



## Full length article

# Employment recovery capital in the treatment of substance use disorders: Six-month follow-up observations



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## ABSTRACT

**Background:** Recovery capital represents client strengths associated with substance use disorder (SUD) recovery. Employment is part of recovery capital supporting long-term recovery. However, specific employment recovery capital (ERC) factors associated with SUD recovery are not well understood.

**Methods:** The present study used retrospective logistic regression modeling to predict treatment completion at discharge and substance use at six-month follow-up from employment variables at intake and follow-up. An additional exploratory follow-up of ERC Change is further investigated. Existing clinical data from a random selection of all Iowa SUD treatment facilities receiving public funding from 1999–2016. Clients in the study (N = 8,925) were a mean age of 31.7 (SD = 11.8), mostly male (67.2%), and primarily White (86.6%). Measurements included substance use, treatment completion, ERC Change, demographic, and treatment statistical control variables.

**Results:** Results demonstrated that employment variables at intake predicted greater successful treatment completion,  $p < 0.0001$ . However, the same employment variables were predictive of maintained and increased use at six-month follow-up. Further investigation showed the best predictors of post-treatment recovery was a change in employment variables including months employed increase (AOR = 1.53, 95% CI = 1.34–1.75) and days missed from work due to substance use decrease (AOR = 2.43, 95% CI = 2.00–2.96).

**Conclusions:** Researchers and providers can help improve client recovery with intervention design, consultation, and policies focused on vocational growth in addition to employment benchmarks of gross income, full-time employment, occupation, primary support, months employed, and work missed. ERC is a promising route to improve the lives for those involved with substance use disorders.

## 1. Introduction

Substance use disorders (SUDs) are a serious public health concern contributing to health risks for the individual and their community (Csete et al., 2016; U.S. Department of Health and Human Services, 2016). Sustainable and effective SUD treatment provides relief from the health, social, and economic costs to society and the individual (Marshall et al., 2014; Mundt et al., 2005; U.S. Department of Health and Human Services, 2016). SUD treatment completion is associated with improved employment outcomes contributing to social and economic benefits such as greater employment status and reduced criminal involvement (Arndt et al., 2004; Arria, 2003; Evans et al., 2009;

Garnick et al., 2009; Zarkin et al., 2002). Therefore, substance use treatment succeeds in improving clients' lives and communities. Research on employment, substance use, and treatment tends to focus on SUD's contribution to poor vocational outcomes (Arria, 2003; Bray et al., 2000; French et al., 1991; Zarkin et al., 1998a, 1998b; Zarkin et al., 1998a; Zarkin et al., 2002, 2002). This existing research posits economic benefits are associated with reducing substance misuse. This approach fails in addressing clients' basic needs first. Rather, employment provides fulfillment of basic needs of survival, relatedness, and self-determination (Blustein, 2013, 2008). Thus, enhancing employment of those with SUDs may be associated with long-term recovery. Research focused on SUD treatment's effect on employment misses the

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benefits employment serves in recovery.

More recently, researchers have begun to investigate employment and education predicting treatment completion (Defulio et al., 2009; Defulio and Silverman, 2011; Sahker et al., 2015). Employment as a predictor could help to inform interventions supportive of recovery. For example, understanding that employment referrals are more predictive of treatment completion than criminal justice referrals (Sahker et al., 2015) may better inform policies funding employee assistance programs (EAPs). Vocational interventions could focus on SUD recovery through specific employment factors (Brown and Lent, 2016; Fitzgerald et al., 2013; Varghese, 2013; Varghese and Cummings, 2013). Yet, current research has identified limited employment variables supportive of recovery, and few employment-focused post-treatment studies exist.

Recovery capital represents client strengths and is positively associated with long-term recovery (Best, 2017; Best et al., 2015; Granfield and Cloud, 1999; Granfield and Cloud, 2001; Kelly, 2017; Laudet, 2012; Laudet et al., 2006; Moos and Moos, 2005). Recovery capital was originally conceptualized as personal, physical, cultural, and social resources aiding in recovery (Granfield and Cloud, 2001). Such resources have positive effects on overall health and quality of life (Jetten et al., 2010). The measurement of recovery capital has been mapped onto 10 factors of (1) substance use and sobriety, (2) global psychological health, (3) global physical health, (4) citizenship and community involvement, (5) social support, (6) meaningful activities, (7) housing and safety, (8) risk-taking, (9) coping and life functioning, and (10) recovery experience (Groshkova et al., 2013). Employment is one component of recovery capital (Best et al., 2015; Granfield and Cloud, 2001; Henkel, 2011). For example, the assessment of recovery capital scale (Groshkova et al., 2013) conceptualizes employment recovery capital (ERC) as a meaningful activity through access to employment opportunities. Employment provides improved self-determination, fundamental needs, and life-satisfaction (Blustein, 2008; Duffy et al., 2016). Self-determination theory suggests greater change is achieved through intrinsic meaning and is an overarching framework for understanding successful SUD treatment (Urbanoski, 2010; Wild et al., 2006, 1998). Indeed, employment represents a source of self-determination through intrinsically motivating factors (Deci and Ryan, 1985; Ryan and Deci, 2000). Thus, aspects of employment may represent recovery capital increasing the chances for treatment completion and long-term recovery. However, the specifics of ERC have not been identified and it is unclear which aspects of employment map onto the recovery capital framework.

The present research addresses a gap in the literature by investigating objective employment variables of ERC predicting (a) successful treatment completion, and (b) substance use at six-months follow-up. Second, ERC Change at follow-up is explored. Finally, the present investigation determines which employment variables provide the greatest contribution to abstinence at follow-up. Results may help to conceptualize employment components contributing to the theoretical framework of recovery capital. It is hypothesized that employment will predict both abstinence and reduced substance use. In addition, it is hypothesized that other understudied employment variables will predict abstinence or reduced substance use to a greater or lesser extent. Because access to employment opportunities fits the existing recovery capital framework of meaningful activities, it is further hypothesized that employment (i.e., full-time, part-time, unemployed) will represent the greatest adjusted odds of both Abstinence and Reduced Substance Use.

## 2. Materials and methods

### 2.1. Procedure

Data consisted of a random sample from the population of clients admitted to Iowa substance use treatment programs receiving public

funding in settings including: medically monitored residential, clinically managed residential, intensive outpatient, or outpatient. All data were compiled in the Iowa Central Data Repository by the Iowa Department of Public Health, merged with electronic health files, and assembled into a client management system (I-SMART). The Iowa Consortium for Substance Abuse Research and Evaluation (Consortium) select yearly random samples from all I-SMART treatment data, conduct six-month follow-up telephone interviews, and compile follow-up data into the Outcomes Monitoring System (OMS). Each OMS response set includes a merged single treatment episode including admission, treatment discharge, and follow-up interview data. Individuals are not sampled twice. The Iowa Department of Public Health approved the use of a deidentified and concatenated OMS dataset for years 1999 to 2016 (N = 8925). OMS sampling varied over the years, ranging from 5% to 15% of the population. Admission data, as well as follow-up data, are client self-reported. Because these data represent de-identified existing program evaluation information, no informed consent was given and the University Human Subjects Office, Institutional Review Board exempted this study from review.

### 2.2. Outcome variables

Data were collected at treatment admission, discharge, and six-month follow-up. Three outcome variables were tested: Abstinence, Total Use, and Treatment Completion. First, Abstinence was calculated using Past Six-Month Use from treatment completion to follow-up. Second, Total Use included three discrete categories calculated by subtracting Primary Use Frequency-Admission from at Past Six-Month Use. Primary Use Frequency-Admission was collected and reported to SAMHSA's Treatment Episodes Datasets – Admission (United States Department of Health and Human Services. Substance Abuse and Mental Health Services Administration. Office of Applied Studies, 2017). Past Six-Month Use was collected by the Consortium approximately six-months after treatment discharge. For Past Six-Month Use, respondents indicated any and all substance use and frequency during the past six months. Total Use included Abstinence (no past 6-months use; n = 4408), Reduced (lower use comparing admission and follow-up; n = 1497), and Maintained (same or increased use at follow-up; n = 3026). Third, Treatment Completion is a dichotomous variable consisting of successful and unsuccessful treatment completion collected at treatment discharge. Counselor rated assessment defines successful completion as treatment plan completion, fully or substantially. Unsuccessful completion consists of all other reasons for program termination.

### 2.3. Employment recovery capital (ERC)

Employment variables in the model include (a) Employment, (b) Occupation, (c) Primary Support, (d) Past Six Months Employed (Months Employed), (e) Work Missed (past month days of work missed due to substances use), and (f) Gross Income. Employment consists of full-time, part-time, unemployed/looking, and not in labor force. Occupation consists of none, professional/managerial, sales/clerical, crafts/operatives, laborers, farm, and service/household. Primary Support consists of none, wages, family/friends, public assistance (including all federal/state income programs), retirement, disability, and other. Months Employed and Work Missed are ordinal, and Gross Income is continuous.

### 2.4. ERC change

Each of the six employment variables' change from admission to six-month follow-up were coded as increased, no change, or decreased increased. Continuous variables (i.e., Months Employed, Work Missed, Gross Income) were simply categorized by change at follow-up. Categorical variables were treated as ordinal in terms of most

**Table 1**  
Demographic and treatment variables at SUD treatment admission stratified by Total Use outcome.

Variable	Total (%)	Treatment Completion (%)		Six-Month Follow-Up Total Use (%)		
		Successful	Unsuccessful	Abstinence	Reduced	Maintained
	N = 8925	n = 5,452	n = 3,455	n = 4,443	n = 1,473	n = 3,009
<b>Demographic Variables</b>						
Age at Admission <i>M(SD)</i>	31.7(11.8)	31.9(11.9)	31.5(11.6)	33.3(12.0)	31.8(11.6)	29.5(11.3)
Sex						
Female	32.8	30.8	35.8	36.2	34.9	26.6
Male	67.2	69.2	64.2	63.8	65.1	73.4
Race						
White	86.6	88.4	83.7	86.5	86.1	86.9
African Am/Black	11.0	9.2	13.7	10.9	11.5	10.9
Other/Multiple	1.4	1.5	1.3	1.5	1.3	1.4
Native American	1.0	0.9	1.3	1.1	1.2	0.9
Ethnicity						
Not Hispanic/Latino	96.1	95.9	96.4	96.1	95.6	96.2
Puerto Rican	0.5	0.5	0.4	0.4	0.9	0.4
Mexican	2.1	2.3	1.7	2.1	2.0	2.1
Cuban	0.0	0.0	0.1	0.1	0.0	0.0
Other Hispanic/Latino	1.4	1.3	1.5	1.4	1.5	1.3
<b>Clinical Variables</b>						
Primary First Use Age <i>M(SD)</i>	17.4(7.2)	17.4(6.6)	17.6(8.1)	18.0(8.0)	16.9(6.9)	16.9(6.0)
Treatment Setting						
Extended Outpatient	63.6	66.9	58.4	62.6	47.2	73.2
Intensive Outpatient	17.5	14.5	22.3	16.5	25.5	15.1
High Intensity Clinically Managed	11.0	11.0	11.0	11.1	24.2	4.2
Low Intensity Clinically Managed	1.8	1.5	2.3	2.3	1.2	1.4
Continuing Care	5.9	5.9	5.8	7.2	1.5	6.1
Medical and Detox	0.2	0.2	0.1	0.2	0.4	0.0
No Treatment Recommended	0.0	0.0	0.0	0.0	0.1	0.0
Primary Substance						
Alcohol	49.5	53.7	43.0	46.2	48.5	55.1
Marijuana	25.4	24.4	27.0	24.7	26.2	26.1
Methamphetamine	17.0	15.7	18.9	20.7	15.1	12.3
Cocaine	4.8	3.4	6.8	4.9	4.8	4.5
Opiates and Synthetics	1.6	1.4	2.0	1.9	2.7	0.8
Heroin	0.7	0.5	1.0	0.5	1.6	0.5
Other Prescription drugs	0.6	0.5	0.8	0.6	1.0	0.5
Other	0.4	0.4	0.4	0.5	0.3	0.3
Primary Use Frequency-Admission						
No Use in Past 6 Months	13.2	15.0	10.5	17.7	0.0	13.2
No Past Month Use	30.9	33.4	26.8	34.8	0.1	40.2
1-3 Times in Past Month	23.0	22.9	23.2	20.7	17.1	29.4
1-2 Times Per Week	11.0	10.2	12.1	7.7	19.4	11.6
3-6 Times Per Week	8.0	7.2	9.4	6.6	21.9	3.4
Daily	13.9	11.3	18.0	12.5	41.6	2.3
Referral Source						
Criminal Justice	58.0	63.1	50.0	57.0	43.4	66.8
Self	11.1	8.5	15.1	10.6	19.0	8.0
Healthcare Provider	4.7	3.7	6.2	4.3	10.1	2.6
Alcohol/Drug Abuse Provider	11.5	11.3	11.9	12.4	13.8	9.1
Other	10.9	10.1	12.2	11.4	10.4	10.5
DHS	3.8	3.3	4.5	4.5	3.4	3.0
Number of Problem Substances						
0	46.5	49.2	42.2	44.6	45.5	49.9
1	23.9	24.4	23.3	24.4	22.5	24.0
2	13.4	12.4	15.1	14.2	13.0	12.6
3+	16.1	14.0	19.5	16.9	19.0	13.6

**Note.** Percentages may not add to 100 due to rounding; DHS, department of human services. *M*, mean; *SD*, standard deviation.

employment capital. Primary support consisted of wages, other supports, and no support. A move from no support to other support (i.e., friends and family, public assistance) was determined to be an increase. Occupation was dichotomized to no occupation and any occupation. Change from nothing to something was treated as an increase. Employment was ordered from most to least recovery capital as such: full time, part time, unemployed-looking, out of the labor force. These variables may not represent true ordinal values in that part time is neither better nor worse than full time employment. However an assessment of recovery capital works by adding individual assets one has to form an index score (Arndt et al., 2017). The present research explores if a change in ERC is indeed meaningful.

## 2.5. Statistical control and descriptive variables

Statistical controls included demographic variables of Sex, Age at Treatment Admission, Race, and Ethnicity. Additionally, the clinical variable Number of Problem Substances was also used as a statistical control. Race and Ethnicity were recorded by treatment agency staff as two separate and overlapping variables. Number of problem substances ranges 0–3 and includes problem substances clients list as primary, secondary, or tertiary. Clients select 0 problem substances for different reasons that are not reported. It may be that they do not believe they have a problem substance, or that many substances are equally problematic.

**Table 2**  
Employment variable comparisons and differences stratified by Treatment Completion and Total Use at follow-up.

Variable at Admission	Treatment Completion (%)			Total Use at Six-Month Follow-Up (%)				
	Successful n = 5,452	Unsuccessful n = 3,455	Successful Vs. Unsuccessful Difference	Abstinence n = 4,443	Reduced n = 1,473	Maintained n = 3,009	Abstinence Vs. Maintained Difference	Reduced Vs. Maintained Difference
Employment <sup>a,b</sup>								
Employed full time	34.0	24.9	<b>9.1</b>	29.6	24.9	34.4	-4.8	-9.5
Employed part time	15.9	13.9	2.0	13.9	13.0	17.9	-4.0	-4.9
Unemployed-looking	27.1	35.5	-8.4	31.4	34.4	26.8	4.6	7.7
Not in labor force	23.1	25.8	-2.7	25.1	27.8	21.0	4.1	6.8
Occupation <sup>a,b</sup>								
None	40.9	48.3	-7.4	46.0	49.4	37.7	<b>8.3</b>	<b>11.7</b>
Prof/Managerial	4.3	3.3	1.0	3.9	3.8	3.9	0.0	-0.1
Sales/Clerical	6.3	6.1	0.2	6.0	5.4	6.9	-1.0	-1.5
Crafts/Operatives	5.5	3.9	1.7	4.6	4.4	5.6	-1.0	-1.2
Laborers	29.3	25.6	3.6	26.6	25.3	30.9	-4.4	-5.6
Farm	2.1	1.8	0.3	1.9	1.9	2.1	-0.2	-0.2
Service/Household	11.7	11.1	0.6	11.1	9.8	12.9	-1.8	-3.1
Primary Support <sup>a,b</sup>								
None	18.5	22.4	-3.9	22.4	21.5	15.8	<b>6.5</b>	<b>5.7</b>
Wages	48.6	38.2	<b>10.4</b>	43.0	37.2	50.6	-7.6	-13.4
Family/Friends	23.4	29.4	-6.0	24.5	29.7	25.6	-1.1	4.2
Public Assistance	2.8	2.8	0.0	3.2	3.1	1.9	1.3	1.2
Retirement	0.7	0.6	0.1	0.8	1.0	0.3	0.4	0.6
Disability	2.1	2.3	-0.2	2.5	1.9	1.9	0.6	0.0
Other	3.9	4.3	-0.5	3.6	5.6	3.8	-0.2	1.8
Past Six Months Employed M (SD)	3.0(2.6)	2.6(2.6)	0.4 <sup>c</sup>	2.6(2.6)	2.7(2.6)	3.2(2.6)	-0.6 <sup>c</sup>	-0.5 <sup>c</sup>
Days Missed work/ school M(SD)	6.3(22.8)	8.4(26.0)	-2.1 <sup>c</sup>	8.0(25.9)	7.5(24.4)	5.6(20.9)	2.4	1.9 <sup>c</sup>
Gross Monthly Income† \$M (SD)	649.55(840.37)	516.61(820.21)	132.94 <sup>c</sup>	566.40(792.41)	560.75(872.93)	663.36(872.38)	-96.96 <sup>c</sup>	-102.61 <sup>c</sup>

**Note.** † centered at its mean; **Bold**, clinically meaningful difference greater than |5|; M, mean; SD, standard deviation.

<sup>a</sup> p < 0.001 chi square test for difference comparing Treatment Completion.

<sup>b</sup> p < 0.001 chi square test for difference comparing Total Use at six-month follow-up.

<sup>c</sup> p < 0.001 Mann-Whitney U test.

Descriptive variables included clinical variables recorded at admission. These included Primary First Use Age, Treatment Setting, Primary Substance, Primary Use Frequency-Admission, and Referral Source. Primary First Use Age is the age of the client when they first used their primary problem substance. Treatment Setting includes extended outpatient, intensive outpatient, high intensity clinically managed, low intensity clinically managed, continuing care, medical and detox, and no treatment recommended. Treatment Setting is in line with the American Society of Addiction Medicine (ASAM) criteria (Mee-Lee et al., 2013). Primary Substance includes alcohol, marijuana, methamphetamine, cocaine, opiates and synthetics, heroin, other prescription drugs, and other (low frequency drugs). Primary Use Frequency includes no use in past six months, no past month use, 1–3 times in past month, 1–2 times per week, 3–6 times per week, and daily use. Referral Source includes criminal justice, self, healthcare provider, alcohol/drug treatment provider, employment/other, and DHS. Due to low frequencies employment (including employee assistance programs [EAP]), other individual, and school referrals had to be collapsed into the “other” category.

## 2.6. Statistical analysis

Analyses were conducted using SAS 9.4. The primary test analyzed the association of ERC variables on Total Use at six-months post SUD treatment, which included (a) abstinence and (b) reduced use, and (c) maintained/increased use. First, ERC was investigated predicting treatment completion. Second, six-month follow-up total use was

investigated using bivariate multinomial logistic regressions for each employment variable. Third, effects were presented for each employment variable. Fourth, follow-up bivariate logistic regressions were used to assess ERC Change predicting abstinence at six-month follow-up. Fifth, to assess unique contributions, each significant ERC Change variable was assessed through a backward selection procedure. ERC Change variables that remained in the model were then adjusted for number of problem substances, race, ethnicity, sex, and age. Odds ratios (OR) were presented for regression analyses both Total Use and Abstinence likelihood effects. Additionally, Mann-Whitney U tests were used to compare continuous variables due to non-normal distributions with Probabilistic Index for effect size (Acion et al., 2006; Grissom and Kim, 2012). In the Probabilistic Index, a probability ( $P_{x > y}$ ) of 0.50 indicates a 50% probability x is greater than y and would indicate no effect. Chi-square tests with risk difference (RD) effect sizes were used for categorical variables. RD is the inverse of number needed to treat (NNT; Grissom and Kim, 2012). For instance, an RD of 5 equals an NNT of 20. RDs greater than |5| are considered clinically meaningful effects in accordance with previous research (Sahker et al., 2015; St. Marie et al., 2015). Because of the larger sample size (N = 8,925) and multiple tests, small differences have a greater probability to reach statistical significance. To adjust for the potential inflation in the Type I error rate, alpha was set at p < 0.01. The final adjusted regression model sample size was reduced due to missing demographic data (n = 7,509).

### 3. Results

Table 1 shows client demographics and clinical variables for the entire sample ( $N = 8,925$ ) stratified by Treatment Completion and Total Use. The outcome of Total Use at six-month follow-up consisted of abstinence (49.8%), reduced use (16.5%), and maintained use (33.7%). The full sample were a mean age of 31.7 ( $SD = 11.8$ ), mostly male (67.2%), primarily White (86.6%) and non-Hispanic/Latino (96.1%). Outpatient care comprised the majority of services with extended outpatient (63.6%) and intensive outpatient (17.5%) settings. Most clients completed treatment successfully (61.2%).

#### 3.1. Treatment completion

All six employment variables predicted greater successful treatment completion in bivariate models. Successful treatment completion was predicted by Employment (Wald  $\chi^2_{[3]} = 117.11$ ,  $p < 0.0001$ ), Occupation (Wald  $\chi^2_{[6]} = 55.13$ ,  $p < 0.0001$ ), Primary Support (Wald  $\chi^2_{[6]} = 98.28$ ,  $p < 0.0001$ ), Months Employed (Wald  $\chi^2_{[1]} = 60.50$ ,  $p < 0.0001$ ), Work Missed (Wald  $\chi^2_{[1]} = 16.44$ ,  $p < 0.0001$ ), Gross Income (Wald  $\chi^2_{[1]} = 51.16$ ,  $p < 0.0001$ ). Employment percentages and differences are displayed in Table 2.

#### 3.2. Six-month follow-up

The omnibus multinomial logistic regression predicting Total Use was significant,  $p < 0.0001$ . While all employment variables significantly predicted Total Use at six-month follow-up, differences between abstinence and reduced use versus maintained use were predictive in unexpected directions. Greater ERC at admission was associated with lower abstinence and reduced use compared to maintained use at treatment follow-up. Table 2 presents percentages and clinically meaningful effect sizes. All ERC variables were significantly predictive of Total Use and included: Employment ( $\chi^2_{[6]} = 99.7$ ,  $p < 0.0001$ ), Occupation ( $\chi^2_{[12]} = 74.9$ ,  $p < 0.0001$ ), Primary Support ( $\chi^2_{[12]} = 129.4$ ,  $p < 0.0001$ ), Months Employed (Abstinence Mann-Whitney  $U = 7336230$ ,  $p < 0.0001$ , Reduced Use Mann-Whitney  $U = 1993687.5$ ,  $p < 0.0001$ ), Work Missed (Reduced Use Mann-Whitney  $U = 2408151$ ,  $p < 0.0001$ ), and Gross Income (Abstinence Mann-Whitney  $U = 6780096$ ,  $p < 0.0001$ , Reduced Use Mann-Whitney  $U = 1906175$ ,  $p < 0.0001$ ). Probabilistic Index scores demonstrated that no Mann-Whitney  $U$  test was clinically meaningful in effect size.

The present study hypothesized that ERC present at admission would predict greater abstinence. However, the opposite was true in almost every case. These findings suggest full-time employment, no occupation, and more months employed (i.e., more ERC) are associated with greater maintained substance use at six-month follow-up. ERC at admission may fail to capture self-improvement. Therefore, ERC Change at follow-up was explored as a predictor of abstinence.

#### 3.3. ERC change from admission to six-month follow-up

ERC Change predicting abstinence is presented in Table 3. Increases and no change in ERC from admission to follow-up were associated with the greater abstinence at follow-up. Five of the six employment variables significantly predicted abstinence at follow-up in bivariate models ( $p < 0.01$ ). Primary Support was not significant ( $p = 0.0104$ ) and therefore excluded from the backward selection multivariate model. The backward selection model revealed two employment variables were providing unique contributions to predicting abstinence; Work Missed Change and Months Employed Change. Compared to increased Work Missed, no change (AOR = 2.67, 95% CI = 2.23–3.12) and decreased (AOR = 2.43, 95% CI = 2.00–2.96) Work Missed was more associated with Abstinence. Additionally, increased Months Employed was more associated with Abstinence than was decreased

Months Employed (AOR = 1.53, 95% CI = 1.34–1.75). Age at admission and sex were significant in the adjusted model. Fig. 1 demonstrates significant abstinence differences associated with Work Missed Change and Months Employed Change. Work Missed Change shows a particularly disparate difference comparing increased and decreased days.

### 4. Discussion

The present research addresses a critical gap in the literature by assessing the importance of ERC in the treatment of SUDs. First, employment variables present at intake were hypothesized to predict (a) successful treatment completion, (b) abstinence at six-month treatment follow-up and (c) reduced use at six-month treatment follow-up. The hypothesis was based on literature demonstrating current employment predicts successful treatment completion and abstinence, respectively (Adamson et al., 2009; Brewer et al., 1998; Defulio et al., 2009; Defulio and Silverman, 2011; Henkel, 2011; Room, 1998). This hypothesis was partially supported. ERC predicted greater successful treatment completion. However, the same ERC at admission predicted maintained/increased use at six-month follow-up.

Second, the employment variables under investigation were assessed for predictive value. However, as more ERC was associated with greater maintained/increased use, the clinical utility of this information was difficult to consider for treatment planning. Clinically speaking, a provider would most likely not consider having too much ERC as a deficit requiring intervention. Thus, the predictive value of ERC Change was explored from admission to follow-up. Results from the ERC Change model demonstrated that those with increased Months Employed Change and decreased Days Missed Change were more likely to be abstinent at six-month follow-up. Odds were increased when controlling for race, ethnicity, age, sex and number of problem substances.

The greatest contribution of the present research is the finding showing improvement of ERC predicts greater abstinence at follow-up, rather than amassing objective employment assets. In other words, simply securing a job or earning significant income is not a good predictor of abstinence. Instead, clients improving their employment, no matter what level they begin at treatment admission, may demonstrate greater long-term SUD recovery outcomes. This contribution has implications for existing theory, as well as clinical implications. For instance, assessment of ERC may best be served as a change in employment. Moreover, objective employment markers of Months Employed and Days Missed contribute the most variance in change among the variables tested. More work is needed to investigate clients' personal perceptions of ERC Change.

The present findings demonstrate two important results. First, greater ERC at admission predicted greater maintained use at follow-up, which is somewhat contrary to research on recovery capital demonstrating associations with increased long-term recovery (Laudet, 2012; Laudet et al., 2006; Moos and Moos, 2005). Rather, the present findings contribute evidence supporting ERC as a dynamic and improvable point of intervention (Best et al., 2012; Hibbert and Best, 2011; Moos and Moos, 2005). Second, it was improvement in ERC Change that was associated with greater odds of abstinence. It was growth, improvement, and change that proved to be more predictive of recovery. Granted, this was only a six-month follow-up study. Though, the dramatic bidirectional associations suggest an important difference in accumulation of ERC versus improvement of ERC.

Theoretically, improving ERC is a good idea. However, many SUD treatment clients are in treatment due to probation/parole stipulations. Having a criminal record can make finding employment more difficult. Yet, the present sample was overwhelmingly referred by criminal justice sources. Ultimately, criminalizing SUDs is a barrier to recovery and has implications in social/community capital. Even considering the social, legal, stigmatic constraints of SUD treatment, developing

**Table 3**  
Logistic regression models predicting abstinence from ERC at six-month follow-up.

Variables	df	Wald $\chi^2$	p value	OR	95% CI	Adjusted Wald $\chi^2$	Adjusted p value	AOR	95% CI
<b>Step 1: Multinomial Models Predicting Use (N = 8925)</b>									
Employment	6	99.26	< .0001						
Occupation	12	74.59	< .0001						
Primary Support	12	127.67	< .0001						
Months Employed	2	69.73	< .0001						
Work Missed (Days)	2	17.76	< .001						
Gross Income	2	26.54	< .0001						
<b>Step 2: Bivariate Change Models Predicting Abstinence (N = 8925)</b>									
Employment Change	2	10.98	< .01						
Occupation Change	2	15.81	< .001						
Primary Support Change	2	9.13	= .0104						
Months Employed Change	2	31.03	< .0001						
Work Missed (Days) Change	2	107.25	< .0001						
Gross Income Change	2	19.38	< .0001						
<b>Step 3: Backward Selection Change Model<sup>a</sup> (n = 7509)</b>									
Work Missed (Days) Change	2	116.77	< .0001			113.66	< .0001		
Increased				ref				ref	
No Change				2.48*	2.10-2.92			2.67*	2.23-3.12
Decreased				2.39*	2.00-2.86			2.43*	2.00-2.96
Months Employed Change	2	41.56	< .0001			51.55	< .0001		
Increased				1.43*	1.27-1.61			1.53*	1.34-1.75
No Change				1.14*	1.01-1.29			1.14	0.99-1.31
Decreased				ref				ref	
Occupation Change	2	0.55	= .76			2.30	= 0.32		
Employment Change	2	1.47	= .48			2.83	= 0.24		
Gross Income Change	2	3.87	= .14			3.95	= 0.14		
<b>Step 4: Adjusted Model<sup>b</sup></b>									
Number of Problem Substances	2					4.70	= 0.20		
Race	3					0.80	= 0.85		
Ethnicity	4					2.75	= 0.60		
Sex	1					50.82	< .0001		
Male								ref	
Female								1.43*	1.30-1.58
Age at Admission	1					139.12	< .0001		
Per 1-year increase								1.024*	1.020-1.029

Note. df, degrees of freedom; CI, confidence interval; OR, odds ratio; AOR, Adjusted Odds Ratio controlling for sex, age, race, ethnicity, and number of problem substances.

<sup>a</sup> Backward selection criteria set to  $p = 0.01$ . Non-significant variables were excluded from the adjusted model.

<sup>b</sup> Adjusted model included Work Missed Change, Months Employed Change, Number of Problem Substances, Race, Ethnicity, Sex, and Age at Admission. The sample size was reduced in the adjusted model due to missing demographic data.

\* Odds ratio significantly different than 1.

improvements in ERC may be a difficult, but beneficial pursuit.

#### 4.1. Clinical implications

Treatments incorporating employment goals as part of recovery interventions may benefit from developing feedback informed goals highlighting ERC Change and improvement. Employment Change, Occupation Change, Months Employed Change, Work Missed Change, and Gross Income Change were all significant in bivariate models. Yet, a variable selection procedure highlighted that Months Employed Change and Work Missed Change are responsible for the unique contributions predicting abstinence. This finding contributes to the literature by highlighting ERC factors that may be important points of intervention. This may mean that any job can be a source of ERC. The present findings suggest that researchers and clinicians can be more specific in how they target employment outcomes. In addition, it may not matter where a client begins in terms of ERC. Rather, improvement is the important factor contributing to recovery.

Baseline static measures of employment were great predictors of treatment completion, but bad predictors of recovery post-treatment. It may be that having access to financial resources was interpreted by the client as a lack of a problem, despite criminal justice involvement. Therefore, treatment gains may not be maintained after their court-

mandated conditions have been met. Alternatively, the more financial resources one has, the easier it may be to access substances. It may also be that improvement of ERC represents behaviors incompatible with substance use (Conyers et al., 2004; Goetz et al., 1975; Petscher et al., 2009). Whereas an accumulation of ERC prior to admission may not provide the same behavior-change effects. With this in mind, SUD interventions may see greater success when focused on ERC Change. Developing improved self-efficacy and outcome expectations of employment (Brown and Lent, 2013; Lent et al., 1994) may be helpful in SUD treatment.

#### 4.2. Limitations

This research has limitations of note. First, we were limited in our ability to measure all aspects of ERC due to our use of existing data. There may additional aspects of ERC that have yet to be determined. For instance, environmental sources of happiness (Warr, 2007), outcome expectations and self-efficacy (Brown and Lent, 2013; Lent et al., 1994), or social class associations with treatment and recovery (Liu et al., 2009) could be directly measured. Second, employment referral source did not occur with enough frequency to investigate. Employment referrals are predictive of substance use treatment completion (Capraro, 2000; Marzell et al., 2017; Sahker et al., 2015; St. Marie et al., 2015)

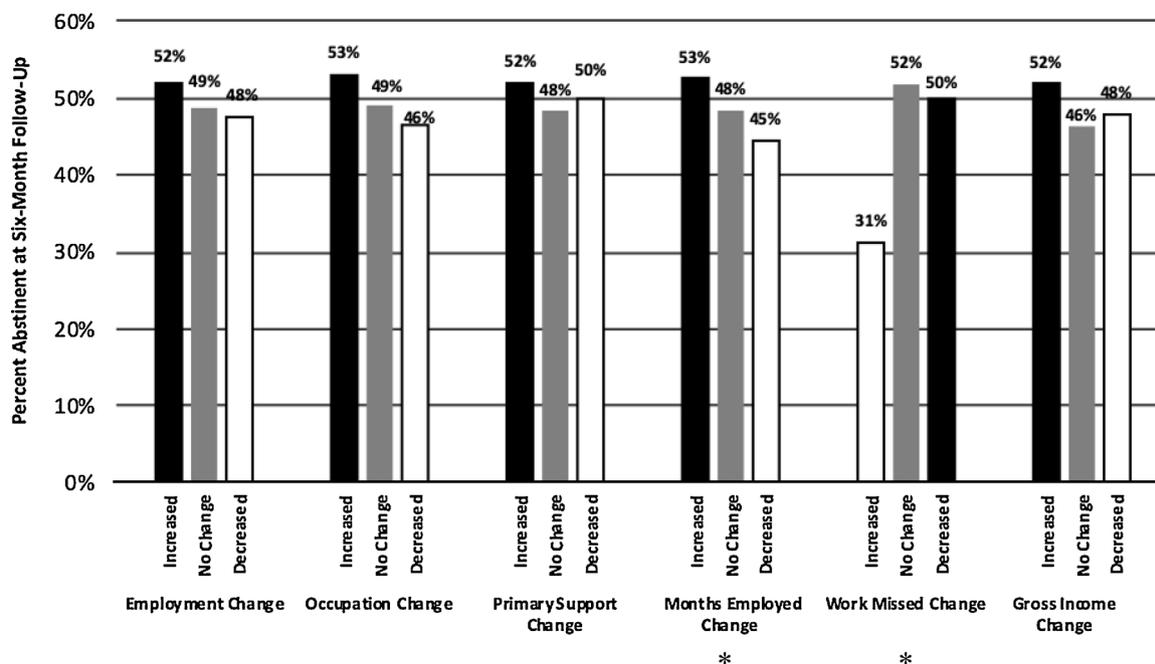


Fig. 1. Percent Abstinent by employment change at six-month follow-up.

All six employment change variables with the percent abstinent at six-month follow-up. Primary Support was non-significant in initial bivariate tests. Only Work Missed and Months Employed remained significant in the backward selection multivariate model and adjusted model.

\* = significant at  $p < 0.001$ .

and successful completion of substance use treatment is associated with improved employment outcomes (Arndt et al., 2004; Arria, 2003; Evans et al., 2009; Garnick et al., 2009; Zarkin et al., 2002).

Third, the present findings are not generalizable to the entire US. Yet, these findings do represent a meaningful proportion of the US. The present sample represents a population attending treatment centers receiving federal or state funding in one Midwest state. Generally, the present sample exemplifies a treatment population representative of a lower social class/socioeconomic status. In addition, those from lower social class backgrounds are the most in need of supported employment interventions. Thus, the limitation of the present research can alternatively be seen as a strength as those involved may be in need of attention. The present sample represents only one Midwestern state with its own employment and treatment needs limiting generalizability to a Midwestern and a more rural than urban population. Finally, the present research does not explain why ERC was associated with successful treatment completion and also increased use at follow-up. Wild et al. (2006) suggest that treatment coercion from criminal justice and other social sources provides motivation to complete SUD treatment, but may not extend to post-treatment recovery. More research is required to understand how the present findings are associated with either motivating factors of recovery. For instance, ERC Change may map onto the social capital domain (Best et al., 2012) as clients improve community connections through work. Alternatively, it may be more personal and derived through educational/employment self-efficacy and success (Terrion, 2013).

### 5. Conclusion

Treatment providers can help to improve use outcomes and the quality of life for those in SUD treatment by becoming involved in intervention design, consultation, and policies focused on ERC Change. Greater research in ERC can further identify beneficial points of intervention. While the presence of ERC at admission was associated with treatment completion, it was not associated with abstinence or reduced use at six-month follow-up. Instead, improving recovery capital through treatment and beyond predicted greater abstinence. In addition, it was

increased Months Employed Change and Decreased Worked Missed Change providing unique contributions to abstinence. The present findings suggest that research and practice could focus more on finding decent work, increasing employment length, and decreasing days missed from work due to substances. Focusing on more motivating factors of ERC improvement may help improve recovery outcomes. ERC is one route for treatment providers to increase engagement that can help to improve the people and communities struggling with substance use.

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### Contributors

All authors have contributed to and approved the final article. Dr. Sahker, PhD, contributed to the literature search, study design, data collection, data analysis, data interpretation, writing, and editing. Dr. Arndt, PhD, contributed to, study design, data collection, data analysis, data interpretation, writing, and editing. Dr. Rasheed Ali, PhD, contributed to, study design, data interpretation, writing, and editing.

### Declaration of Competing Interest

No conflict declared.

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