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## Recovery Capital as Prospective Predictor of Sustained Recovery, Life satisfaction and Stress among former poly-substance users

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### Abstract

Many recovering persons report quitting drugs because they are ‘sick and tired’ of the drug life. Recovery is the path to a better life but that path is often challenging and stressful. There has been little research on the millions of recovering persons in the US, and most research has focused on substance use outcomes rather than on broader functioning domains. This study builds on our previous cross-sectional findings that recovery capital (social supports, spirituality, religiousness, life meaning, and 12-step affiliation) enhances the ability to cope with stress and enhances life satisfaction. This study (1) Tests the hypothesis that higher levels of recovery capital prospectively predict sustained recovery, higher quality of life and lower stress one year later, and (2) Examines the differential effects of recovery capital on outcomes across the stages of recovery. Recovering persons (N = 312), mostly inner-city ethnic minority members whose primary substance had been crack or heroin, were interviewed twice at a one-year interval in New York City between April 2003 and April 2005. Participants were classified into one of four baseline recovery stages: under six months, 6- to 18-months, 18- to 36-months, and over three years. Multiple regression findings generally supported the central hypothesis and suggested that different domains of recovery capital were salient at different recovery stages. The study’s limitations are noted and implications of findings for clinical practice and for future research are discussed, including the need for a theoretical framework to elucidate the recovery process.

### Keywords

Recovery capital; Recovery; Quality of life; Stress; Social Support; Addiction

## Recovery Capital as Prospective Predictor of Sustained Recovery, Life satisfaction and Stress among Former Poly-substance Users

Substance abuse and dependence (addiction) are being increasingly viewed as chronic conditions, on par with diabetes, hypertension and asthma in terms of aetiology, course and symptoms management requirements (e.g., adherence to treatment -, McLellan, Lewis, O’Brien & Kleber, 2000; White, Boyle and Loveland, 2002 and 2003). This suggests that remission (recovery) from substance misuse is a process that unfolds over time rather than a time-limited ‘event’.<sup>1</sup> The chronicity of addiction is illustrated by reports that people with

addiction-related problems often make several attempts at recovery prior to being able to attain and maintain stability and drug-free status (e.g., Dennis, Scott, Funk, & Foss, 2005).<sup>2</sup> In spite of the prevalent view that addiction is most often chronic, treatment protocols and research studies in this field have adopted an acute model approach using short therapeutic interventions and short research follow-ups periods (e.g., one or at most, two-years - McLellan, McKay, Forman, Cacciola, & Kemp, 2005; Morgan, 1995). The goal of these interventions is most often to rehabilitate and discharge clients as one would a surgical patient, typically without continued monitoring while expecting treatment gains to endure and considering any return to active drug use a failure of the individual rather than of the intervention (McLellan et al., 2000). As a result, findings from most studies speak to recovery *initiation* only, not to the challenges and processes involved in achieving and sustaining long term recovery. This is particularly true of studies of recovery from illicit drug dependence (as opposed to alcohol dependence), where only a few researchers have begun to examine recovery patterns over longer periods of time (e.g., McAweeney, Zucker, Fitzgerald, Puttler & Wong, 2005). Several studies have examined long term recovery, including research on natural recovery (remission without the help of treatment or self-help- e.g., Margolis et al., 2000, Burman, 1997; Snow et al., 1994, Toneatto et al., 1999); these reports are useful but cross-sectional designs limits the usefulness of findings in terms of elucidating the remission process over time Whilst recovery initiation is a critical step during which the risk of return to active addiction is particularly high, there are reports of returns to active addiction after 5 years or more of continuous abstinence. For example, one study found that 25% of a large sample of opiate users *relapsed after 15 years of abstinence*, suggesting that the risk of relapse diminishes over time but does not disappear (Hser, Hoffman, Grella, & Anglin, 2001; also see Laudet & White, 2004; Dennis et al 2005). Return to active addiction carries heavy costs in terms of public health and safety as well as high risks of harm to the person who uses substances, and/or to his/her family and immediate community. Thus it is important to broaden the investigative scope beyond recovery initiation and to identify predictors of sustained stable recovery from substance use and misuse.<sup>3</sup> To date, there has been little work in this area; the few studies adopting a long-term approach have typically concentrated on treatment and/or 12-step as predictors and on substance use outcomes, particularly alcohol use (e.g., Cross, Morgan, Mooney, martin & Rafter, 1990; Timko, Finney & Moos, 2005; Vaillant, 1983/1995).

Factors associated with behaviour maintenance often differ from those related to behaviour initiation (e.g., Humphreys, Moos & Cohen, 1997; Moos, 1994); therefore, predictors of recovery initiation may not apply to recovery maintenance and to achieving a high quality of life or well-being. There is also a growing body of literature positing that addiction recovery proceeds in “stages” that differ in focus, priorities and challenges (e.g., Prochaska & DiClemente, 1992), although the empirical evidence on which stage models rests has been recently challenged (Sutton, 2001). An informative, albeit small-scale, exploratory study of persons with histories of drug dependence who were abstinent for an average of 9 years speaks to longitudinal recovery patterns (Margolis et al., 2000). The majority of study participants reported passing through similar patterns, commencing with early recovery (lasting one to three years) almost solely focused on remaining abstinent. Once a solid recovery foundation was

<sup>1</sup>We note that the term ‘recovery’ is largely steeped in 12-step culture; the term ‘remission’ is used in biomedical fields to describe a state where the individual is free of symptoms – e.g., in oncology. The terms ‘remission’ and ‘recovery’ both connote the idea that the underlying condition may remain, in contrast to the term ‘cure’ that suggests that the underlying condition is no longer present.

<sup>2</sup>Total abstinence is but one of the possible recovery goals; in the United States where treatment programmes are heavily influenced by 12-step tenets, total abstinence from drugs and alcohol is typically the goal, and reports from recovering persons suggest that total abstinence is their goal as well (Laudet et al., 2005). Tobacco, and nicotine, regarded by some as ‘drugs’ as well, are rarely included in remission goals by either treatment programs or remitting individuals themselves.

<sup>3</sup>Although social context and environmental factors are regarded as critical to understanding the etiology, maintenance, and remediation of disease and health, individual-level analysis has been more valued than ecological analysis. and most research on factors promoting remission from substance use and misuse has focused on the individual.

established, participants were able to concentrate on “living a normal life” beyond the critical concern of maintaining abstinence. That middle recovery phase was a transitional period involving a conscious decision to change life focus. After years of living a life dominated first by addiction and then by the demands of early recovery, the individual must then confront the existential question, “What do I do now?” (Chapman, 1991, p.11). Following this transitional period comes late recovery, a time marked by individual growth and search for meaning (Freyer-Rose, 1991). Each recovery phase presents new challenges and risks, again emphasizing the need to adopt a long-term approach to the investigation of stable recovery.

We note that clinical interventions and research in substance use and misuse focus almost exclusively on substance use outcomes, other aspects of functioning that are often critical to the individual – e.g., developing healthy eating and physical activity habits, leisure activities and opportunities to assume valued social roles, are typically distant secondary goals and/or outcomes when they are considered at all. The focus on substance use outcomes This is necessary and understandable in light of the multiple and costly consequences of active addiction. However, in the same way as substance dependence can affect all areas of functioning (e.g., social, mental, emotional, vocational), recovery from addiction is more than the absence of substance use in an otherwise unchanged life. The importance of considering global health as outcome measure was emphasized by the World Health Organisation in its definition of health as not just the absence of pathology but as “a state of complete physical, mental and social wellbeing” (1985, p34). Further, the narratives of the recovery community define ‘recovery’ not as absence of drug use problems but as enhanced quality of life (QOL), having goals, being a productive and valued citizen, helping others and having positive social relationships (e.g., Laudet, White, & Morgen 2005). A frequently cited threat to sustained recovery is stress (e.g., Laudet, Magura, Vogel, & Knight, 2004; Titus, Dennis, White, Godley, Tims, & Diamond, 2002) but there is a marked absence of empirical work on stress among recovering persons, or on factors that may influence levels of stress over the course of recovery.

In a previous study, we examined stress and life satisfaction among recovering persons, and used structural equation modelling (SEM) to test a model where recovery capital, operationalized as social supports, spirituality, life meaning, religiousness and 12-step affiliation, was hypothesized to improve the ability to respond to stress emanating from intra- and interpersonal challenges and to enhance quality of life (Laudet, Morgen & White, 2006). We had selected these domains as critical ingredients of recovery capital because they have been shown to promote recovery and/or buffer stress (e.g., social support - Caplan & Caplan, 2000; Nelson, 1992; Laudet, Magura, Vogel, & Knight, 2000) and to be associated with reduced substance use outcome in prior studies using short-term follow-ups. Moreover, these domains figure prominently in the narratives of recovering persons (see Laudet et al., 2006 for review). Recovery capital refers to the quantity and quality of internal and external resources that one can bring to bear to initiate and sustain recovery from addiction (Granfield & Cloud, 1999 and 2001). Findings from that cross-sectional study indicated that the hope for a better life that motivates many substance users to initiate recovery becomes a reality for many: Quality of life increased and stress decreased significantly as a function of length of recovery. The hypothesized role of recovery capital on stress was empirically demonstrated, as was the significant contribution of recovery capital to quality of life.

**Study Objectives**—This study builds on our previous work and represents a first step toward identifying prospective predictors of global health over the course of addiction recovery. We address three research questions: (1) Does recovery capital (as defined above) prospectively predict sustained recovery? (2) Does recovery capital influence subsequent quality of life and stress levels? and (3) Do the effects of recovery capital on outcomes differ as a function of recovery ‘stage’? Based on our previous work as well as that of other researchers, we predicted

that, controlling for baseline level of the outcome domains, greater levels of recovery capital would prospectively predict sustained recovery, higher life satisfaction and lower stress at one-year follow-up.

## Materials and Method

This study was conducted in the context of a NIDA-funded prospective investigation of factors associated with stable recovery from illicit drug abuse or dependence.

**Sample**—Recruiting was conducted in New York City through media advertisements placed in free newspapers (e.g., the Village Voice) and flyers posted throughout the community (e.g., libraries, coffee shops, and YMCAs).<sup>4</sup> Recruiting was conducted over a one-year period starting in March 2003. The study maintained a toll-free telephone number for interested persons to call. Callers were screened briefly (10–12 minutes). Information was collected on basic demographics, past and current drug use, lifetime dependence severity (using the Drug Abuse Screening Test- DAST 10 - Skinner, 1982), current utilization of treatment services and of 12-step meetings, and contact information. Eligibility criteria for the study were: (1) fulfilling the DSM-IV(TR) criteria for abuse or dependence of any illicit drug for at least one year in one's lifetime, but not in the past month; (2) self-reported abstinence from illicit drugs for at least one month, and (3) not being enrolled in residential treatment.<sup>5</sup> Eligible callers were contacted within a week to schedule an in-person interview. Seven hundred and two unduplicated screenings were conducted; of those, 440 were eligible; 354 were interviewed (81% of eligibles). [Reasons why 86 eligibles were not interviewed: unable to contact with information given at screener – e.g. disconnected telephone (39), did not come to appointment and unable to contact to reschedule (19), refused (10), relapsed between screening and scheduling call (6), data collection ended (12).]

The study was reviewed and approved by the first author's Institutional Review Board (IRB) and we obtained a certificate of confidentiality from our funding agency. The baseline interview session started by explaining the voluntary nature of the study, participation requirements and administration of the informed consent procedure. The interview lasted an average of two and a half hours. Each participant was paid \$30 for his/her time. The one-year follow-up interview protocol (F1) was somewhat shorter as it omitted the background and historical information collected at baseline. Participants received \$40 for this interview.<sup>6</sup> Participants were contacted by mail quarterly to maintain updated locator information and to thank them for their continued participation in the project; 312 one-year follow-up interviews were conducted an average (mean) of 359 days after the baseline assessment (Std Dev = 44 days), representing 91% of those remaining alive (4 died). These 312 individuals represent the sample for this study.

**Measures**—The semi-structured instruments consisted of sociodemographics and background measures as well as of the measures described below and summarized in Table 1. We have used most of these instruments in our previous work and where necessary, the items are reworded for ease of understanding at a reading level corresponding to 9<sup>th</sup> grade in the United States. Unless otherwise stated, higher scores represent a higher level of the construct under study; Chronbach Alpha reliability scores reported are those obtained for this dataset.

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<sup>4</sup>Sample text of recruiting ad: "Have you successfully overcome a drug problem? NDRI is interested in interviewing anyone in NYC who used to have a serious problem with drugs and is no longer using. Your experiences can provide valuable information to help people with similar problems. Confidentiality is strictly maintained. Participants compensated for time. We do not provide treatment. Call Pathways toll free (800) xxx-xxxx"

<sup>5</sup>This study is a naturalistic investigation of the role of psychosocial factors on long-term recovery, we wanted to be able to assess the role of baseline community-related factors on subsequent outcome.

<sup>6</sup>Participant incentives were increased at F1 in an effort to maximise participant retention into this 5-year study.

**Hypothesized baseline predictors: Length of recovery:** Drug and alcohol use history was collected using a list of 13 substances included in the Addiction Severity Index (ASI - McLellan, Kushner, Metzger, et al 1992).<sup>7</sup> For each substance ‘ever’ used once or more, participants provided the last date of use. A variable was computed for clean time from each substance ever used; length of recovery represents time since *most recent use of any of the illicit drug* ever used, in months (i.e., if participant last used heroin 4 years ago and crack 5 months ago, length of recovery is 5 months).

**Recovery stage:** Four time-linked recovery benchmarks were used: Under 6 months in recovery at baseline (28 % - Group 1), 6 to under 18-months (26% - Group 2), 18 to 36 months (20% - Group 3), and over three years (26% - Group 4). These stages were selected for several reasons. The study from which this dataset is drawn is a prospective examination of long-term remission from substance use and misuse where we seek to determine whether factors that promote and hinder remission change as a function of length of remission; we needed to identify discreet remission stages that coincide with remission ‘landmarks’ both clinically and experientially; we had reviewed the extant literature and conducted focus groups with persons self-identified as ‘in recovery’ for various lengths of time prior to commencing the analyses and we determined that these four stages had clinical relevance. In this dataset, they also afforded four groups of relatively equal size which aids in the analyses.

**Recovery support:** The Social Support for Recovery Scale (SSRS) consists of 11 items rated on a Likert-type scale (1= strongly disagree to 4 = strongly agree); sample item: “The people in my life understand that I am working on myself.” The items were derived from qualitative work reported in Vogel, Laudet, Magura & knight, 19978 (also see Laudet et al., 2000). Chronbach  $\alpha = .88$ .

**General Social support:** The 23-item Social Support Appraisal Scale (SSA; Vaux & Harrison, 1985; Vaux 1988) measures the degree to which a person feels cared for, respected, and involved with friends, family and other people. The instrument is was based explicitly on Cobb’s (1976) conceptualization of social support and was designed to measure the degree to which a person feels cared for, respected, and involved.. Items are rated on a Likert-type scale (1= strongly disagree to 4 = strongly agree). Sample item: “My friends respect me,” “I don’t feel close to members of my family. Chronbach  $\alpha = .92$

**Spirituality:** The 6-item *Spirituality* subscale of the Spiritual Well-Being Scale (SWBS- Paloutzian & Ellison, 1982) rated on a Likert-type scale (1= strongly disagree to 4 = strongly agree) yields one score representing “the affirmation of life in relationship with God, self, community and environment” (Ellison, 1983, p. 331). We adapted the wording of the items to a broader dimension of spirituality (from “God” to “God/Higher Power). Sample items: “I don’t get much personal strength and support from God/my Higher Power” and “I have a personally meaningful relationship with God/my Higher Power.” (Cronbach  $\alpha = .82$ ).

**Life meaning:** We used the *Existential* Subscale of the Spiritual Well-Being Scale (Paloutzian & Ellison, 1982), consisting of 6 items rated as described above. This scale score represents perception of life’s purpose without any specific reference. Sample items: “Life doesn’t have much meaning,” and “I believe there is some real purpose for my life.” (Cronbach  $\alpha = .87$ ).

**Religiousness:** The *Religious Background and Behavior* (RBB - Connors, Tonigan, & Miller, 1996) measures frequency of a) thinking about God; b) prayer or meditation; c) attending

<sup>7</sup>Alcohol, cannabis, heroin, street or illegal Methadone (to get high), other opiates/Analgesics (e.g., morphine, codeine), downers or depressants (e.g., sedatives, barbiturates, or tranquilizers), crack, non-crack cocaine, methamphetamine or other amphetamines/ stimulants, PCP or other hallucinogens, inhalants/Solvents (Glue, gasoline), ecstasy, any other drug including over-the-counter.

worship services; d) reading/studying scriptures or holy writings and e) having a direct experience with God; answer categories range from never to once a day (Cronbach  $\alpha = .81$ ).

**Twelve-step affiliation:** Affiliation consists of two dimensions: meeting attendance and involvement in 12-step suggested activities. a) *Meeting attendance* at baseline is the number of Alcoholics Anonymous (AA), Narcotics Anonymous (NA) and/or Cocaine Anonymous (CA) meetings attended in the past year ; b) *12-step Involvement* is the sum of nine 12-step activities in the past year: Having a sponsor; sponsoring someone; considering oneself a member of AA, NA or CA; having a home group; working the steps; doing service; having contact with 12-step members outside of meetings; reading 12-step or recovery literature outside of meetings; and socializing with 12-step members outside of meetings.

**One-year follow-up outcome domains: Sustained recovery:** This was operationalized as no self-reported drug or alcohol use between baseline and one-year F1. A dichotomous variable was computed to code whether or not each participant had sustained recovery in the year preceding F1. We choose this strict operationalization of ‘recovery’ because empirical evidence, including from participants in this study, suggest that individuals who seek remission regard total abstinence of all substances (drugs and alcohol) as their remission goal (e.g., Laudet et al., 2005, also see Burman, 1997)

**Quality of life satisfaction:** “Overall, how satisfied are you with your life right now?” answered on a visual scale where 1 = not at all, and 10 “completely.” We used this global measure because we sought to assess participants’ overall evaluation of their life satisfaction, taking into account the balance between positive and negative as it was relevant to *their* individual experience rather than the researcher determining which life domains are or are not relevant to life satisfaction. Such global assessments can be reliable indicators of how a person feels (US Department of Health and Human Services, 2000). The baseline assessment value was entered as a control variable in the regression where F1 quality of life is the dependent variable.

**Stress:** “Overall, how stressed have you been in the past year?” Answer scale: 0 = not at all to 10 = extremely. Assessed at baseline and F1. As in assessing QOL, we wanted to assess the individual’s overall perceived level of stress resulting from his/her global assessment taking into consideration both positive and negative major life events or change in routine – including welcomed ones, that may have been stressful (Holmes & Rahe, 1967). Baseline stress level was entered as a control variable in the regression where F1 stress level is the outcome.

**Analytic Plan—**First, descriptive statistics are presented that examine the key variables under study, and bivariate association among these variables are examined. Next, multiple regression analyses were conducted for the total sample as well as for each of the four baseline recovery stages subgroups. Logistic regressions were conducted for the analyses where sustained recovery was the dependent variable and linear regressions were used where stress and quality of life are the outcome domains. We used hierarchical regression analyses where the baseline level of the outcome domain was forced entered in Block one and the hypothesized predictors were entered in Block two, using the stepwise method so that only variables that are significant are retained.

**Attrition analysis—**We compared participants included in the analyses (n = 312) with those surviving who were not re-interviewed at F1 (n = 38) on key individual-level variables: age, gender, race/ethnicity, primary substance, baseline length of recovery and lifetime addiction severity. Differences were assessed using chi-square for categorical variables and t-tests for continuous measures. Participants who were reinterviewed, compared to those who were not, (a) were less likely to be in the early stage of recovery (under 6 months) and more likely to be

in the longest, stable stage (3 years +;  $X^2(3) = 9.53, p < 0.05$ ), and (b) had slightly higher lifetime addiction severity (11.7 vs 11.3 on a scale of 0 to 14,  $F = 4.4, P = .037$ ). The two groups did not differ significantly on any of the other variables.

## Results

### Descriptives

**Sample**—The sample was 55% male; 63% African-American, 15% non-Hispanic white, and 22% of other or mixed ethnic/racial background; 18% were of Hispanic origin. At baseline, participants ranged in age from 19 to 65 years (mean = 43, Std. Dev = 8). Educational attainment ranged from 5 to 18 years of schooling (mean = 12 year, Std. Dev = 2). Twenty percent were employed part-time, 22% full time; 58% cited government or other benefits (e.g., Veteran's pension) as primary source of income, 36% a job on- or off-the books. Over half (56%) were single, 16% were married and 28% were widowed, separated or divorced. Nearly one quarter (24%) reported being seropositive for HIV antibodies and 30% had tested positive for Hepatitis C. The majority (85%) had no current involvement with the criminal justice system; 13% were on probation or parole. Lifetime dependence severity as per the Lifetime Non-alcohol Psychoactive Substance Use Disorders subscale of the Mini International Neuropsychiatric Interview (M.I.N.I.), was high in this sample, with a mean score of 11.7 (Std. Dev. = 2.4; possible range on the scale is 0 to 14). The majority of participants had used multiple substances. Most frequent primary problem substance was crack (59%) followed by heroin (17.5%). Length of recovery ranged from one months to ten years. Means and standard deviations for key variables are presented in Table 2.

**Predictor domains**—As shown in Table 2, stress levels at both baseline and F1 were moderate; life satisfaction at both times was high, as were levels of both recovery-specific support and general social support, life meaning (existential well-being) and spirituality. Religious activities were moderate.<sup>8</sup> Nearly three-quarters of participants had attended a 12-step meeting in the past year; involvement in 12-step activities was more moderate.

**Outcome domains**—At F1, stress level for the sample as a whole was moderate (mean = 5.63) and life satisfaction was in the upper range (7.2 on a scale from 0 to 10). When compared with baseline levels, stress was significantly lower at F1 ( $t(310) = 3.5, p = .002$ ) as was life satisfaction ( $t(310) = 2.4, p = .017$ ). For Group 1 (recovery under six months at baseline), stress had decreased significantly (from 7.4 to 6.3) and quality of life satisfaction was unchanged (6.7 and 6.5, respectively); both stress and quality of life were unchanged between baseline and F1 for Group 2 (stress: 6.0 vs. 5.8 at F1, and QOL: 7.6 vs. 7.2); for Group 3, stress was unchanged (5.4 vs. 5.2) but QOL was significantly lower (8.2 vs. 7.6,  $t(63) = 2.02, p = .047$ ); there were no changes for group 4. (Subgroup analyses are not shown in Table 2).

At one-year follow-up, 66.1% of the sample had sustained abstinent recovery. Examining sustained recovery rates by recovery stage, 43% of Group 1 (under 6 months in recovery at baseline) sustained recovery at F1, 58.5% of Group 2 (6 to under 18-months), 84.1% of Group 3 (18 to 36 months), and 85% of Group 4 (over three years). Group 1 was significantly less likely to have sustained recovery at F1 than were the other recovery groups ( $\chi^2(1) = 28.6, p = .000$ ); Groups 3 and 4 were both significantly more likely to sustain recovery than were other participants. We conducted a logistic regression with Group 1 set as the reference group to assess the odds (expressed by the exponential *b* weight) of sustaining recovery at F1 for the three other recovery groups compared to Group 1: Group 2 was 1.75 times more likely to have

<sup>8</sup>With respect to individual religious activities, 85% of participants reported thinking about God 'daily' or 'almost daily', 78% prayed or mediated 'daily' or 'almost daily', 33% attended worship services weekly or more often, 37% read or studied scriptures or holy writings at least weekly and 43% had a direct experience with God 'daily' or 'almost daily' whereas 29% never did and 20% rarely did.

sustained recovery at F1 than the reference group (trend level,  $p = .07$ ); Group 3 was 6.87 times more likely than Group 1 to have sustained recovery at F1, and the odds of sustained recovery for Group 4 compared to that of Group 1, were 7.78.

### Bivariate associations among key variables

Zero-order two-tailed Pearson  $r$  coefficients of the bivariate associations among key variables are reported in Table 3. The hypothesized predictors are in Cols. 1–10 and the three outcome domains are in Cols 11–13. Longer baseline recovery, higher levels of general and recovery-specific support, greater levels of spirituality, more religious beliefs and behaviours, greater life meaning and greater involvement in (but not attendance at) 12-step were significantly correlated with sustained abstinent recovery at F1. All the hypothesized baseline predictors except 12-step meeting attendance were significant correlated of life satisfaction at F1 in the expected direction; the same pattern of results held for F1 stress, with the exception of religiosity that was not significant. For each of the three outcome domains, as expected, baseline and F1 levels were strongly correlated.

### Multivariate Analyses

Results of the analyses regressing baseline level of recovery capital on sustained recovery, life satisfaction and stress at F1 are presented in Tables 4–6. For each outcome domains, results (Standardized- $\beta$ ) for the total sample are in the first column, followed by results for each of the four baseline recovery stages. Stepwise (hierarchical) regression of the individual variables in Block 2 retains only the variables that significantly contribute to predicting outcome above and beyond the predictive power of Block 1 (here, baseline level of outcome domain).

**Predicting sustained recovery at F1**—For the total sample, the full model was significant (Table 4). The improvement in the model was also significant when Block 2 (recovery capital) was added, correctly classifying 73.20% of the sample. The exponential  $b$  weights (ExpB) express the change in odds of sustained recovery per each unit of increase in the dependent variable when all the other independent variables are held constant. Significant predictors were 12-step involvement and life meaning. Baseline recovery length and the full model were also significant for the recovery stage subgroups, with the exception group 3 for which no significant predictor emerged. The full model correctly classified between 68.75% and 83.3% of participants across recovery subgroups. Greater stress at baseline predicted sustained recovery among Group 1 participants; greater 12-step involvement predicted better outcome in Group 2 and greater social support predicted better outcome in Group 4.

**Predicting quality of life satisfaction (QOL) at F1**—For the total sample, the full model was significant, accounting for 21% of the variance in F1 QOL, as was the change in  $R^2$  resulting from adding recovery capital to baseline QOL level (a 10% increase – Table 5). Three variables in Block 2 were significant: Longer baseline recovery, lower stress and higher spirituality. In analyses for the four recovery stage subgroups, baseline life satisfaction (Block 1) was consistently significant as was the full model and the change in  $R^2$  from Block 1 to Block 2. Total explained variance ranged from 12% to 29%. In subgroup analyses, longer recovery was a significant predictor of QOL at F1 for Group 1, lower baseline stress was the only significant predictor of QOL for Group 2, higher levels of baseline spirituality predicted better QOL at F1 for Groups 3 and 4, as did lower baseline stress (for Group 4 only).

**Predicting stress at F1**—For the total sample, the full model was significant, accounting for 19% of the variance in F1 stress, as was the change in  $R^2$  resulting from adding recovery capital to baseline stress level (a 6% increase – Table 6). Two variables in Block 2 were significant individual predictors of F1 stress: Shorter baseline recovery and lower levels of spirituality. Baseline stress level was a consistent predictor of F1 stress in the analyses

conducted by recovery stage subgroup as was the full model and the change in  $R^2$  from Block 1 to Block 2. Total explained variance ranged from 12% to 34% for all subgroups except for Group 2 where no variable emerged as significant. In subgroup analyses, lower baseline levels of 12-step involvement predicted higher F1 stress; lower baseline spirituality predicted higher F1 stress for Groups 3 and 4, as did shorter baseline recovery (Group 4 only).

## Discussion

The study set out to address three research questions. The first two questions concerned whether recovery capital prospectively predicts sustained recovery, quality of life satisfaction and stress levels one year later. The main hypothesis that greater levels of baseline recovery capital prospectively predicts better outcomes was generally supported: for the full sample, recovery capital added a significant percentage of explained variance in all three outcome domains after controlling for baseline level of the domains under study, and the full model reached statistical significance for each of the outcomes. The third research question - whether recovery capital differentially predicts F1 outcomes depending on participants' baseline recovery stage? - had not been investigated previously. Findings suggest that the predictive power of recovery capital as defined here does differ across recovery stages and that different domains assume greater or lesser salience as recovery progresses

**The role of recovery capital and individual domains**—The domains under study as hypothesized 'ingredients' of recovery capital - predictors of subsequent outcome -were social supports, spirituality, life meaning, religiousness and 12-step affiliation, all empirically linked to the achievement of short-term recovery (Laudet et al., 2006 for review). The broad range of baseline length of recovery in this sample lends itself to investigating whether the role of these factors extends in time beyond the early recovery period (recovery initiation) to a more diversified recovery experience. In analyses conducted on the total sample, only 12-step involvement and life meaning emerged as significant predictors of sustained recovery at F1. Until quite recently, most research has limited the assessment of 12-step participation to meeting attendance. A number of researchers have stressed the importance of assessing 12-step related activities (e.g., working the steps, having a sponsor, doing 12<sup>th</sup> step work) to enhance the construct and predictive validity of the assessment (e.g., Tonigan et al., 1996). The findings that 12-step involvement predicts sustained recovery but that 12-step meeting attendance alone does not, are consistent with reports from two prior studies (Montgomery et al., 1995; Weiss et al., 2000). This finding also extends the results of our cross sectional study where 12-step involvement accounted for a small amount of variance in QOL (3.5%) but meeting attendance accounted for none. Here, twelve-step involvement was also the only significant predictor of sustained recovery among individuals with 6 to 18 months of recovery at baseline. Further, it was the only significant predictor of (lower) stress at F1 among the earliest recovery group (greater 12-step involvement at baseline predicted lower stress at F1). This is particularly critical since stress has often been cited as a perceived trigger for return to active addiction (e.g., Laudet, Magura, Vogel, & Knight, 2004; Laudet & White, 2004) and the risk of relapse is highest during the earliest stages of recovery.<sup>9</sup> Early recovery is fraught with difficult realizations and situations (e.g., facing the consequences of the past, lack of resources, poor housing, physical and mental health, deteriorated social and family ties); the individual is severely challenged to acquire the skills to cope with stress in a healthy and adaptive way, that is, without resorting to drug use. Involvement in 12-step recovery may provide the tools necessary to cope with stress associated with early recovery. For instance,

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<sup>9</sup>In the present study, the association between baseline stress and F1 recovery for the earliest recovery group was positive so that higher baseline stress predicted better recovery outcome. Whilst this finding was not expected, it can be explained by the fact that stress levels at baseline were very high in this subgroup (7.4 on a scale from 0 to 10); further, it may be that high stress level precipitates the decision to initiate recovery - an idea often expressed as 'being sick and tired of being sick and tired.'

the first and second steps (admitting powerlessness over drugs and coming to rely on “a power greater than ourselves” that can “restore us to sanity”) may contribute to the acceptance that one is unable to stop drug use on one’s own and that additional help is needed. Moreover, hope that things will get better and the growing belief that, as stated in the Big Book of Alcoholics Anonymous “there is a solution” may contribute to an emergent capacity to tolerate much of the stress associated with early recovery. Other critical aspects of the 12-step program of recovery such as having a home group, having a sponsor, working the 12-steps, socializing with other members and doing service can also provide role models, experiential information about effective coping strategies, a sense of belonging and acceptance, and enhanced self-esteem, all of which are critical to recovery.

Life meaning has been largely neglected by addiction researchers, in spite of its potential as a recovery- promoting factor. In our cross sectional study, meaning individually contributed 5.6% of the explained variance in QOL overall. The “will to meaning”- constructing meaning from life’s events is an essential human characteristic, a critical element of psychological well-being (Fetzer Institute, 1999; Ryff 1989) and one that can lead to physical and mental discomfort if blocked or unfulfilled (Frankl, 1963). Meaning provides essential context to understand and cope successfully with life’s difficulties (Fife, 1994; Park & Folkman, 1997), making the construct especially relevant to the challenging task of recovery. We note that twelve-step ideology may confer meaning by providing a detailed and comprehensive world view that reinterprets and reevaluates the addiction experience in ways that may serve as an antidote to the cognitive distortions associated with addiction (Antze, 1976; Ray, Friedlander & Solomon, 1984). Moreover, involvement in 12-step recovery activities such as working the steps, sponsoring other members and doing service, may enhance meaning found in reflecting on one’s experience (4<sup>th</sup> and 5<sup>th</sup> steps) and in helping others.

Turning to life satisfaction (QOL) and stress as outcome domains, both were strongly predicted by recovery length, extending the findings from our cross-sectional study whereby QOL increases and stress decreases over time. This suggests that the growing discomforts of the drug-using life and the hope for a better life that sets many substance users on the path of recovery can and will lead to improvements in quality of life and reductions in stress for many. Higher baseline spirituality was a strong predictor of both enhanced QOL and of lower stress among participants in recovery for 18 months and longer. Reliance on spiritual beliefs and engaging in spiritual activities can give hope, strength, and provide meaning during stressful periods (e.g., Galanter, 1997), a process Underwood and Teresi (2002) have described as ‘social support from the divine’ (p. 31). The extant literature has documented a strong and consistent inverse relationship between spiritual well-being (SWB - a multidimensional construct that incorporates both existential well-being or life meaning, and spiritual beliefs - Ellison 1983) and negative affect in stressful situations (e.g., Fehring, Brennan, & Keller, 1987; Riley, Perna, Tate, Forchheimer, Anderson, & Luera, 1998). SWB has also been shown to contribute to QOL even after controlling for the influence of mood, emotional well-being and social desirability (Brady et al., 1999). Spirituality was also included in the World Health Organization’s Quality of Life instrument (WHOQOL) after focus group participants worldwide reported that it was an important component of their QOL (The WHOQOL Group, 1995). In stressful situations, spiritual beliefs and practices appear to function as protective factors that mediate or moderate the relationship between life stressors and quality of life (e.g., Culliford, 2002; Miller & Thoresen, 2003; for review, see Fetzer Institute, 1999). In our cross sectional examination of recovery capital as moderating stress and enhancing QOL, spirituality independently contributed 17% of the explained variance in QOL overall. Spirituality enhances coping, confers hope for the future, and provides a heightened sense of control, security and stability. In the context of addiction recovery, spirituality confers support and strength to resist the opportunity to use substances, all of which are very much needed to initiate and maintain recovery (for reviews, see Cook, 2004; The National Center on Addiction and Substance

Abuse, 2001; The Fetzer Institute, 1999). In addition to this protective effect, a spiritual disposition may also have a transformational impact through how stress is interpreted. In this way, a person may come to view stressful situations as signals that require not just 'protection', but more adaptive responses to a particular concern; that is, spirituality may enhance the likelihood that stressors become opportunity for personal growth – this is consistent with the present finding that higher baseline stress was a significant predictor of sustained F1 recovery among early recovery group participants (under 6 months at baseline).

While not all recovering persons embrace spirituality (White & Nicolaus 2005), many report that a spiritual connection to the transcendent is part of their recovery. In one study, recovering participants expressed a sense of needing something to depend on that could be trusted over time and that was there always (Morjaria & Orford, 2002), and another study reported that lack of a spiritual connection was seen to contribute to the escalation of addiction problems (National Center on Addiction and Substance Abuse, 2001). Moreover, there is evidence that spirituality increases from pre-to post-recovery (Mathew, Georgi, Wilson, & Mathew, 1996; Miller, 1998) and that among recovering individuals, higher levels of religious faith and spirituality are associated with cognitive processes previously linked to more positive health outcomes including more optimistic life orientation, higher resilience to stress, lower levels of anxiety, and positive effective coping skills (Pardini, Plante, Sherman, & Stump, 2000; Kondo, Imuro, Iwai, Kurata, Kouda, Tachikawa, Nakashima, & Munakata, 2000). Of note, previous religiousness or spirituality is not a prerequisite to gaining the benefit of spirituality in recovery (e.g., Christo & Franey, 1995; Jones, 1994), suggesting that this critical recovery resource is widely available to those who seek it.<sup>10</sup>

Religiousness did not emerge as a significant predictor. Persons with substance use problems often come into recovery feeling abandoned by or alienated from God or from the religious community (National Center on Addiction and Substance Abuse, 2001). Spiritual beliefs are typically not tied to a specific religious belief system or community, and as such, may be more attractive than are specific religious tenets and/or practices. Kaskutas and colleagues have reported findings whereby spirituality prospectively predicted sobriety among formerly alcohol-dependent persons while religiosity did not (Kaskutas, Turk, Bond, & Weisner, 2003).

The finding that social supports (general social support and recovery support) did not generally emerge as significant predictors of outcomes was unexpected. In our cross-sectional study, general support accounted for 9.6% of the variance in QOL and recovery support, 7.3%. There has been virtually no research in the addiction field assessing the role of social support in influencing stress levels or QOL among recovering persons but there is a large body of evidence suggesting that supports, and particularly recovery-specific support (e.g., support for abstinence) prospectively enhances the likelihood of favourable recovery outcomes over the short-term (e.g., Humphreys, Mankowski, Moos, & Finney, 1999). In bivariate regressions, supports were associated with recovery in the expected direction although only general support reached significance. To elucidate the unexpected findings, we examined support levels across recovery stages; bivariate associations between supports and length of recovery did not reach significance, but subgroup analyses revealed that both forms of support were significantly lower among participants in Group 1 (under 6 month recovery at baseline) and highest among participants in Group 3.<sup>11</sup> More research is needed to elucidate and quantify the role of supports

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<sup>10</sup>We also note that spirituality may not need to rely on a connection to the transcendent. For example, 12-step members are encouraged to find their own conception of a Higher Power, "however limited" (AA Big Book, "We agnostics", 1939/1976). There is anecdotal evidence of some 12-step members defining their Higher Power as the recovery community, their home group or even a more experienced recovering peer (e.g., their sponsor); while limited in some ways, this secular form of spirituality may confer a sense of connectedness and belonging, a force that is loving, non-judgemental and supportive, that can be trusted to be there always. More research is needed on this topic.

on sustained recovery; we plan to replicate the analyses with future assessments at two- and three-year follow-ups.

**The role of recovery capital across recovery stages**—This study appears to be the first specifically designed to assess the differential role of psychosocial factors as prospective predictors of recovery outcome. Recovery is complex, multi-dimensional and dynamic process, as is the psychosocial environment where recovery unfolds. As a result, factors that are helpful (or harmful) to recovery at a given time may be less relevant at other times. Identifying recovery patterns over time, as well as the factors that promotes and hinder positive outcomes over the course of that process may assist in realising recovery potential and help to minimise the risk of return to active addiction by informing clinicians, the recovery community, family and other carers. Because recovery is also bound by individual characteristics (age, gender), time and place, and there is a need to elucidate the process not only among different sociodemographic and recovery stage subgroups but also in different socio-political contexts that have adopted different responses to substance use and misuse. To that end, we are currently conducting a cross-sectional replication of this study in Australia to begin identifying ‘universal’ and cross-cultural remission processes (Laudet & Storey, 2006). More attention also needs to be given to the role of the environment where substance misuse and remission unfold; the role of environment safety, opportunity for leisure, access to services have been neglected thus far as research typically focuses on individual-level domains to elucidate a psychosocial process.

Thus far, the preponderance of empirical evidence on determinants of recovery has focused on recovery initiation. This is largely an artefact of research designs that typically utilise treatment samples and short follow-up periods. Further, most studies have not been designed specifically to identify key ingredients of recovery capital; rather, the focus is most often on assessing the effectiveness of a therapeutic intervention (e.g., treatment or 12-step) and/or the role of one or two well-researched domains (e.g., social support). More work is needed to identify key ingredient of recovery capital associated with recovery maintenance. As discussed earlier, the early recovery period is critical but that is not to say that later phases of the process are problem-free. Our findings represent a first step toward identifying helpful recovery resources over time. They suggest that factors associated with recovery, life satisfaction and stress levels may differ as recovery progresses. With respect to QOL and to stress, spirituality significantly predicts these outcomes among participants in what may be termed ‘intermediate’ and ‘stable’ recovery’ (18 months and over) but not earlier; it is likely that for many, developing and relying on spiritual beliefs is a process that unfolds over time, as suggested by the second of the 12-steps: “*Came to believe that a power greater than ourself could restore us to sanity*”(AA World Services, 1939/1976; emphasis added).

## Limitations

There are several limitations to this study. First, participants were members of urban, typically underserved minorities characterized by a long and severe history of poly-substance use. Findings may not apply to members of other groups, such as persons with lower problem severity or those living in smaller cities or rural areas.. Currently, the scarcity of profiles of the recovering community makes it extremely difficult to determine how representative this sample is of the recovering population as a whole and more research is critically needed in this area. We note that most of the domains under study here (e.g., remission, social support, 12-step participation) have been investigated in other venues in studies cited in the literature review and our findings are consistent with prior reports; further those domains and the questions

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<sup>11</sup>The finding of low support early in recovery is consistent with previous reports that friendships erode with the cessation of substance use – in all likelihood because the individual is moving away from substance using associates but may not have yet developed a healthier network (e.g., Ribisl, 1997).

examined here are not geography specific. Quality of life remains a neglected outcome in our field (Donovan et al., 2005), especially among persons who misused illicit drugs (vs. alcohol). Second, with respect to measurement, using single items to assess stress and life satisfaction may be viewed as a limitation; we selected these measurements because we were interested in participants' overall subjective assessment of stress and life satisfaction. Findings from our cross-sectional study using the same measures were consistent with prior reports on both stress and QOL that used a variety of measures ranging from single items to sophisticated standardized scales, suggesting that this measurement limitation may not significantly compromise the interpretation of results presented here. Further, single item global assessments measures can be reliable indicators of one's perceived status (U.S. Department of Health and Human Services., 2000). However, we plan to use more sophisticated measures in future studies in this area. Third, we used self-reported data that may be vulnerable to reporting bias (underreporting) particularly for substance use outcomes. However, the pattern of findings obtained for sustained recovery showing high risk of relapse early on and significant decreases in lapses as recovery progresses are consistent with the few previous reports using long-term follow-ups (e.g., Flynn, Joe, Broome, Simpson & Brown, 2003; Hser et al., 2001; McAweeney et al., 2005; Scott, Foss & Dennis, 2005; Vaillant, 1983/1995; Weisner, Delucchi, Matzger & Schmidt, 2003). Findings suggesting that different domains gain/lose relevance as predictors across recovery stages were replicated with two other recovery outcome domains that are likely to be less vulnerable to reporting bias, namely stress and life satisfaction. This suggests that the validity of present findings for recovery outcomes may not be critically threatened by reliance on self-report data. Fourth, the investigation of recovery capital is still in its infancy and the 'ingredients' that we used here are not meant to be interpreted as exhaustive; the role of other resources, both internal (motivation, coping skills, self-efficacy but also physical and emotional health) and external (valued social roles, financial, housing, employment, community involvement, leisure activities) must be assessed as part as recovery capital in the future to obtain a more complete profile of the factors that enhance and impede the progression to stable addiction recovery.<sup>12</sup> The limitation of the present definition of recovery capital is underlined by the relatively small amount of variance explained by the construct combined with the baseline level of outcome domain (ranging from 12 to 29% for QOL, 12 to 34% in stress and correctly classifying between 69 and 83% of participants in the analyses where sustained recovery was the outcome). While this is not an atypical finding in the addictions, it clearly suggests that additional factors are at play that must be identified. Further, not surprisingly, there was a high degree of multicollinearity among recovery capital 'ingredients;' future research is needed to categorize and par down these domains, and to develop improved measures of recovery capital. Fifth, the concept of recovery stages is somewhat artificial as is any attempt at categorizing the human experience in discrete phases; the approach has heuristic value however. Moreover, the stages used here are clinically intuitive, they are consistent with the few available published reports (e.g., Chapman, 1991; Freyer-Rose, 1991; Margolis et al., 2000) in addition to being statistically valid – yielding four groups that were approximately similar in size.

### Implications and future directions

Findings from this study have important implications for clinical practice, for the recovery community and for future research. This study represents a first step in examining the role of recovery capital as a prospective predictor of recovery, quality of life and stress level. First, as previously discussed, findings highlight the importance of 12-step involvement, (low) stress

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<sup>12</sup>In preliminary work, we replicated the analyses presented adding baseline levels of self-efficacy, size of general support network and size of recovery network (number of individuals in network who are in recovery); results were unchanged from those presented here and since this study is an extension of our earlier cross-sectional study, we elected to operationalized recovery capital in the same way as we did in the first study.

and spirituality as factors that enhance the likelihood of positive recovery outcomes and of global functioning. Second, this study appears to be the first to investigate the differential role of recovery capital as a function of recovery 'stage.' Findings underline the premise that recovery is a dynamic process. Different factors promote positive outcome at successive stages of the recovery process, suggesting that recovery-oriented research must adopt a long-term approach. Recovery is also a challenging process. It is likely that there is broad variation in stages as a function of individual and psychosocial factors that remain to be elucidated empirically. The likelihood of returning to active addiction decreases significantly over time but it does not disappear. Hence the critical need for identifying recovery-promoting factors and barriers that apply to the later stages of recovery. Findings also emphasize the need for a paradigmatic shift in services and in research, from an acute illness/crisis mode (assess, admit, treat, discharge) to a model of recovery management that parallels approaches used in the treatment of other disorders characterised with chronicity, course variability and functional fluidity such as diabetes mellitus, asthma and hypertension (e.g., Dennis, Scott & Funk, 2003; McLellan et al., 2000 and 2005; White et al., 2002; White 2005). At the service development level, this means making available a continuity of recovery resources with the intensity and monitoring modulated by the severity of the symptoms present (e.g., Bodenheimer, Wagner & Grumbach, 2002). At the individual level, clinicians should work in partnership with clients on a case-by case basis to develop strategies that maximize recovery capital (and its utilisation) tailored to the individual's situation; these strategies should be revisited periodically since needs and available resources may change as recovery progresses – for more substantial discussion of *recovery management*, see Dennis et al., 2003; Godley, Godley, Dennis, Funk, & Passetti, 2002). Increasingly in the fiscal context of decreasing intensity and duration of treatment services, interventions are primarily delivered in group format; one-on-one counsellor-client meetings are minimal (e.g., once a week), rendering the individualization of services more difficult and perhaps, unlikely – the role of such systemic conditions needs to be examined as potential barriers to optimal treatment and post-treatment recovery outcomes. Finally, for researchers, the stage approach, even with its inherent limitations discussed earlier, is useful in beginning to quantify and qualify the influence of various domains on the recovery experience over time. Overall, adopting a stage approach to identifying prospective predictors of the recovery experience is a promising way to supplement and refine current knowledge and to identify additional recovery resources and obstacles.

The next steps in this line of inquiry are to work toward developing a theoretical framework of addiction recovery. This work must be based on additional knowledge about the various pathways to sustained recovery and on the aspects of recovery capital that are critical and/or most salient at different stages of the recovery continuum as well as from existing scientific literature and from the narratives of the recovery community. This much needed theoretical framework will then guide the development of measures that have the requisite sensitivity and capacity to measure recovery capital and to elucidate the recovery process. The authors have planned future analyses using two- and three-year follow-up with this sample to further the knowledge base in this direction. In addition, clinical interventions and research evaluations among persons with a history of substance misuse need to recognize that for the individuals themselves, reducing substance use is a means to an end, the end is a better life (Laudet et al., 2005). Therefore, non substance use domains such as global quality of life as a positive life resource (World Health Organization, 1985) need to be embraced as bona fide outcomes; we noted that harm minimization models adopted outside of the United States to respond to substance misuse “measure success in terms of individual and community well-being rather, not in relation to level of drug use than in terms of level of substance use” (Puigdollers et al., 2004, p. 1354); from that perspective, remission and recovery capital ought to be defined at multiple levels including individual, community and society. This requires a paradigmatic shift from a pathology-based model to one where optimal functioning is the goal; this shift has gradually occurred in biomedical fields where virtually no area of medicine is without

published research on quality of life. Our field lags far behind in that regard, particularly in the United States (Donovan et al., 2005). Broadening the investigative scope to global functioning domains in substance misuse can guide clinical intervention and training, policy and the allocation of scarce resources toward decreasing health disparities.

Finally, researchers rarely address specifically the ethical issue of collecting data among individuals who may not directly benefit from participating in our studies. Procedures such as informed consent partially address the issue in stating the risk and benefits of participation for the individual and for society. The current study is unique in a number of ways: we interview participants yearly at four time points (an unusually long follow-up period) and participants are media recruited from the community (in contrast with most research where participants are recruited in treatment programs). Therefore we are particularly interested in learning of participants' experiences in this project as we plan studies with a similar design in the future. We developed the instruments in collaboration with experientialists (persons in recovery) and emphasize throughout the project that we are interested in participants' experiences, 'good or bad'. Our follow-up rate (89% of the surviving cohort at the two-year follow-up) is encouraging. We recently commenced collecting data for the three-year follow-up where we ask a series of questions about overall experience with the study including personal usefulness of participation and level of interest in participating in similar studies in the future. To date, the preponderance of participants report benefiting from taking part in the study (e.g. "It kept me aware of what's going on and how far I've gotten" – 82% said participation was "very useful", 15% 'somewhat useful' - other options: 'not at all' and not really useful') and 93% said they would "*definitely*" be interested in participating in a similar study in the future (other options: "not at all" and "may be interested"). These early findings suggest that long-term research among community-based persons in remission from substance misuse is feasible and may even benefit the individuals themselves by providing a forum where to reflect on past experiences, in addition to contributing greatly to empirical knowledge that can aid in guiding clinical intervention, training and funding decisions.

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Table 1

## Summary of Domains and Instrument

DOMAIN	SCALE NAME	No. items	Scoring	Time to respond
<b>BASELINE PREDICTORS</b>				
LENGTH OF RECOVERY	Addiction Severity Index (footnote #7)	13	Use ever-yes/no IF YES; when last used	2 min. >5 min.
RECOVERY STAGE	see above	13		
RECOVERY SUPPORT:	Social Support for Recovery Scale (SSRS)	11	Likert-type scale	2 min.
GENERAL SUPPORT	Social Support Appraisal Scale (SSA)	23	Likert-type scale	4 min.
SPIRITUALITY	Spirituality subscale of the Spiritual Well-Being Scale (SWBS)	6	Likert-type scale	1 min.
LIFE MEANING	Existential Subscale (SWBS- see above)	6	Likert-type scale	1 min.
RELIGIOUSNESS	Religious Background & Behavior (RBB)	5	frequency (never/daily)	2 min.
12-STEP AFFILIATION	Meeting attendance (number of AA, NA and CA meetings past year)	3	open-ended (number)	1 min.
12-STEP INVOLVEMENT	See Measures section	9	yes/no	1 min.
<b>ONE-YEAR FOLLOW-UP OUTCOMES</b>				
SUSTAINED REMISSION	Addiction Severity Index	13	used any substance in the past 12 months	computed (from when last used)
QUALITY OF LIFE SATISFACTION	single item	1	visual scale (0–10)	1 min
STRESS	Single item	1	visual scale (0–10)	1 min

Table 2

Key Variables Descriptives: (N = 312)

	Possible Range	Mean	Standard Deviation
Length of recovery (in months)	1 – 120	30.8	42.1
Baseline Stress	0 – 10	6.2	2.6
F1 Stress	0 – 10	5.6	2.7
Baseline Quality of life satisfaction	0 – 10	7.5	2.0
F1 Quality of life satisfaction	0 – 10	7.3	2.1
Baseline Recovery Support	1 – 4	3.0	.40
Baseline Social Support	1 – 4	3.0	.32
Baseline Spirituality	0 – 4	2.9	.39
Religious activities	0 – 8	5.1	1.8
Life Meaning	1 – 4	3.2	.49
Baseline Twelve-step affiliation:			
Ever Narcotics Anonymous (NA)	----	86.5%	
Ever Alcoholics Anonymous (AA)	----	69.5%	
Ever Narcotics Anonymous (NA)	----	77%	
Past year Narcotics Anonymous	----	64%	
Past year Alcoholics Anonymous	----	71.5%	
Any 12-step meetings, past year (NA or AA)	----	89	
Total (NA+AA) meetings past year*	0–700		137
Total (NA+AA) meetings past month	0–94	11	17
12-step involvement (activities in NA+AA)*	0–9	4.2	3.6
Sustained abstinence recovery at F1			
Total sample		66.2%	
Baseline recovery stage:			
Under 6 months		42.4%	
Six to 18 months		58.5%	
Eighteen to 36 months		84.1%	
Three years and over		85.0%	

\* Past month among past year attenders

Table 3

Bivariate Associations among Predictors and Outcome Domains

	1	2	3	4	5	6	7	8	9	10	11	12	13
<u>Baseline Predictors</u>													
1. Length of recovery	1.0	-.*** 26	.11	.04	.14	.13	.10	.00	.04	.16**	.28***	.22***	-.24***
2. Stress		1.0	-.*** 23	-.*** 20	-.*** 31	-.11	-.12*	-.15	-.13*	-.***	-.09	.30***	.36***
3. General social support			1.0	.77***	.58***	.17***	.36***	.16**	.21***	.32***	.15***	.25***	-.25***
4. Recovery Support				1.0	.54	.10†	.28	.18***	.27***	.29***	.11†	.21***	-.22***
5. Spirituality					1.0	.36***	.57***	.17***	.26***	.44***	.22***	.35***	-.31
6. Religious activities						1.0	.67***	.20**	.33***	.33***	.23***	.24***	-.08
7. Life Meaning							1.0	.16	.24***	.26***	.23***	.23***	-.14
8. NA+AA meetings past month								1.0	.57***	.13*	.05	.10	-.07
9. 12-step involvement									1.0	.22***	.19***	.15**	-.16***
10. Quality of life satisfaction										1.0	.20***	.33***	-.18***
<u>One year-follow-up Outcomes</u>													
11. Sustained recovery											1.0	.40***	-.24***
12. Quality of life satisfaction												1.0	-.39***
13. Stress													1.0

\* p<.05

\*\* p<.01

\*\*\* p<.001

† p<.1 (trend); all correlations are two-tailed

Logistic regression results of baseline recovery capital as predictor of sustained recovery at one-year follow-up

Table 4

	Baseline Recovery Stage								
	Total N = 312 b(SE) <sup>a</sup>	Group 1 (> 6 months) N = 87 b(SE) <sup>a</sup>	Group 2 (6–18 months) N = 82 b(SE) <sup>a</sup>	Group 3 18–36 months N = 63 b(SE) <sup>a</sup>	Group 4 3 yrs + N = 80 b(SE)	OR <sup>b</sup>	OR	OR <sup>b</sup>	OR <sup>b</sup>
<b>Step One</b>									
Baseline length of recovery	.03 (.007)	.38 (.14)	.17 (.07)	.06 (.08)	.01 (.01)	1.03	1.19**	1.06	1.04
Correctly classified %	70.59	64.7	72.5	84.1	85.9				
Model $\chi^2$	40.97***	7.2**	7.4**	.64	2.44				
<b>Step Two: Baseline recovery capital</b>									
General Social Support	ns	ns	ns	ns	ns				
Recovery support	ns	ns	ns	ns	ns				
12-step attendance	ns	ns	ns	ns	ns				
12-step involvement	.08 (.04)	ns	.20 (.07)	ns	ns	1.09*	1.22**		
Quality of life	ns	ns	ns	ns	ns				
Stress	ns	.24 (.12)	ns	ns	ns				
Spirituality	ns	ns	ns	ns	ns		1.27*		
Religiosity	ns	ns	ns	ns	ns				
Life meaning	.76 (.28)	ns	ns	ns	ns	2.15**			
Correctly classified %	73.20	69.41	68.75	84.1%	83.3				
Model $\chi^2$	16.07***	4.4*	7.96**	ns	5.21*				

\* p <.05

\*\* p <.01

\*\*\* p <.001

<sup>†</sup> p <.1 [trend]

<sup>a</sup> Standardized- $\beta$  reported

<sup>b</sup> Exponentiated b weight

Multiple linear regression results of baseline recovery capital as predictor of life satisfaction at one-year follow-up<sup>a</sup>

Table 5

	Total N = 312	Baseline Recovery Stage			
		Group 1 > 6 months N = 87	Group 2 6–18 months N = 82	Group 3 18–36 mo. N = 63	Group 4 3 years + N = 80
<b>Step One</b>					
Baseline life satisfaction	.33***	.25*	.25*	.21	.39***
F	36.46***	5.7*	5.28*	2.72†	13.42***
R <sup>2</sup>	11%	6.5%	6%	4%	15%
<b>Step Two: Baseline recovery capital</b>					
Length of recovery	.13*	.24*	ns	ns	ns
General Social Support	ns	ns	ns	-ns	ns
Recovery support	ns	ns	ns	ns	ns
12-step attendance	ns	ns	ns	ns	ns
12-step involvement	ns	ns	ns	ns	ns
Stress	-.15**	ns	ns	ns	ns
Spirituality	.21**	ns	ns	ns	ns
Religiosity	ns	ns	ns	ns	ns
Life meaning	ns	ns	ns	ns	ns
F	7.89***	5.72*	6.49**	6.02**	9.95***
R <sup>2</sup>	21%	12%	14%	17%	29%

\* p < .05

\*\* p < .01

\*\*\* p < .001

† p < .1 [trend]

<sup>a</sup> Standardized-β reported

Multiple linear regression results of baseline recovery capital as predictor of stress at one-year follow-up<sup>a</sup>

Table 6

	Total N = 312	Baseline Recovery Stage			
		Group 1 > 6 mos N = 87	Group 2 6-18 mos. N = 82	Group 3 18-36 m N = 63	Group 4 3 yrs + N = 80
<b>Step One</b>					
Baseline Stress	.36***	.27*	.19 <sup>†</sup>	.54	.36
F	44.58***	6.28*	2.78 <sup>†</sup>	24.69***	11.57***
R <sup>2</sup>	13%	7%	3%	29%	13%
<b>Step Two: Baseline recovery capital</b>					
Length of recovery	-.15**	ns	ns	ns	-.24*
General Social Support	ns	ns	ns	ns	ns
Recovery support	ns	ns	ns	ns	ns
12-step attendance	ns	ns	ns	ns	ns
12-step involvement	ns	ns	ns	ns	ns
Quality of life	.ns	-.18*	ns	ns	ns
Spirituality	-.21***	ns	ns	ns	ns
Religiosity	ns	ns	ns	ns	ns
Life meaning	ns	ns	ns	ns	ns
F	24.09***	5.6**	NA	15.51***	11.23***
R <sup>2</sup>	19%	12%	NA	34%	29%

\* p < .05

\*\* p < .01

\*\*\* p < .001

<sup>†</sup> p < .1 [trend]

<sup>a</sup> Standardized-β reported