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Psychopathology and pain correlates of dispositional optimism in methadone-maintained patients

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Abstract

While higher levels of dispositional optimism are associated with decreased levels of psychopathology and pain, and higher levels of mental health functioning—important outcomes in opioid treatment programs—a paucity of studies has examined dispositional optimism among individuals with opioid use disorders. The aim of this study was to examine the clinical correlates (i.e., psychopathology, pain status) of dispositional optimism in opioid dependent patients enrolled in methadone maintenance treatment (MMT). A survey targeting demographics, pain, psychopathology, and dispositional optimism was administered to 150 MMT patients. In multivariable analyses, higher levels of dispositional optimism were significantly associated with lower levels of depression, screened personality disorder criteria, screened symptoms of PTSD, and pain-related emotional strain. In comparison to those without a history of chronic pain (i.e., non-cancer related physical pain lasting at least 3 months), MMT patients who reported either lifetime or current chronic pain exhibited significantly lower levels of dispositional optimism. The associations among higher levels of dispositional optimism, lower levels of psychopathology, and lower pain-related emotional strain suggest that research focusing on the efficacy of specific interventions to promote dispositional optimism in MMT patients is warranted.

Keywords

Personality; methadone; opioid-related disorders; pain; psychopathology

1. Introduction

Dispositional optimism is a personality trait defined by a generalized expectancy of positive outcomes, irrespective of perceived ability to attain goals or control outcomes.¹ The construct of dispositional optimism is grounded in expectancy-value models of motivation, which assume that behavior is guided by the pursuit of goals.² Studies on non-addicted individuals have identified important clinical correlates of dispositional optimism: Higher (as opposed to lower) levels of dispositional optimism are associated with fewer depressive symptoms, decreased levels of distress, attenuated pain perception, increased resilience in coping with trauma, greater life satisfaction, and higher levels of overall mental health functioning.^{3–10}

Although still in its infancy, research on the clinical correlates of dispositional optimism among individuals who engage in substance use or who have substance use disorders has

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generally found that higher (as opposed to lower) levels of dispositional optimism are associated with (a) less cigarette, alcohol, and marijuana use among adolescents^{11,12} and (b) higher rates of drug abstinence¹³ and treatment completion among patients with substance use disorders.¹⁴⁻¹⁷

To our knowledge, only one study to date has systematically examined the clinical correlates of dispositional optimism among patients enrolled in methadone maintenance treatment (MMT) for opioid dependence^a: In a study of 121 MMT patients in the U.S., higher levels of dispositional optimism were associated with lower levels of depression and hopelessness.¹⁸ MMT is a mainstay treatment for opioid dependence in the U.S. and—similar to treatments for other chronic medical conditions—involves regular monitoring of medications, accompanied by interventions that promote lifestyle and behavioral change.^{19,20} As with other chronic medical conditions, relapses are common among individuals with opioid dependence and other substance-related disorders.¹⁹ MMT has been demonstrated to be effective in reducing illicit opioid and other drug use, reducing morbidity and mortality, and enhancing legal, social, and vocational functioning.²¹

Given that higher dispositional optimism among patients with non-opioid substance use disorders is associated with increased levels of treatment engagement and drug abstinence, and reduced levels of psychopathology¹⁴⁻¹⁷—all important facets of successful MMT—an enhanced understanding of the clinical correlates that accompany dispositional optimism in MMT patients is likely to have important clinical applications. Whereas we previously reported on the prevalence of pain, substance use and psychiatric correlates, and prior pain treatment utilization among the study sample, we did not report on findings related to dispositional optimism.²²⁻²⁴ The primary aim of this study was to investigate associations between dispositional optimism and demographics, psychopathology, pain status, and MMT characteristics. We hypothesized that higher levels of dispositional optimism would be associated with (a) lower levels of psychopathology, (b) lower levels of pain-related emotional strain, and (c) the absence of a chronic pain history.

2. Methods

2.1. Participants

As reported previously²⁴, participants were 150 MMT patients (85 men and 65 women) aged 19 to 61 years ($M = 41.5$; $S.D. = 10.2$) who were in treatment for at least six months ($Mdn = 24$; $Q_1 = 12$; $Q_3 = 60$) at one of the three opioid agonist treatment programs operated by the APT Foundation, Inc. (hereafter referred to as APT), a private not-for-profit community-based organization located in New Haven, CT. At the beginning of data collection, APT had a census of approximately 1,500 MMT patients. Participants were predominantly Caucasian (58%), male (57%), never married (53%), and unemployed (43%) or disabled (29%). A majority of participants had at least a high school level of education (68%). All participants had at least one prior MMT episode; the frequency of prior MMT episodes ranged from 1 to 15 ($Mdn = 2$; $Q_1 = 1$; $Q_3 = 3$). Age of onset of regular opioid use and age of index opioid use treatment episode ranged from 11 to 48 years ($M = 22.6$; $S.D. = 7.4$) and 17 to 57 years ($M = 29.8$; $S.D. = 8.2$), respectively.

2.2. Design

The study employed a cross-sectional survey design.

^aIn this manuscript, the terms “opioid dependence” and “opioid dependent” are used in accordance with the Diagnostic and statistical manual of mental disorders (4th edition, text revision) DSM-IV-TR (APA, 2000).

2.3. Procedures

Participants were self-selected in response to study flyers indicating, “This study aims to better understand patients’ experiences and treatment needs at APT.” No reference to optimism, psychopathology, or pain was mentioned in the flyer. Flyers were posted at APT’s three methadone clinics—Legion, Orchard, and Park. Study inclusion criteria were that participants needed to be (a) currently enrolled in MMT at APT and (b) English speaking. The first 50 patients from each of the 3 MMT clinics who responded to the flyer by contacting a research assistant were admitted into the study. All patients who spoke with a research assistant about the study agreed to participate. Research assistants administered the questionnaire packet after describing the study, including the potential benefits and risks of study participation. This study, involving the use of survey data without subject identifiers, was presented to the Human Investigations Committees at APT and the Yale University School of Medicine and was exempted from review by both institutions per United States Department of Health and Human Services (DHHS) regulation 45 CFR 6.101(b)(2). Participants were paid \$10 for study participation.

2.4. Measures

2.4.1. Demographics—Demographics, including age, sex, race/ethnicity, employment status, education level, and relationship status, and opioid use history, including age of onset of regular illicit opioid use (i.e., 3 or more times per week) and age of index opioid use disorder treatment episode, were provided by participants.

2.4.2. Dispositional optimism—Dispositional optimism was measured with the Life Orientation Test – Revised¹⁰, a widely used 10-item (6 content, 4 filler) self-report measure of dispositional optimism with scores ranging between 0 and 24. Sample items include: “In uncertain times, I usually expect the best” and “If something can go wrong for me, it will [reverse coded].”

2.4.3. Psychopathology—Psychopathology was measured with: (a) Brief Symptom Inventory-18²⁵, a self-report measure of depression, somatization, and anxiety; (b) Behavior and Symptom Identification Scale-24²⁶, a self-report inventory designed to assess psychiatric symptoms and functioning across six domains: depression, interpersonal relationships, self-harm, emotional lability, psychotic symptoms, and substance abuse; (c) Life Experiences Checklist²⁷, a self-report instrument that measures whether or not respondents have experienced 13 possible traumatic experiences (e.g., physical assault, sexual assault). The LEC total score reflects the total number of different traumatic experiences reported by the respondent; (d) Primary Care Post-Traumatic Stress Disorder Screen²⁸ is a 4-item PTSD screening instrument, designed to assess the experience of nightmares or intrusive re-experiencing, avoidance of trauma reminders, hypervigilance or hyperarousal, and detachment or numbness; and (e) Iowa Personality Disorder Screen²⁹ an 11-item semi-structured interview that assesses respondents’ characteristic thoughts and feelings.

2.4.4. Pain status—Pain status was assessed by asking respondents whether they had ever (lifetime) or were currently (current) experiencing an episode of physical pain lasting at least three months (i.e., chronic pain). In addition, respondents completed the current pain intensity item (0-10 scale) from the McGill Pain Questionnaire-Short Form³⁰ and were asked to rate their level of emotional strain associated with pain (on a similar 0-10 scale). Respondents provided information about the causes of the pain experienced in the past 7 days.

2.4.5. MMT Characteristics—Respondents provided information about methadone dose, months enrolled, and number of different methadone maintenance treatment episodes.

2.5. Data Analysis

T-tests were performed to assess potential differences in dispositional optimism among groups pertaining to race/ethnicity (white vs. non-white), sex (male vs. female), prior history of chronic pain (yes/no), and current chronic pain status (yes/no). Univariate associations between dispositional optimism, demographics, opioid use history, psychopathology, pain status, and MMT characteristics were computed using Pearson correlations for continuous variables and Spearman's rho correlations for dichotomous variables. We then conducted a series of multiple regression models examining the independent contributions of psychopathology, pain- and MMT-related variables in predicting participants' levels of dispositional optimism. For each regression model, we calculated the overall significance of the model (i.e., Adjusted R^2 , Adjusted F , and P -value) as well as the individual contributions of each predictor variable (i.e., t). While Pearson and Spearman's rho correlations do not calculate independent contributions of specific variables (since they ignore the effects of other variables), multiple regression analyses provide two types of correlations that do calculate independent contributions: semi-partial and partial correlations. When the correlation between a specific predictor (e.g., anxiety) and the criterion (e.g., dispositional optimism) partials out all of the remaining predictor variables from the relevant category of predictor variables (e.g., depression, somatization), it is called a semi-partial correlation; when the correlation partials out the remaining predictor variables from both the specific predictor and the criterion variable, the correlation is called a partial correlation. We performed separate semi-partial and partial correlational analyses for specific categories of psychopathology (i.e., BSI-18, BASIS-24, and Trauma [i.e., LEC total, PC-PTSD]), pain (i.e., current pain, emotional strain), and MMT characteristics (i.e., methadone dose, months of MMT, number of MMT episodes) (see Table 2). For the measures with subscales (BSI-18 and BASIS-24), the subscale and not the total scale scores were used in analyses; subscale and total scale scores were not included together in analyses because of concerns about collinearity.

All of the study measures are designed so that a higher scale or subscale score indicates more of the phenomenon or construct being studied. Statistical significance was set to $p < 0.05$. A power analysis was computed to determine the number of participants required to detect a medium-size effect in a multiple regression analysis with six predictors (the largest set of predictors). The power analysis was conducted with GPOWER 3.1.1.³¹ Alpha was set to 0.05 and power was set to 0.80. With 150 participants, this study was adequately powered to detect a medium effect. The observed effect size from the multiple regression analysis with six predictors presented in Table 2 was 0.54, which indicates a large effect.³² Statistical analyses were performed using SPSS Version 17.0 for Windows.³³

3. Results

Scale descriptive statistics are presented in Table 1. Alpha coefficients were acceptable for research purposes³⁴, ranging from 0.69 to 0.89. Participants' average ratings for dispositional optimism were 12.96 (S.D. = 4.5). Levels of dispositional optimism were not associated with age ($P = 0.10$), race/ethnicity ($P = 0.06$), sex ($P = 0.19$), employment status ($P = 0.14$), educational level ($P = 0.59$), relationship status ($P = 0.15$), age of first regular opioid use ($P = 0.96$), or age of index opioid use disorder treatment ($P = 0.91$). Among those reporting pain lasting at least three months (i.e., chronic pain), the most frequently endorsed causes of past-week pain were accident 54% ($n = 35$), arthritis 29% ($n = 19$), and surgery 23% ($n = 15$), and average ratings for current pain intensity were 6.3 (S.D. = 2.2).

3.1. Association between Psychopathology, Pain Status, MMT Characteristics, and Dispositional Optimism

Zero-order correlations between psychopathology, pain status, MMT characteristics and dimensional ratings of dispositional optimism are summarized in Table 2. Higher levels of BSI-18 anxiety, depression, and somatization; BASIS-24 depression, interpersonal relations, self-harm, and emotional lability; LEC total; PC-PTSD; IPDS total; and pain-related emotional strain were associated with lower levels of dispositional optimism. Of the MMT characteristic variables, methadone dose—but not months in MMT or number of MMT episodes—was associated with levels of dispositional optimism.

3.2. Prediction of Dispositional Optimism

The BSI subscales were jointly related to dispositional optimism (Adjusted $r^2 = 0.37$, $F = 29.25$, $P < 0.001$). Each subscale was related to dispositional optimism: $t_{\text{Anxiety}} = 1.98$, $P < 0.05$, $t_{\text{Depression}} = -6.41$, $P < 0.001$, $t_{\text{Somatization}} = -2.13$, $P < 0.05$. For both the semi-partial and partial correlational analyses, lower levels of depression predicted higher levels of dispositional optimism (see Table 2).

The BASIS-24 subscales were jointly related to dispositional optimism (Adjusted $r^2 = 0.35$, $F = 14.23$, $P < 0.001$). Two of the subscales were related to dispositional optimism: $t_{\text{Depression}} = -4.50$, $P < 0.001$, $t_{\text{Emotional Lability}} = -2.11$, $P < 0.05$. For both the semi-partial and partial correlational analyses, lower levels of depression predicted higher levels of dispositional optimism (see Table 2).

The trauma-related measures were jointly related to dispositional optimism (Adjusted $r^2 = 0.14$, $F = 12.36$, $P < 0.001$). Both the number of traumatic events (as measured by the LEC) and screened symptoms of PTSD (as measured by the PC-PTSD) were significant: $t_{\text{LEC}} = -2.12$, $P < 0.05$, $t_{\text{PC-PTSD}} = -3.54$, $P < 0.01$. For both the semi-partial and partial correlational analyses, fewer screened symptoms of PTSD predicted higher levels of dispositional optimism (see Table 2).

The IPDS score was significantly, inversely related to dispositional optimism (Adjusted $r^2 = 0.11$, $F = 19.56$, $P < 0.001$). The beta weight for the IPDS was -0.35 ($t = -4.42$, $P < 0.001$). Partial and semi-partial correlations are not relevant because the IPDS total score was the only independent variable in the equation.

In the multivariable model, current pain intensity and pain-related emotional strain were jointly related to dispositional optimism (Adjusted $r^2 = 0.06$, $F = 4.49$, $P < 0.05$). Pain-related emotional strain (but not current pain intensity) was significantly associated with dispositional optimism ($t = -2.31$, $P < 0.05$). For both the semi-partial and partial correlational analyses, lower levels of pain-related emotional strain predicted higher levels of dispositional optimism. In comparison to those without any history of chronic pain, respondents with either lifetime ($t = 3.12$, $df = 148$, $P < 0.01$) or current chronic pain ($t = 2.05$, $df = 148$, $P < 0.05$) reported lower levels of dispositional optimism. In contrast, MMT characteristics were not jointly related to dispositional optimism (Adjusted $r^2 = 0.01$, $F = 1.56$, $P = 0.20$); thus, individual partial and semi-partial coefficients related to this model were not interpreted.

4. Discussion

To our knowledge, this study is among the first to systematically investigate the correlates of dispositional optimism among a sample of opioid dependent patients enrolled in methadone maintenance treatment (MMT). The findings support our main hypotheses: Higher levels of

dispositional optimism were associated with lower levels of psychopathology, pain-related emotional strain, and chronic pain status. Implications of these findings are discussed below.

4.1. Psychopathology and Treatment Variables

Study findings confirm and expand upon prior research showing an association between dispositional optimism and depression among MMT patients.¹⁸ After controlling for other psychiatric variables in the multivariable models, we found that higher levels of dispositional optimism were associated with lower levels of depression, fewer screened symptoms of PTSD, and lower rates of personality disorder criteria. In contrast, respondents' levels of dispositional optimism were not associated with specific MMT characteristics (i.e., methadone dose, length of current MMT episode, number of MMT episodes) in multivariable models. Thus, current methadone dose, fewer (or more) episodes of MMT, and length of current MMT episode did not predict levels of dispositional optimism. Our finding that self-reported substance abuse was not associated with levels of dispositional optimism corroborates a previous study on MMT respondents which found that lapses to heroin use were not associated with dispositional optimism.¹³

These findings also suggest that further research examining dispositional optimism and psychopathology is merited to better define the nature of the relationships and the clinical implications. For example, the extent to which lower levels of dispositional optimism may exacerbate mental health conditions in MMT patients warrants direct investigation, as does the extent to which attenuated dispositional optimism may represent a response to mental health conditions. Longitudinal studies that investigate how dispositional optimism and psychiatric symptoms among MMT patients co-vary over time (e.g., how dispositional optimism might influence treatment outcome for psychiatric disorders) is needed. While some level of "positive illusion" (i.e., perceiving events in a positive—as opposed to an accurate—manner) may be beneficial for mental health³⁵, the extent to which accurate versus positive expectations are related to mental health, problem solving, and discrete categories of psychiatric disorders in MMT patients is currently unclear and merits further examination.

4.2. Pain Status

As hypothesized, higher (as opposed to lower) levels of dispositional optimism were associated with the absence of a lifetime or current chronic pain episode. In the multivariable model, the association between dispositional optimism and pain-related emotional strain remained significant after controlling for levels of current pain. Currently, it is unclear whether low levels of dispositional optimism precede, co-occur with, or follow chronic pain episodes among MMT patients, and this merits further research investigation. While previous research on pain in MMT by Compton and colleagues has demonstrated that opioid dependent patients exhibit hyperalgesia or increased sensitivity to painful stimuli, future research on pain in MMT might benefit from examining the potential association between dispositional optimism and hyperalgesia among MMT patients with chronic pain.³⁶ One study on healthy college students found, for example, that dispositional optimism was negatively associated with pain sensitivity in response to an experimentally-generated brief pain stimulus.⁷ Additionally, since higher levels of dispositional optimism predict greater perceived pain reduction following a sham treatment, future research should consider examining this phenomenon among MMT patients with pain who have varying levels of dispositional optimism.³⁷

4.3. Limitations and Strengths

Several potential limitations are worth noting. The cross-sectional design of the survey limits statements regarding causation among study variables. Participants were drawn from

three opioid agonist treatment programs operated by one organization in a particular geographic region; thus, our findings may or may not generalize to other MMT programs. Given the study design, it was not possible to assess variables over time (e.g., test/re-test reliability, predictive validity). Our study did not employ formal diagnostic assessments of psychopathology (e.g., structured clinical interview) or collect detailed family (e.g., quality of interpersonal relationships), legal (e.g., incarceration), medical (e.g., hepatitis C) or psychiatric (e.g., treatment) histories, and no independent assessment of patients' pain (e.g., MRI) or substance use status (e.g., urinalysis) was conducted. A comprehensive DSM-IV-TR³⁸ multi-axial diagnosis, for example, might yield important data regarding potentially important mediators or moderators of the relationship between dispositional optimism and pain in this patient population. Future research on the association between pain and dispositional optimism might benefit from including (a) qualitative interviews to assess patients' subjective experiences of this putative relationship and (b) data on physiologic mechanisms and chemical messengers that have been found to play a role in the modulation of pain perception and mood, including serotonin and endogenous opioids.³⁹⁻⁴¹

Despite these limitations, this study represents an initial examination of the clinical correlates of dispositional optimism in opioid dependent patients enrolled in MMT. In the multivariable model, higher levels of dispositional optimism were associated with lower levels of depression, screened symptoms of PTSD, personality disorder criteria, and pain-related emotional strain. In comparison to those with no prior history of chronic pain, MMT patients with current or lifetime histories of chronic pain exhibited significantly lower levels of dispositional optimism. According to the reformulated learned helplessness theory, individuals vary in the manner in which they routinely interpret or explain events in their lives.⁴² Optimistic explanations for negative events (e.g., pain flare up) tend to be external, unstable, and specific (e.g., "I'm going through a rough patch right now. I have skills that will help me get through this. This too will pass"), whereas pessimistic explanations tend to be internal, stable, and global (e.g., "There is no point denying it, this is awful. My pain will never get better. What is wrong with me?"). Recently, the U.S. military began an army-wide initiative to foster "comprehensive soldier fitness," an approach which, in part, trains soldiers to adopt explanatory styles that are associated with dispositional optimism.⁴³ Our findings suggest that research on similar interventions that specifically target the accentuation of dispositional optimism in MMT patients is warranted.

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Table 1

Descriptive statistics for study variables.

Variable	M	S.D.	α
LOT-R Total Score	12.96	4.53	0.76
LOT-R Items			
Expecting the best in uncertain times	2.33	1.09	N/A
Expecting things to go wrong ^a	1.73	1.18	N/A
Optimistic about one's future	2.35	1.09	N/A
Hardly ever expecting things to go one's way ^a	2.09	1.17	N/A
Rarely counting on good things happening ^a	2.03	1.11	N/A
Expecting more good than bad things to happen	2.43	1.09	N/A
BSI-18			
Anxiety	57.83	11.60	0.87
Depression	58.24	10.89	0.89
Somatization	58.64	10.61	0.80
BASIS-24			
Depression	1.65	0.92	0.86
Interpersonal Relations	1.38	0.78	0.72
Self-Harm	0.20	0.58	0.86 ^b
Emotional Lability	1.85	1.01	0.76
Psychotic Symptoms	0.58	0.74	0.70
Substance Abuse	1.04	0.95	0.77
Trauma			
LEC Total	4.82	2.61	0.69
PC-PTSD	1.55	1.60	0.84
IPDS	3.93	2.77	0.78
Pain			
Current Pain	4.05	3.19	N/A
Emotional Strain	5.81	2.95	N/A
MMT Characteristics			
Methadone Dose	90.46	28.31	N/A
Months of MMT	46.72	54.54	N/A
Number of MMT Episodes	2.10	1.70	N/A

M = Mean; S.D. = Standard deviation; LOT-R = Life Orientation Test-Revised; BSI-18 = Brief Symptoms Inventory-18; BASIS-24 = Behavior and Symptom Identification Scale-24; LEC = Life Events Checklist; PC-PTSD = Primary Care Post-Traumatic Stress Disorder Screen; IPDS = Iowa Personality Disorder Screen; MMT = Methadone Maintenance Treatment.

^aReverse-coded.

^bThis subscale contains two items; therefore we report their Pearson Product-Moment Correlation ($r = 0.76$) in addition to their coefficient alpha.

Table 2

Regressing optimism on study variables.

	β	t	P	Zero-Order	Partial	Semi-Partial
BSI-18						
Anxiety	0.21	1.98	0.049	-0.39 ^{**}	0.16	0.13
Depression	-0.66	-6.41	<0.001	-0.60 ^{**}	-0.47 ^{**}	-0.42 ^{**}
Somatization	-0.18	-2.13	0.035	-0.41 [*]	-0.18	-0.14
BASIS-24						
Depression	-0.44	-4.50	<0.001	-0.58 ^{**}	-0.35 ^{**}	-0.30 [*]
Interpersonal Relations	-0.12	-1.49	0.138	-0.38 [*]	-0.13	-0.10
Self-Harm	-0.09	-1.16	0.250	-0.27 [*]	-0.10	-0.08
Emotional Lability	-0.20	-2.11	0.037	-0.47 ^{**}	-0.18	-0.14
Psychotic Symptoms	0.17	1.98	0.050	-0.21	0.17	0.13
Substance Abuse	0.02	0.20	0.840	-0.15	0.02	0.01
Trauma						
LEC Total	-0.17	-2.12	0.036	-0.27 [*]	-0.17	-0.16
PC-PTSD	-0.29	-3.54	0.001	-0.35 [*]	-0.28 [*]	-0.27 [*]
IPDS	-0.35	-4.42	<0.001	-0.35 ^{**}	N/A	N/A
Pain						
Current Pain	0.03	0.19	0.849	-0.18	0.02	0.02
Emotional Strain	-0.30	-2.31	0.023	-0.28 [*]	-0.22 [*]	-0.22 [*]
MMT Characteristics ^a						
Methadone Dose	-0.19	-2.12	0.037	-0.19 [*]	-0.19	-0.19
Months of MMT	-0.02	-0.21	0.835	0.01	-0.02	-0.02
Number of MMT Episodes	-0.04	-0.47	0.641	-0.04	-0.04	-0.04

BSI-18 = Brief Symptoms Inventory-18; BASIS-24 = Behavior and Symptom Identification Scale-24; LEC = Life Events Checklist; PC-PTSD = Primary Care Post-Traumatic Stress Disorder Screen; IPDS = Iowa Personality Disorder Screen; MMT = Methadone maintenance treatment.

^aSince the multivariable model for MMT characteristics was not significant, partial and semi-partial correlations should not be interpreted.

* $P < 0.05$.

** $P < 0.01$. Correlations that reached statistical significance are bolded.