance use (Delker et al., 2016; Hjorthøj et al. 2012). For each of the preceding 30 days, participants were asked to state whether they used each of the following types of illicit substances: opioids, stimulants, hallucinogens, sedatives, and cannabinoids. We calculated substance use frequency by summing number of days where an illicit substance was consumed (0 – 30 days).

2.4.2 Chronic pain—Pain severity and pain interference were measured using the Brief Pain Inventory short form (BPI-sf), a widely-used reliable and valid self-report measure of non-malignant chronic pain (Cleeland and Ryan, 1994). Scores range from 0 – 10. The BPI-sf demonstrated acceptable internal consistency on the pain severity scale ($\alpha = 0.73$) and pain interference scale ($\alpha = 0.90$).

2.4.3 Psychological flexibility—All psychological flexibility measures were self-administered and used a Likert-type scale. Measures of mindfulness, acceptance, and values were included.

Mindfulness was measured using the 15-item Mindful Attention Awareness Scale (MAAS), a reliable and valid measure of dispositional mindfulness (Brown and Ryan, 2003). Scores range from 1 – 6. The MAAS demonstrated acceptable internal consistency ($\alpha = 0.89$).

Pain acceptance was measured using the 20-item Chronic Pain Acceptance Questionnaire (CPAQ; McCracken et al., 2004). Scores range from 0 – 120. The CPAQ demonstrated acceptable internal consistency ($\alpha = 0.77$).

The 12-item Chronic Pain Values Inventory (CPVI) assessed values success, the degree to which participants believe their actions are congruent with their personal values (McCracken and Yang, 2006). Values domains represented in the CPVI are: family, intimate relations, friends, work, health, and growth or learning. Scores range from 0 – 5. The CPVI demonstrated acceptable internal consistency ($\alpha = 0.87$).

2.5 Statistical analyses

Data were screened for completion, accuracy, normality, and collinearity. Less than 2% of data were missing. The MAAS, CPAQ, and CPVI each had one case with missing values (2 values). Total scores of these surveys were mean imputed to account for the missing values. No participants were removed from the dataset due to missing values or extreme scores. Statistical testing was 2-sided with a 0.05 significance level. Data were screened and analyzed using SPSS version 19 and R version 3.5.1. AER, pscl, mass, and boot packages (Canty and Ripley, 2017; Jackman et al., 2017; Kleiber and Zeileis, 2017; Ripley et al., 2018).

Descriptive statistics were calculated for demographic and key variables. We visually inspected the distribution of substance use and conducted a test of dispersion, revealing a zero-inflated distribution and overdispersion, respectively (Cameron and Trivedi, 1990; Kleiber and Zeileis, 2017). We modeled a zero-inflated negative binomial regression (ZINB) to estimate 1) the probability that an individual does not continue illicit substance use (logit model) and 2) identify predictors of substance use frequency (i.e., days of use) among those expected to use (negative binomial model) (Hu et al., 2011). Extant literature suggests having chronic pain and having low mindfulness are associated with continued substance use (Garland et al., 2015; Levin et al., 2014; Weiss et al., 2014). Therefore, pain severity and mindfulness were included as predictors in the logit model. Similarly, being unwilling to accept pain and persist in activities aligned with personal values is associated with increased substance use (Lin et al., 2015). Pain interference, pain acceptance, and values success were therefore included as predictors in the negative binomial model. We controlled for gender and age in both models.

Results of the logit model are represented as odds ratios (OR) and results of the negative binomial model are represented as incidence rate ratios (IRR). The Vuong test confirmed the ZINB fit the data better than a standard negative binomial regression, $p < 0.001$ (Vuong, 1989).

3.0 Results

Of 229 individuals screened for eligibility, 121 were eligible to participate; 21 declined to participate. Reasons for exclusion included not endorsing one or more criteria: chronic pain ($n = 43$), past year opioid use ($n = 58$), or methadone treatment ($n = 26$). A total of 100 participants enrolled in the study and provided data. This is the sample size reported for all statistics.

3.1 Participant characteristics

Overall, 51% of participants were female, and average age was 40 years ($SD = 10.8$). Most participants were Hispanic (84%). Over half (64%) of participants reported using an illicit substance at least once during the past 30 days. Substance use frequency ranged from 0 - 30 days (daily), with a median of five days (table 1). Pain was most frequently reported in the lower extremities (72%), low back (69%), and upper extremities (65%). Demographics, pain, and psychological flexibility are reported in table 1.

3.2 Probability of continued substance use

Mindfulness significantly predicted the probability that an individual does not continue to use illicit substances. Participants with a higher degree of mindfulness had a 1.59 greater probability of reporting no substance use compared to those who reported a lower degree of mindfulness (table 2). However, pain severity was not associated with substance use.

3.3 Substance use frequency

Substance use frequency was predicted by the degree to which individuals believed their actions were congruent with their personal values (i.e., values success). Among participants

with low values success, substance use frequency (i.e., days of use) was 0.72 times higher compared to those who believe they have greater values success (table 2). Pain interference and acceptance did not predict substance use frequency among participants expected to use.

4.0 Discussion

We explored pain, psychological flexibility, and continued substance use among adults receiving methadone treatment for OUD. Findings suggest two psychological flexibility processes, mindfulness and values, are associated with continued substance use. In this sample, pain acceptance was not associated with continued substance use. We measured pain-specific acceptance rather than general acceptance; this may influence the result. While pain is a known reason for continuing to use opioids (Weiss et al., 2014), it may be that mindfulness is more salient in the context of an active substance use. This may also be why, contrary to our hypothesis, we found no evidence that pain on its own (i.e., severity and interference) was associated with substance use. An alternative explanation may be cultural differences in subjective pain experience; specifically, reports suggest that Hispanic adults tolerate pain differently (Hollingshead et al., 2016a). This is similar to Foster et al. (2016) who found values commitment, but not substance use behavior, was moderated by pain in a sample of adults receiving treatment for OUD. It is worth noting that perhaps substance use behavior is explained by an interaction between psychological flexibility and pain; this relationship should be explored. Results may be further explained by a proposed model of mindfulness mechanisms, which suggests personal values may be a pathway by which mindfulness influences health outcomes (Shapiro et al., 2006). For example, individuals who have a high degree of mindfulness may be better equipped to recognize and reduce maladaptive behaviors (e.g., substance use) that are inconsistent with their values. Finally, this study contributes to the literature on substance use and chronic pain experience among Hispanic adults; a population not routinely considered in substance use research.

4.1 Limitations

The cross-sectional analysis and single recruitment site could not address contextual factors or cohort effects that may have influenced outcomes. Measures were self-report, and an interviewer was present during data collection, which may have also biased reporting. Additionally, we did not examine the temporality of pain with respect to OUD, or specific reasons for continued substance use during methadone treatment.

4.2 Conclusions

Findings from this predominantly Hispanic sample of adults treated for OUD with co-occurring chronic pain suggest that for some, psychological flexibility (mindfulness and values) is associated with continued substance use. Although unable to generalize or draw causal inference from this cross-sectional analysis, findings signal a need for further exploration of psychological flexibility as a mitigating factor in substance use progression and treatment outcomes among individuals with chronic pain. Behavioral interventions focused on strengthening psychological flexibility (e.g., Acceptance and Commitment Therapy) may be considered as part of comprehensive treatment for OUD and co-occurring

chronic pain. These findings may have implications for informing treatment guidelines for this unique population.

Acknowledgments

Role of Funding Source

Research reported in this publication was supported by the National Institute on Drug Abuse (NIDA) [K23DA022297] (PI: Jennifer Sharpe Potter). Kristen Rosen's effort is supported by a NIDA training grant [T32DA031115] (PI: Charles France). NIDA had no role in the study design, collection, analysis, interpretation of the data, writing, or decision to submit the manuscript for publication.

Funding: Research reported in this publication was supported by the National Institute on Drug Abuse [K23DA022297] (PI: Jennifer Sharpe Potter). Dr. Rosen's effort is supported by a National Institute on Drug Abuse training grant [T32DA031115] (PI: Charles France).

References

- Brown KW, Ryan RM, 2003 The benefits of being present: mindfulness and its role in psychological well-being. *J. Pers. Soc. Psychol* 84, 822–848. [PubMed: 12703651]
- Cameron AC, Trivedi PK, 1990 Regression-based tests for overdispersion in the Poisson model. *J. Econom* 46, 347–364.
- Canty A, Ripley B, 2017 Package “boot” (Version 1.3-20) [R], Accessed on December 4, 2018 <https://cran.r-project.org/web/packages/boot/boot.pdf>
- Cleeland CS, Ryan KM, 1994 Pain assessment: global use of the brief pain inventory. *Ann. Acad. Med. Singapore* 23, 129–138. [PubMed: 8080219]
- Delker E, Aharonovich E, Hasin D, 2016 Interviewer-administered TLFB vs. self-administered computerized (ACASI) drug use frequency questions: a comparison in HIV-infected drug users. *Drug and Alcohol Depend.* 161, 29–35.
- Feliu-Soler A, Montesinos F, Gutierrez-Martinez O, Scott W, McCracken LM, Luciano JV, 2018 Current status of acceptance and commitment therapy for chronic pain: a narrative review. *J. Pain. Res* 11, 2145–2159. [PubMed: 30323649]
- Fletcher L, Hayes S, 2005 Relational frame theory, acceptance and commitment therapy, and a functional analytic definition of mindfulness. *J. Ration. Emot. Cogn. Behav. Ther* 23, 315–336.
- Foster KT, Ehrnstrom C, Chermack S, Hosanagar A, 2016 Pain moderates changes in psychological flexibility but not substance use symptoms during substance use disorder treatment. *Psychiatry Res.* 245, 51–57. [PubMed: 27526317]
- Garland EL, Hanley AW, Thomas EA, Knoll P, Ferraro J, 2015 Low dispositional mindfulness predicts self-medication of negative emotion with prescription opioids. *J. Addict. Med* 9, 61–67. [PubMed: 25469652]
- Guildford BJ, Daly-Eichenhardt A, Hill B, Sanderson K, McCracken LM, 2018 Analgesic reduction during an interdisciplinary pain management programme: treatment effects and processes of change. *Br. J. Pain* 12, 72–86. [PubMed: 29796259]
- Hayes SC, Luoma JB, Bond FW, Masuda A, Lillis J, 2006 Acceptance and commitment therapy: model, processes, and outcomes. *Behav. Res. Ther* 44, 1–25. [PubMed: 16300724]
- Hjorthøj CR, Hjorthøj AR, Nordentoft M, 2012 Validity of Timeline Follow-Back for self-reported use of cannabis and other illicit substances--systematic review and meta-analysis. *Addict. Behav* 37, 225–33. [PubMed: 22143002]
- Hollingshead NA, Ashburn-Nardo L, Stewart JC, Hirsh AT 2016a The pain experience of Hispanic Americans: a critical literature review and conceptual model. *J. Pain* 17, 513–528. [PubMed: 26831836]
- Hollingshead NA, Vraney EA, Stewart JC, Hirsh AT 2016b Differences in Mexican Americans' prevalence of chronic pain and co-occurring analgesic medication and substance use relative to Non-Hispanic white and Black Americans: results from NHANES 1999-2004. *Pain Med.* 17, 1001–1009. [PubMed: 26814239]

- Hu MC, Pavlicova M, Nunes EV, 2011 Zero-inflated and hurdle models of count data with extra zeros: Examples from an HIV-risk reduction intervention trial. *Am. J. Drug Alcohol Abuse* 37, 367–375. [PubMed: 21854279]
- Jackman S, Tahk A, Zeileis A, Maimone C, Fearon J, Meers Z, 2017 Political science computational laboratory (Version 1.5.2) [R], Accessed on December 4, 2018 <https://cran.r-project.org/web/packages/pscl/pscl.pdf>
- Kleiber C, Zeileis A, 2017 Applied econometrics with R (Version 1.2-5) [R], Accessed on December 4, 2018 <https://cran.r-project.org/web/packages/AER/AER.pdf>
- Larson MJ, Paasche-Orlow M, Cheng DM, Lloyd-Travaglini C, Saitz R, Samet JH, 2007 Persistent pain is associated with substance use after detoxification: a prospective cohort analysis. *Addiction*. 102, 752–760. [PubMed: 17506152]
- Levin ME, Dalrymple K, Zimmerman M, 2014 Which facets of mindfulness predict the presence of substance use disorders in an outpatient psychiatric sample? *Psychol. Addict. Behav* 28, 498–506. [PubMed: 24274438]
- Lin LA, Bohnert ASB, Price AM, Jannausch M, Bonar EE, Ilgen MA, 2015 Pain acceptance and opiate use disorders in addiction treatment patients with comorbid pain. *Drug Alcohol Depend.* 157, 136–142. [PubMed: 26530502]
- McCracken LM, Vowles KE, 2007 Psychological flexibility and traditional pain management strategies in relation to patient functioning with chronic pain: an examination of a revised instrument. *J. Pain* 8, 700–707. [PubMed: 17611162]
- McCracken LM, Vowles KE, Eccleston C, 2004 Acceptance of chronic pain: component analysis and a revised assessment method. *Pain*. 107, 159–166. [PubMed: 14715402]
- McCracken LM, Yang SY, 2006 The role of values in a contextual cognitive-behavioral approach to chronic pain. *Pain*. 123, 137–145. [PubMed: 16564627]
- Potter JS, Chakrabarti A, Domier CP, Hillhouse MP, Weiss RD, Ling W, 2010 Pain and continued opioid use in individuals receiving buprenorphine–naloxone for opioid detoxification: Secondary analyses from the Clinical Trials Network. *J. Subst. Abuse Treat* 38, S80–S86. [PubMed: 20307799]
- Potter JS, Prather K, Weiss RD, 2008 Physical pain and associated clinical characteristics in treatment-seeking patients in four substance use disorder treatment modalities. *Am. J. Addict* 17, 121–125. [PubMed: 18393055]
- Ripley B, Venables B, Bates DM, Hornik K, Gebhardt A, Firth D, 2018 Package ‘MASS’ (Version 7.3-51.1) [R], Accessed on December 4, 2018 <https://cran.r-project.org/web/packages/MASS/MASS.pdf>
- Shapiro SL, Carlson LE, Astin JA, Freedman B, 2006 Mechanisms of mindfulness. *J. Clin. Psychol* 62, 373–386. [PubMed: 16385481]
- Sobell LC, Sobell MB, Buchan G, Cleland PA, Fedoroff I, Leo GI, 1996 The reliability of the Timeline Followback method applied to drug, cigarette, and cannabis use. Presented at the 30th Annual Meeting of the Association for Advancement of Behavior Therapy, New York, NY.
- Volkow N, Benveniste H, McLellan AT, 2018 Use and Misuse of Opioids in Chronic Pain. *Annu. Rev. Med* 69, 451–465. [PubMed: 29029586]
- Vuong QH, 1989 Likelihood Ratio Tests for Model Selection and Non-Nested Hypotheses. *Econometrica*. 57, 307–333.
- Weiss RD, Potter JS, Griffin ML, McHugh RK, Haller D, Jacobs P, Gardin J 2nd, Fischer D, Rosen KD, 2014 Reasons for opioid use among patients with dependence on prescription opioids: the role of chronic pain. *J. Subst. Abuse Treat* 47, 140–145. [PubMed: 24814051]

Highlights

- Analyzed continued substance use among adults treated for opioid use disorder
- Predominantly Hispanic sample received methadone, reported chronic pain.
- Higher mindfulness associated with odds of continued substance use.
- Higher values success associated with lower substance use frequency.
- Pain severity and interference not associated with continued substance use.

Table 1.

Participant demographics, pain, and psychological flexibility by past 30 day substance use

	Substance use (n = 64)	No substance use (n = 36)		
Variable	n (%) / Mean (SD)	n (%) / Mean (SD)	χ^2 / t	P-value
Age (years)	38.91 (10.66)	42.22 (10.78)	1.49	0.14
Gender (female)	36 (56.3%)	15 (41.7%)	1.96	0.16
Race and ethnicity			0.19	0.91
Black (non-Hispanic)	9 (14.1%)	4 (11.1%)		
White (non-Hispanic)	2 (3.1%)	1 (2.8%)		
Hispanic	53 (82.8%)	31 (86.1%)		
< 12 years education	29 (45.3%)	16 (44.4%)	0.01	0.93
Full-time employment pattern	16 (25%)	2 (5.6%)	10.95	0.03
Chronic pain characteristics				
Pain severity	7.03 (1.94)	6.51 (2.16)	-1.25	0.22
Pain interference	6.72 (2.12)	6.34 (1.98)	-0.89	0.38
Psychological flexibility				
Mindfulness	3.24 (0.90)	3.73 (1.13)	2.39	0.02
Pain acceptance	47.14(14.48)	52.12 (16.51)	1.57	0.12
Values success	2.60 (1.25)	3.13 (1.11)	2.09	0.04
Mean days of substance use				
Opioid analgesics (n = 35)	7.97 (10.93)			
Heroin (n = 29)	5.17 (9.22)			
Methadone, not prescribed (n = 13)	1.42 (4.65)			
Buprenorphine, not prescribed (n = 0)	0.00 (0.00)			
Cocaine (n = 24)	1.94 (4.39)			
Amphetamines (n = 1)	0.31 (0.25)			
Hallucinogens (n = 0)	0.00 (0.00)			
Sedatives (n = 31)	3.04 (7.14)			
Cannabinoids (n = 20)	6.05 (11.41)			

Table 2.

Predictors of illicit substance use probability and frequency

		B (SE)	Z Value	95% Confidence Interval	
Logit Model					Odds Ratio
	Intercept	−2.23 (1.61)	−1.38		
	Pain severity	−0.12 (0.11)	−1.03	−0.34, 0.11	0.89
	Mindfulness	0.46 (0.23)	1.99 *	0.01, 0.92	1.59
	Age	−0.02 (0.02)	1.00	−0.02, 0.07	1.02
	Gender (female)	−0.35 (0.50)	−0.69	−1.33, 0.64	0.71
Negative Binomial Model					Incidence Rate Ratio
	Intercept	3.65 (0.83)	4.40		
	Pain interference	0.04 (0.06)	0.69	−0.07, 0.15	1.04
	Pain acceptance	−0.00 (0.01)	−0.01	−0.02, 0.02	1.00
	Values success	−0.33 (0.11)	−3.13 **	−0.54, −0.12	0.72
	Age	−0.002 (0.01)	−0.23	−0.02, 0.02	1.00
	Gender (female)	−0.31 (0.23)	−1.35	−0.75, 0.14	0.74

*
 $p < 0.05$ **
 $p < 0.01$