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The Relationship between General Causality Orientation and Treatment Outcome among Marijuana-Dependent Adults

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Abstract

General causality orientations are motivational styles that are indicative of a person's belief about personal change and their motivation to change. The purpose of the current study was to investigate whether causality orientations were associated with marijuana treatment outcomes in a sample of marijuana-dependent individuals. A total of 74 participants (66% male) were recruited from the Seattle, Washington area and randomly assigned to receive a combination of motivational enhancement and cognitive behavioral therapy or the combination treatment plus additional "check-up" sessions. Follow-up assessments evaluated frequency of use, use-related problems, and marijuana use disorder symptoms through 9 months. Causality orientations were relatively stable over time. Posttreatment Autonomy orientations were associated with lower frequency of use and Controlled orientations were associated with a reduction in use, problems, and marijuana use disorder symptoms. Autonomy and Controlled orientations were associated with readiness to change. Results suggest that both autonomous and controlled orientations have implications for response to treatment; perhaps for different reasons. Causality orientations may be a promising avenue of research to predict treatment response and outcome.

Keywords

general causality orientation; marijuana treatment; motivation

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Contributors

DW, RR, and RS conceived, designed, and implemented the parent trial. CB and KB conceived the aims of this paper. CB wrote the initial draft of the manuscript, and KB performed statistical analyses. All authors discussed the results and contributed to and have approved the final manuscript.

Conflict of interest

No conflict declared.

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1. Introduction

Self-determination theory is a meta-theory that describes the relationships between internal and external factors on intrinsic and extrinsic motivation (Deci & Ryan, 2011). Causality Orientations Theory, a component of self-determination theory, describes an individual's pattern of motivation and behavior. General causality orientations are relatively enduring, trait-like characteristics reflective of an individual's belief about their ability to promote or cause change (Deci & Ryan, 1985). These beliefs regarding locus of causality correspond with an individual's motivational pattern. Three distinct orientations have been evaluated: *Autonomy*, associated with an internal locus of causality and intrinsic motivation; *Controlled*, related with an external locus of causality and extrinsic motivation; and *Impersonal*, associated with a lack of control over causality leading to a lack of motivation.

Previous studies report that causality orientations are related to treatment outcomes. For example, Autonomy orientations were associated with lower rates of depression among individuals in a brief depression treatment (Zuroff et al., 2007) and higher attendance rates and more sustained weight loss among individuals enrolled in a long-term weight loss program (Williams, Grow, Freedman, Ryan, & Deci, 1996). The majority of research has focused on the superiority of Autonomy orientations in the promotion of behavior change. However, individuals with Controlled orientations may increasingly benefit from some types of treatment modalities (Neighbors, Lewis, Bergstrom, & Larimer, 2006). Indeed, individuals with Controlled orientations are concerned with rules, perceptions of social norms, and other external factors. Thus, treatments that incorporate these principles may be especially beneficial to such individuals.

The substance-using population may provide a valuable population from which to study causality orientations (Smith, 2011). Recent Substance Abuse and Mental Health Services Administration (SAMHSA) data indicates that the most prevalent illicit drug of use is marijuana, with 51.2% of individuals aged 18-25 reporting lifetime use and 19.1% reporting current use (SAMHSA, 2014). Although now legal for recreational use in several states, marijuana use leads to negative consequences for some individuals. According to reviews of the literature and recent epidemiological studies, approximately 5-9% of marijuana users and 25-50% of daily users meet diagnostic criteria for marijuana abuse or dependence (Hall & Degenhardt, 2010; SAMHSA, 2014; Volkow, Baler, Compton, & Weiss, 2014). Additionally, rates of treatment-seeking for marijuana use have increased in the past decade (UNODC, 2014). Thus, there is a need to gain information on individual characteristics that may promote substance use treatment success.

Previous research has highlighted the importance of motivation in behavior change among substance users (DiClemente & Prochaska, 1998; W. R. Miller & Tonigan, 1996; Ryan, Plant, & O'Malley, 1995; Zeldman, Ryan, & Fiscella, 2004). Given the predominance of literature suggesting the importance of motivation for treatment success, many motivation-based treatments have been developed, most notably those based on motivational interviewing principles (Miller & Rollnick, 2012). Several researchers have noted the theoretical links between motivation-based treatments, such as motivational interviewing, with facets of self-determination theory (Markland & Ryan, 2005; Neighbors, Walker,

Roffman, Mbilinyi, & Edelson, 2008). Namely, motivational interviewing may provide individuals an opportunity to find and enhance their own motivation through an autonomy-supportive environment (Neighbors et al., 2008). Motivational enhancement therapy (MET) utilizes motivational interviewing plus personalized feedback to promote motivation for behavioral change. Although motivational interviewing was primarily thought to enhance Autonomous orientations, the personalized feedback utilized in MET typically provides information on normative use and may harness social expectations in those with Controlled orientations.

Several studies have examined causality orientations among alcohol-using college students. Among cross-sectional samples, a high level of Controlled orientation and low levels of Autonomy have been associated with rates of alcohol use and related problems (Neighbors, Larimer, Markman Geisner, & Knee, 2004; Neighbors, Walker, & Larimer, 2003), suggesting these individuals may be more at risk for developing long-standing problematic use patterns. A longitudinal evaluation of normative feedback among individuals with varying levels of Controlled orientations revealed significantly reduced alcohol use among those who received feedback as compared to those who did not (Neighbors et al., 2006). Results suggest that individuals with high Controlled orientations may be at higher risk for problematic use patterns and may be differentially impacted by feedback. However, findings from these studies utilizing college students with little psychopathology may not generalize to clinical populations who are initiating an attempt at changing substance use behavior. In addition, little attention has been paid to the Impersonal orientation which measures a tendency to be amotivated towards change due to a belief that one is not capable of causing change. There is reason to believe that such an orientation may work against treatment participation and outcomes.

The current study utilizes data from a randomized, controlled trial for marijuana-dependent adults involving MET and will assess the relationship between causality orientation and treatment outcomes. The following hypotheses will be evaluated:

- (1) Autonomy and Controlled orientations will be associated with improved treatment outcomes, including reductions in days of marijuana use, marijuana-related problems, and marijuana use disorder symptoms.
- (2) Impersonal orientations will be associated with poorer treatment outcomes.

2. Method

2.1 Overview of Parent Clinical Trial

The current investigation is a secondary analysis of data collected as part of a randomized controlled trial of interventions for marijuana dependent adults (Walker, Stephens, Towe, Baner, & Roffman, 2015). The study was designed to test the incremental utility of Maintenance Check-Ups (MCU) following a 9-session MET/CBT base treatment. All study procedures were approved by the institutional review boards at the University of Washington and Virginia Tech. Participants were randomized to one of two conditions: The MCU condition ($n = 37$) included a 9-session MET/CBT base treatment plus two additional maintenance check-up sessions. The No-Check-Up condition (NCU; $n = 37$) consisted of the

9-session base treatment alone. Treatment outcomes were assessed 3 and 9 months after intake.

2.2 Participants

A total of 224 participants were screened for eligibility, 75 of whom met final eligibility criteria. Eligibility criteria included: being dependent on marijuana, aged 18 or above, not dependent on other drugs or alcohol, not currently enrolled in substance abuse treatment, no evidence of psychosis, and lived within 60 miles of the research office. Participants were deemed ineligible ($n = 98$) for the study due to: not being dependent on marijuana ($n = 45$), being dependent on substances other than marijuana ($n = 38$), lacking residential stability or access to transportation ($n = 19$), living with someone already enrolled in the project ($n = 2$), evidencing current psychosis ($n = 1$), and being a minor ($n = 1$). An additional 51 participants met eligibility criteria but declined to participate. Another participant was derandomized from the study due to a clerical error, resulting in a final sample size of 74. The sample was primarily male (66.20%). Participants' reported racial backgrounds were 77.8% White or Caucasian, 11.1% Black or African American, 8.3% multiracial, 1.4% Alaskan Native or Eskimo, and 1.4% Other. The mean age was 37.73 ($SD = 12.08$). The majority of participants were currently unmarried, with 46% who had never married and 23% who were either divorced or separated. Participants averaged 14.19 years of education ($SD=2.63$).

2.3 Measures

2.3.1 General Causality Orientation Scale—Causality orientations were measured at baseline and 3-months using the General Causality Orientations Scale (GCOS), a self-report questionnaire that assesses motivational orientation using 12 vignettes (Deci & Ryan, 1985). Participants imagined themselves in the situation, and then considered three different responses. For example, participants were asked about their initial thoughts and feelings if they received test results that showed poor performance. Responses included: “ ‘I can't do anything right,’ and feel sad” (*impersonal*); “ ‘I wonder how it is I did so poorly,’ and feel disappointed” (*autonomous*); “ ‘That stupid test doesn't show anything,’ and feel angry” (*controlled*). Each response was rated on a Likert scale ranging from 1 (Very unlikely) to 7 (Very likely). Items were summed to obtain three subscales. The measure yielded acceptable internal consistency for the Autonomy (Baseline $\alpha = .63$; 3-month $\alpha = .75$) and Controlled (Baseline $\alpha = .62$; 3-month $\alpha = .63$) orientation scales and good reliability for the Impersonal scale (Baseline $\alpha = .82$; 3-month $\alpha = .83$).

2.3.2 Timeline Follow-Back—The Timeline Follow-Back (TLFB), a semi-structured interview that utilizes key dates as “anchors” for recalling substance use, was administered at baseline and each follow-up to assess for marijuana use frequency (Sobell & Sobell, 1992). The TLFB has good to excellent reliability and validity for calculating use frequency, and is consistent with urine results (Rohsenow, 2008). Frequency of marijuana use was calculated by taking the percent of marijuana use of the 90 days preceding each assessment. Urine screens were used to examine the accuracy of self-reported marijuana use. Agreement between self-reported abstinence and urine assays for THC was 98.65%, 85.25%, and 94.92% at baseline, 3-months, and 9-months, respectively. All of the discrepancies at 3-

months were due to self-reported marijuana use when assay results were negative. These data support the validity of self-reported marijuana use.

2.3.3 Marijuana Problems Scale—The Marijuana Problems Scale (MPS) was administered at baseline and each subsequent follow-up session to assess problems associated with marijuana use (Stephens, Roffman, & Curtin, 2000). The MPS assesses 19 negative consequences over the last 90 days on a three-point Likert scale: 0 (not a marijuana problem), 1 (minor problem), and 2 (major problem). Items endorsed with a 1 or 2 are summed to form a total score. The MPS exhibited excellent internal consistency (Baseline $\alpha = .87$; 3-month $\alpha = .94$; 9-month $\alpha = .94$).

2.3.4 Structured Clinical Interview for DSM-IV—The Structured Clinical Interview for DSM-IV (SCID-I; First, Spitzer, Gibbon, & Williams, 1996), a semi-structured interview administered by a clinically-trained interviewer, was administered at baseline and all follow-ups to assess for DSM-IV marijuana abuse and dependence symptoms. Eleven use disorder symptoms were coded either 1 (symptom not present), 2 (symptom present below diagnostic threshold), or 3 (symptom present above threshold). Items coded 3 were totaled to determine the number of marijuana use disorder symptoms. The SCID-I has good reliability for measuring substance abuse and dependence (Rohsenow, 2008).

2.3.5 Stage of Change—The Stage of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996) was adapted from studies of alcohol users and administered at baseline and 3 months to assess for the individual's readiness to change their marijuana use. SOCRATES presents a series of 19 statements surrounding their substance use for which participants rate on a scale of 1 (strongly disagree) to 5 (strongly agree). Higher scores are associated with a greater readiness to change. For the purposes of this study, the Taking Steps scale was utilized for exploratory analyses (Baseline $\alpha = .98$; 3-month $\alpha = .87$).

2.4 Procedures

Participants were recruited from the Seattle, Washington area via print and radio advertisements offering treatment for those who wanted help stopping their marijuana use. After initial phone screening, interested participants were invited for a baseline assessment to determine final eligibility. Participants provided written consent and were administered semi-structured interviews and self-report measures. Interested participants meeting eligibility criteria were randomized to condition. All participants received 9 weekly CBT/MET sessions over three months designed to enhance motivation to change and teach skills to enact that change. All participants also had access to additional, optional CBT sessions after the base treatment as needed. Participants in the MCU condition, but not the NCU condition, were scheduled for individual check-up sessions 1 and 3 months following the end of the base treatments. Check-up sessions used an MET framework including a feedback report showing progress in change of marijuana use and related consequences since baseline and were designed to reinforce and boost the individual's motivation for continued behavior change. Participants in both conditions completed follow-up assessment measures at 3-months (end of base treatment) and 9-months (6 months after base treatment).

3. Results

3.1 Preliminary Analyses

Two participants were excluded at baseline due to incomplete GCOS data, resulting in an effective sample size of 72 for analyses using GCOS scales at baseline. Of the original sample of 74 participants, 62 (84%) participants attended the follow-up and had complete 3-month GCOS data, and 63 (85%) participants attended the 9-month assessment. There were no differences between those who had missing data at follow-up and those who did not on sociodemographic and marijuana use related variables; nor were there significant differences at baseline between conditions on the GCOS scales or any other baseline variables.

At baseline, participants used marijuana on 88% of the previous 90 days, reported 7.4 marijuana use disorder symptoms, and 10.1 problems related to marijuana use (see Table 1). Overall outcomes from the project revealed a significant decrease over time in days of use, marijuana-related problems, and marijuana use disorder symptoms among individuals in both conditions (see Table 1). Participants in the MCU condition reported greater abstinence rates and overall fewer days of use at the 3-month follow-up, but no differences were found at the 9-month follow-up (see Walker et al., 2015). No significant main effects of condition or time were found for any of the GCOS scales, but there was a significant interaction between time and condition for Autonomy such that MCU group demonstrated a significant greater increase in posttreatment Autonomy, $F(1, 58) = 4.26, p = .04$. We did not expect GCOS orientations to differentially affect outcomes as a function of treatment conditions, thus data were collapsed across conditions for the purpose of the present analyses. Correlations between corresponding baseline and 3-month follow-up motivational orientation scales revealed that Autonomy orientations were moderately stable ($r(58) = .55, p < .01$), while high stability correlations were found for Controlled ($r(58) = .75, p < .01$) and Impersonal ($r(58) = .86, p < .01$) orientations.

3.2 Relationships Between GCOS and Treatment Outcomes

Bivariate correlations examined relationships between GCOS scales and concurrent marijuana use, problems, and use disorder symptoms at baseline and 3-months. No significant relationships were found among concurrently measured variables. Partial correlations examined the prospective associations between GCOS scales and change in marijuana use, problems, and use disorder symptoms (see Table 2). Analyses were conducted by correlating GCOS scales, at baseline and 3-months, with outcome variables measured at later time points and controlling for outcome variables measured at the concurrent time point. Generally, GCOS scales measured at baseline were not significantly associated with change in treatment outcomes at 3 or 9 months, with the exception of baseline Autonomy, which was related to reductions in use disorder symptoms at 9-months, and baseline Impersonal, which was related to an increase in use disorder symptoms at 3-months.

GCOS scales measured at 3-months (post-intervention) were moderately associated with prospective outcomes. Higher Autonomy scale scores at 3-months were related to significant decreases in frequency of use at 9-months. The Impersonal was associated with an increase

in marijuana-related problems, the relationship did not quite reach conventional levels of statistical significance. The posttreatment Controlled orientation was significantly related to reduced use frequency, use disorder symptoms, and use-related problems.

3.3 Relationships Between GCOS and Motivational Factors

In order to determine the relationship between causality orientations and other motivational factors, exploratory analyses examined bivariate relationships between causality orientations and readiness to change (see Table 1 for descriptive statistics). At baseline, only the Controlled orientation was associated with Taking Steps ($r(69) = .38; p < .01$). At the 3-month timepoint, Autonomy was positively associated with Taking Steps ($r(58) = .30; p = .02$).

4. Discussion and Conclusions

Results indicated that posttreatment general causality orientations were related to outcomes at later follow-up. Autonomy orientation was associated with a decrease in use, while Impersonal orientation was near significant in relating to an increase in problems. Controlled orientations were associated with a reduction in use, use disorder symptoms, and problems.

Autonomy orientation at baseline related to a reduction in use disorder symptoms while Impersonal orientation was related to an increase in use disorder symptoms, but otherwise baseline scores were not robustly associated with change that occurred during the treatment period. Given that GCOS scores generally did not change during the course of base treatment and were not associated with concurrently measured outcomes at 3 months, initial orientations appeared unrelated to change in marijuana use and consequences.

On the other hand, posttreatment Autonomy and Controlled orientations were associated with improved outcomes at 9-months. Conversely, posttreatment Impersonal orientations were associated with greater problems at follow-up. Controlled orientation has been associated with better treatment outcome in previous studies, possibly because of sensitivity to normative feedback (Neighbors et al., 2006). Normative feedback may have enhanced the relationship of Controlled orientations to future use through increased self-monitoring due to sensitivity to social pressure and norms. The expectation of follow-up assessments and check-ins may also work to the advantage of such individuals. Knowing they will need to report about their use over time may have increased motivation to limit use. This finding could be useful clinically to promote treatment adherence and boost treatment outcomes. The differential findings for baseline orientations versus post-intervention orientations suggests that going through the process of trying to make a change in behavior makes the orientations more relevant and influential. These differential findings provide support for an increased focus on beliefs about causality at the end of treatment and throughout the maintenance phase.

The relative stability in orientations over time supports the presumption that causality orientations are trait-like measures reflective of an individual's underlying characteristics and beliefs. Change in Autonomy orientation over time differed by condition, increasing for the check-up condition posttreatment. Differential change in orientation was unexpected

since the treatment conditions were identical until 4 months when the first “check-up” occurred, and suggest that expectations for future treatment may have influenced intrinsic motivation. These changes in Autonomy orientation mirrored the overall effect of the condition on cannabis use at 3-months (Walker et al., 2015), Further suggesting that the anticipation of MCUs may have positively affected participants sense of efficacy for change.

Results indicate that motivational orientations are related to another measure of motivation and treatment change, readiness to change (DiClemente & Prochaska, 1998). The relationship between Autonomy and Taking Steps at the 3-month timepoint suggests that those with Autonomy orientations who are intrinsically motivated and believe that change is in their control may be more likely to move more quickly to action phases. Additionally, the feedback given in therapy and the expectation of future meetings may help individuals in the Controlled orientation draw from their extrinsic motivation and move through stages of change to more action-oriented steps. Conversely, the lack of relationships with Taking Steps suggests that those with Impersonal orientations may be stuck in precontemplation stage due to the belief that change is not in their control. Future research should examine the relationship between these constructs further in order to further describe causality orientations and their role in treatment seeking and subsequent treatment outcomes.

The current study expands upon the previous literature in several ways. First, all three causality orientations were included in the analyses. To date, most studies have focused on the Controlled and Autonomous orientations and have not included information or analyses of the Impersonal orientation. For example, although previous research has provided some support for the role of low Autonomous and high Controlled orientations in development of substance use disorders (Neighbors et al., 2004, 2003) or treatment outcomes of individuals with varying levels of Controlled orientations (Neighbors et al., 2006), these studies have not included analyses of all three orientations. Secondly, the longitudinal nature of the study allowed for examination of change in orientations over time as a result of treatment – which has not been previously examined in the literature to our knowledge. Results provided support for the impact of Motivational Enhancement Therapy and personalized feedback on individuals with Controlled orientations, and illustrate the relatively enduring nature of causality orientations. Additionally, research into causality orientations can shed light on components of therapy that may be more impactful for certain individuals.

Several limitations should be noted. Since participants were treatment-seeking, it is unlikely that our sample represented the full range of causality orientations. Additionally, given the relative lack of change in causality orientations, it is possible that findings may be due to some other, unmeasured factor such as social support or self-efficacy. Another limitation of the study is the reliance on retrospective self-report of marijuana use. Although biological assays were used to assess the accuracy of these reports, assessment of marijuana use via urine screen is limited (Moeller, Lee, & Kissack, 2008). Assessment methods less reliant on retrospective self-report, such as ecological momentary assessment, would likely yield more accurate reports of marijuana use. Power to detect significant relationships may have been limited due to the relatively small sample size. It is possible that, with a larger sample size, changes in causality orientations – particularly the Autonomy orientation – may have been observed. Future research should seek to replicate findings in other, larger clinical samples

using designs that systematically assess the effects of normative feedback and other potential mediators of change.

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Highlights

- General causality orientations classify motivational styles into autonomy, controlled, and impersonal orientations
- Outcomes from a marijuana treatment trial were examined according to causality orientation
- Causality orientations at posttreatment were associated with differential treatment outcomes

Table 1**Means and Standard Deviations of Marijuana Use Variables**

	Baseline (n = 72)	3-Months (n = 62)	9-Months (n = 63)
Marijuana Use Variables			
Proportion of Days Marijuana Used	.88 (.17)	.39 (.36)**	.46 (.37)**
Use Disorder Symptoms	7.43 (1.62)	4.05 (2.85)**	4.27 (3.39)**
Marijuana Problems	10.10 (3.93)	5.58 (5.06)**	5.98 (5.24)**
Readiness to Change	26.84 (7.72)	33.71 (5.92)**	
GCOS Scales			
Autonomy	68.81 (7.42)	68.90 (8.36)	
Controlled	51.65 (8.67)	50.94 (9.39)	
Impersonal	38.90 (12.85)	38.35 (12.12)	

Note: Asterisks represent significant change in variable from baseline to follow-up

**
p<.01,

*
p<.05

Table 2

Partial Correlations among GCOS Scales and Treatment Outcome Variables

	3 Months (<i>df</i> =59)			9 Months (<i>df</i> =56)		
	Frequency	Problems	Symptoms	Frequency	Problems	Symptoms
Autonomy - Baseline	0.05	-0.08	-0.16	-0.12	-0.16	-0.26*
Controlled - Baseline	0.17	0.15	0.10	-0.12	-0.11	-0.13
Impersonal - Baseline	0.12	0.15	0.25*	-0.03	0.18	0.13
Autonomy - 3 months				-0.26*	-0.11	-0.14
Controlled - 3 months				-0.30*	-0.28*	-0.31*
Impersonal - 3 months				-0.05	0.25	0.07

**
p<.01,*
p<.05