Published in final edited form as:

Am J Drug Alcohol Abuse. 2011 January ; 37(1): 48–53. doi:10.3109/00952990.2010.535583.

Substance use and motivation: a longitudinal perspective

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Abstract

Background—Motivation to change substance use behavior is an important component of the recovery process that has usually been studied at entry into treatment. Less studied, but equally important, is the measurement of motivation over time and the role motivation plays in subsequent substance use.

Objectives—The present study sought to examine longitudinal motivation toward sobriety among residents of sober living houses.

Methods—Sober living residents ($n = 167$) were followed at 6-month intervals over an 18-month period and assessed for motivation and substance use outcomes at each study interview. Motivation was measured using the costs and benefits subscales of the Alcohol and Drug Consequences Questionnaire (ADCQ) and substance use outcomes included the Addiction Severity Index (ASI) alcohol scale, ASI drug scale, and peak density of substance use (number of days of most use in a month).

Results—Participants reported higher benefits than costs of sobriety or cutting down substance use at every study time point. Using lagged generalized estimating equation models, the ADCQ costs predicted increased severity for alcohol, drugs, and peak density, whereas the benefits subscale predicted decreased drug and peak density.

Conclusion—Longitudinal measurement of motivation can be a useful clinical tool to understand later substance use problems.

Scientific significance—Given the mixed findings from prior studies on the effects of baseline motivation, a shift toward examining longitudinal measures of motivation at proximal and temporal intervals is indicated.

Keywords

motivation; recovery; sober living; alcohol; drug

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Contributors Rachael Korcha wrote the first draft of the paper, conducted statistical analyses, interpreted results and developed tables. Dr. Polcin was the principal investigator for the study and responsible for the study design and development of data collection procedures. He participated in writing, interpretation of results and contributed input to all sections of the paper. Drs. Bond and Lapp provided statistical expertise and assisted in the writing of the manuscript. Dr. Galloway was co-investigator for the study and provided development of study procedures and consultation on the manuscript.

INTRODUCTION

The role of internal motivation in addiction treatment has been studied extensively and a strong conceptualization of motivational processes behind behavior change is emerging (1). Understanding the key elements that promote motivation to change and, ultimately, support sobriety is a common goal for clinicians and researchers alike. The transtheoretical model (TTM) (2–4) incorporates stages of change to describe intentional behavior modification. There are five stages of change: precontemplation (little or no interest to modify behavior), contemplation (awareness of a problem and consideration to take action), preparation (plan and commit to making a change), action (commit to the change and take steps to execute it), and maintenance (maintaining a new behavior and working to prevent relapse).

Within the framework of the TTM is the evaluation of the pros and cons of changing an undesired behavior that is known as decisional balance. Decisional balance was first proposed by Janis and Mann (5) in their conflict theory of rational decisions. They postulated four major categories of consequences with each factor measured by gains and losses for oneself and others and approval or disapproval by oneself or other people. The original work on decisional balance attempted to address all eight factors (four factors with gains and losses for each factor); however, predictive utility has been demonstrated in the TTM using only two orthogonal factors, specifically the pros and cons of the behavior (6–8).

Motivation to change behavior using stages of change and decisional balance has been examined in connection with a wide range of addictive behaviors. These behaviors include smoking, obesity, drug abuse, and alcohol abuse (1,7,9–11). However, longitudinal study of the motivation to change, especially among the drug and alcohol abusing populations, is lacking (12,13). Most prospective studies have focused on a single baseline measurement of motivation to predict abstinence at later time points. This static measurement of motivation has been criticized because it lacks understanding of the proximal and temporal factors relating to the mechanisms of change (14). In addition to the lack of temporal measurement, these studies have focused solely on individuals entering formal treatment.

The primary goal of the present article is to understand the longitudinal relationship of motivation, substance use, and substance use problem severity among persons entering residency into a sober living facility. To date, no studies to the authors' knowledge have examined repeated measurement of motivation toward sobriety and its relationship to substance use outcomes and problems. Using the perceived costs and the benefits of sobriety or cutting down substance use as a measure of motivation, we hypothesize that sober living house (SLH) research participants will perceive fewer costs of sobriety or costs of cutting down at baseline but that the importance of costs will increase as the long-term difficulty of achieving and maintaining abstinence increases over time. We anticipate that the perception of higher costs will reflect an increase in use and problems with drugs and alcohol and that participants will be motivated by the benefits of sobriety or benefits of cutting down derived from a clean and sober lifestyle. The perceived benefits will be associated with a decrease in alcohol and drug use and decreases in problems with alcohol and drugs.

METHOD

Participants

Study participants for the present article consisted of 167 persons entering 20 SLHs in the San Francisco Bay Area and Central California from March 2004 to June 2006. SLHs are living facilities designed to help residents maintain a clean and sober lifestyle and, although no formal treatment is provided, regular attendance to several 12-step meetings per week is required of all residents. Residents are admitted to the SLH provided they have made some

commitment to sobriety, usually measured by two or more weeks of sobriety. Once admitted into the SLH, residents may stay for as long as they like provided they obey house rules and pay rent. For a complete description of SLHs, please see Polcin and Henderson (15) and Polcin (16).

The sample consisted of 167 participants completing all study interviews and 78% were men, 62% were white, 19% African American, 9% Latino, and 9% other race. The average age was 39 (SD = 10) and half had never been married. The majority (80%) had a high school diploma or had received a general education diploma. Referral sources included self, family, and friends (41%), from the legal system (27%), 13% from inpatient drug and alcohol treatment programs, and 19% entered the SLH from another referral source. Average length of stay at the sober living facility was 211 (SD = 184, range = 1– 545) days with a median SLH residency of 180 days.

DSM-IV diagnostic criteria for substance abuse disorders were ascertained using the DSM-IV checklist (17). Half of the present sample met DSM-IV checklist criteria for dependence on alcohol, 45% for methamphetamines, and 30% were cocaine dependent. As a group, 11% were dependent on alcohol alone, 27% on one drug (excluding alcohol), 48% had poly-substance dependence, and 14% did not meet DSM-IV dependence criteria for any substance in the past 12 months.

Measures

The Alcohol and Drug Consequences Questionnaire (18)—The Alcohol and Drug Consequences Questionnaire (ADCQ) was developed as part of a treatment evaluation for a brief cognitive-behavioral intervention for alcohol and drug abusers. The instrument yields a two-factor solution of the perceived costs and the benefits of changing substance use with excellent reliabilities (18,19). There are 29 items with responses given on a 6-point Likert scale ranging from 0 to 5. No concern or inapplicability (“Probably will not happen to me”) was the lowest response selection with other responses scored from 1 (“not important”) to 5 (“extremely important”). There are 15 questions relating to the perceived costs, or cons, of sobriety such as, “I will have difficulty relaxing” and “I will feel frustrated and anxious,” which participants rate on a 0–5 scale of importance. The 14 perceived benefits items reflect the positive aspects of sobriety or cutting down (e.g., “I will have fewer problems with my family,” “I will have more money to do other things with”). Costs and benefits subscale scores are created by summing each score and dividing by the number of items for that subscale (15 for the costs and 14 for the benefits). Because the instrument is specific to persons entering recovery treatment, ADCQ questions begin with the preface “If I stop or cut down.” Because many SLH respondents were not using drugs or alcohol upon entry into the house, ADCQ questions were asked with an additional preface of “If I keep my sobriety.” Questions were verbally administered by the interviewer with the preface of choice (e.g., “If I stop or cut down, I will feel more active and alert” or “If I keep my sobriety, I will feel more active and alert”) for each of the 29 items. Because the ADCQ was administered with one of two prefaces, Cronbach’s alphas were calculated to test internal reliability for these two groups. Both constructs of costs and benefits were found to be internally reliable and consistent for both preface groups. Excellent baseline reliabilities for the costs (.88 for those choosing to keep sobriety and .89 for choosing to stop or cut down) and very good reliabilities for the benefits (.84 for keeping sobriety and .73 for stop or cut down) were found in accordance with guidelines recommended by Cicchetti (20).

DSM-IV Checklist—DSM-IV checklist assesses alcohol and drug dependence in the past 12 months. Participants were asked about past year use of alcohol, amphetamines, marijuana, cocaine, hallucinogens, inhalants, opiates, PCP, and sedatives. If use was

reported in the past year, participants were asked about the seven DSM-IV dependence symptoms associated with that substance (21). Criteria for a dependence diagnosis is met if three of the seven items are endorsed. This instrument has demonstrated a high level of internal consistency and content validity for many substances including alcohol, marijuana, cocaine, and opioid use among substance abusers seeking treatment (22,23).

Six-Month Measure of Alcohol and Drug Use—This measure was taken from Gerstein et al. (24). Participants were asked how many months they used alcohol or drugs over the past 6 months with peak density identifying the number of days of any substance use (i.e., any alcohol or drug) during the month of highest use over the past 6 months.

Addiction Severity Index Lite—The Addiction Severity Index (ASI) is a standardized, structured interview that assesses problem severity in several areas. The ASI measures a 30-day time period and provides composite scores between 0 and 1 for each problem area. The ASI has demonstrated excellent reliability and validity in numerous studies (25). The current study utilizes the ASI drug and ASI alcohol scales to assess problem severity of substance use.

Procedure

Potential study participants were invited by a trained research interviewer to take part in the study during the first week of admission to the SLH. Three hundred individuals agreed to participate in the study and completed a baseline interview. Few study exclusion criteria were implemented to permit a representative sample of the residents and refusal to participate in the study was very rare. Baseline interviews were conducted during the first week of residence and again at 6, 12, and 18 months after the baseline interview. Interviews required about 2 hours time and participants were paid \$30 for the baseline interview and \$50 for each of the follow-up interviews. All participants signed an informed consent to take part in the study and all were informed that their responses were confidential. The Public Health Institute's institutional review board approved study procedures and a federal certificate of confidentiality was obtained, adding further protection to confidentiality.

Because inclusion to the present study required completion of all study interviews, comparisons between participants completing all interviews to those not completing all four interviews ($n = 133$) revealed no significant differences in terms of demographic characteristics or substance use measures at baseline. However, those included in the analysis remained at the SLH an average of 60 days longer ($\bar{X} = 211$, $SD = 185$ days for completers; $\bar{X} = 134$, $SD = 119$ days for non-completers) with 28% still residing at the SLH at the 12-month interview compared to 10% of the non-completers.

ANALYSIS SOFTWARE

Cross-sectional means, standard errors, correlations, and repeated measures analyses were performed using SPSS software version 15 (26) and multivariate generalized estimating equation (GEE) models (27) utilized the “xtgee” function in Stata version 9 (28).

RESULTS

The perceived costs and benefits toward sobriety or cutting down showed little variation over the course of this 18-month study (Table 1). Relative to the benefits of maintaining or achieving sobriety, the mean perceived costs remained low with median scores for the costs subscale at .71 for baseline and .43, .36, and .36 for 6-, 12-, and 18-month follow-ups. Endorsement of the perceived benefits of keeping or maintaining sobriety was quite high. There was considerable range of subscale mean benefit scores but no participant rated all

benefit items as unimportant (i.e., a mean score of zero). Median scores for benefits toward sobriety were considerably higher than the costs with 4.5 at baseline and varying little at subsequent interviews (4.3, 4.4, and 4.4, respectively). A mean benefit score of 5, rating all benefit items as “very important” occurred among 22% of the group at baseline and similarly at follow-up (16% at 6 months, 17% at 12 months, and 21% at 18 months) but no participant had a perceived costs mean rating of 5 at any time period. Two multivariate repeated measure models to assess differences in costs and benefits scores at each interview were non-significant.

To understand the longitudinal relationship of costs and benefits to substance use and problem severity, Pearson correlations were calculated at each study interview (Table 2). Consistent with the hypothesized relationship of costs and benefits to outcome, there is distinct directionality between outcome measures and the costs (positive direction) and benefits (negative direction) subscales. The baseline costs of maintaining or changing substance use behavior were significantly associated with the values of ASI alcohol and ASI drug scores at baseline but only 6- and 12-month ASI alcohol scores were significantly correlated with baseline costs. The 6-month costs subscale was associated with outcomes at every interview except 12-month ASI drug and 18-month peak density. The 12-month and 18-month costs scores were significantly and positively associated to every outcome at concurrent and subsequent time points. Although the benefits mean scale score was associated with outcomes in the hypothesized direction (i.e., improved outcome with higher benefits), there were fewer significant correlations than were observed between the costs subscale and outcomes. Benefits subscale scores at baseline significantly correlated with the baseline measure of ASI drug but no other measures at baseline or follow-up. Six-month benefits scale scores were correlated with ASI alcohol and peak density at 6 and 12 months but none of the ASI drug scores were significant at the $p < .05$ level. Peak density at 12- and 18-month interviews was significantly correlated with the 12-month benefits subscale score. The 12-month benefits scale correlated with the 12-month ASI drug scores but not 18-month ASI drug scores.

Further examination of the longitudinal relationship of motivation to outcomes employed multivariate lagged GEE models (27) to determine if the costs and benefits subscales were predictive of substance use or alcohol and drug problem severity (Table 3). The association between costs and benefits subscales and outcomes were tested with the time-varying covariates of costs and benefits and the time-invariant variables of age, sex, race, education, and baseline outcome measure. Because many participants reported no substance use or problems with alcohol or drug use, particularly at the follow-up interviews, the ASI alcohol and ASI drug score distributions tended to skew toward zero. To minimize the skew of these distributions, the logged values of the ASI alcohol score and ASI drug score were utilized for the GEE statistical models (Table 3). Costs of maintaining or obtaining sobriety were predictive of an increase in ASI alcohol scores, ASI drug scores, and peak density ($p < .001$ for all), whereas benefits were predictive of a decrease in ASI drug scores and peak density ($p < .05$) but not predictive of change in ASI alcohol scores.

DISCUSSION

A unique aspect of this study was that motivation was repeatedly assessed in proximity to problem use and problem severity with drugs and alcohol. By assessing motivation at 6-month intervals over an 18-month period, we were able to establish motivation that was proximal to the time of increased or decreased use and problem severity. This is in contrast to other studies which examine motivation only at entry into a formal treatment program (18,29).

Of central interest to this study is the relationship of costs and benefits to later outcomes. The cross-sectional correlation matrices lent greater understanding to the multivariate GEE models and demonstrated how motivation related to substance use at given time points. Interestingly, baseline costs and benefits did not correlate with most follow-up outcomes for this study sample with the one exception of ASI alcohol scores. Longitudinal study of sober living environments find the greatest improvement at initial follow-up (30), however, motivation toward sobriety, particularly at the entry into the house, may be wrought with ambivalence and may not equate to improvement in severity. Correlations between motivation scales and outcomes were stronger at the follow-up interviews indicating that a structured environment with 12-step attendance may have helped these individuals focus their recovery efforts and have a greater degree of understanding of the costs and benefits of sobriety.

Consistent with study hypotheses, benefits for these SLH residents were associated with improved outcomes and costs with poorer outcomes although benefits did not significantly predict improved outcome for alcohol severity. The mean scale scores of the benefits were higher than costs at every study time period, which gives indication that these residents valued the positive aspects of maintaining and working toward sobriety. However, it was interesting that the costs of sobriety or cutting down had stronger prediction to poor outcomes. It is possible that benefits of sobriety for these participants reflect the rewards of substance abuse recovery but the hardship of changing substance use behavior, or costs, are potential roadblocks associated with remaining clean and sober. Even though the costs subscale scores were rated as less important than benefits at all time points (Table 1), the costs may be more salient for persons struggling with potential relapse.

The addition of the preface option in the ADCQ originated from the need to allow a point of reference for the respondent. Many who were keeping their sobriety needed a relevant manner in which to respond to the ADCQ. "If I stop or cut down" did not apply to those who were not actively using drugs or alcohol thereby making the questionnaire difficult to understand. Carey and colleagues (19) also encountered problems with comprehension of the ADCQ in a study of comorbid psychiatric patients and administered the questionnaire in a format differing from the original ADCQ. Like the present study, they also found high reliabilities (.85 for costs; .93 for benefits) and conducted test-retest intraclass correlations (.73 for costs and .89 for benefits).

Although this study had the advantage of longitudinal outcomes, there were limitations. Nearly all residents were invited to participate in the study within the first week of residency, however, because refusal to participate in the study was so rare, we did not collect data on the number of refusals. Similarly, few exclusion criteria were exercised and, although rare, we did not collect the information on those ill suited (e.g., could not read English) to participate in the study. To aid us in understanding the relationship of motivation to substance use outcomes over time, we limited our analyses to the subsample that completed all interviews, thereby limiting the generalizability of our results. All participants had problems with drugs or alcohol but we did not identify participants by their primary substance of choice (e.g., alcohol or drug). In addition, although we can see a clear relationship of motivation toward sobriety and decisional balance among our study sample we lacked additional measures of readiness to change to identify the stage of change, leaving concern that the costs and benefits of change would be predictive of some stages and not others.

Further studies assessing the impact of proximal measures of motivation on outcome is needed with different populations of substance users in different recovery settings.

Acknowledgments

This study was funded by a grant from the National Institute on Drug Abuse (R01 AA014030).

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TABLE 1

Mean scores for ADCQ costs and ADCQ benefits at each study time point ($n = 167$).

	Baseline		6-month		12-month		18-month	
	$\bar{X}(\text{se})$	Range	$\bar{X}(\text{se})$	Range	$\bar{X}(\text{se})$	Range	$\bar{X}(\text{se})$	Range
ADCQ costs	.93(.07)	0 – 4.5	.80(.07)	0 – 3.9	.79(.08)	0 – 4.1	.73(.07)	0 – 4.4
ADCQ benefits	4.33(.05)	1.8 – 5.0	3.97(.09)	.3 – 5.0	4.06(.08)	.3 – 4.7	4.06(.09)	.3 – 5.0

TABLE 2

Pearson correlation coefficients of ADCQ costs and benefits with substance use outcomes at concurrent and subsequent time points ($n = 167$).

	Baseline outcomes	6-month outcomes	12-month outcomes	18-month outcomes
Baseline costs				
ASI alcohol	.15*	.19*	.27***	.12
ASI drug	.28***	.03	.11	.11
Peak density	.14	.14	.13	.04
Baseline benefits				
ASI alcohol	-.06	-.10	-.04	-.07
ASI drug	-.32***	-.11	-.04	-.07
Peak density	.00	-.02	-.12	-.05
6-month costs				
ASI alcohol		.37***	.29***	.21**
ASI drug		.17*	.10	.16*
Peak density		.28***	.20*	.11
6-month benefits				
ASI alcohol		-.18*	-.16*	-.13
ASI drug		-.13	-.08	-.04
Peak density		.18*	-.17*	-.11
12-month costs				
ASI alcohol			.42***	.28***
ASI drug			.38***	.18*
Peak density			.36***	.23**
12-month benefits				
ASI alcohol			-.07	-.05
ASI drug			-.21**	-.15
Peak density			-.31***	-.23**
18-month costs				
ASI alcohol				.39***
ASI drug				.42***
Peak density				.42***
18-month benefits				
ASI alcohol				-.15*
ASI drug				-.27**
Peak density				-.25**

* $p < .05$,

** $p < .01$,

 $p < .001$.

TABLE 3

Lagged generalized estimating equation (GEE) models of costs and benefits predicting substance use outcomes ($n = 167$).

	Adjusted models ^a	
	Coefficient (se)	95% CI
Costs		
ASI alcohol	0.03 (0.01) ***	0.02, 0.04
ASI drug	0.02 (0.00) ***	0.01, 0.03
Peak density	2.61 (0.54) ***	1.55, 3.66
Benefits		
ASI alcohol	-0.01 (0.00)	-0.02, -0.00
ASI drug	-0.01 (0.00) *	-0.02, -0.00
Peak density	-1.17 (0.50) *	-2.14, -0.19

^a Models adjusted for age, sex, marital status, education, and baseline outcome measure.

* $p < .05$;

*** $p < .001$.