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ORIGINAL ARTICLE

## Gender Differences in Treatment Retention Among Individuals with Co-Occurring Substance Abuse and Mental Health Disorders

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**Background:** A significant number of individuals with co-occurring substance abuse and mental health disorders do not engage, stay, and/or complete residential treatment. Although prior research indicates that women and men differ in their substance abuse treatment experiences, our knowledge of individuals with co-occurring substance abuse and mental health disorders as well as those attending private residential treatment is limited. **Objectives:** The purpose of this study is to examine gender differences on treatment retention for individuals with co-occurring substance abuse and mental health disorders who participate in private residential treatment. **Methods:** The participants were 1,317 individuals (539 women and 778 men) with co-occurring substance abuse and mental health disorders receiving treatment at three private residential treatment centers. Bivariate analyses, life tables, and Cox regression (survival analyses) were utilized to examine gender effects on treatment retention, and identify factors that predict treatment retention for men and women. **Results:** This study found that women with co-occurring disorders were more likely to stay longer in treatment when compared to men. The findings indicate the factors influencing length of stay differ for each gender, and include: type of substance used prior to admission; Addiction Severity Index Composite scores; and Readiness to Change/URICA scores. Age at admission was a factor for men only. **Conclusions/Importance:** These findings can be incorporated to develop and initiate program interventions to minimize early attrition and increase overall retention in private residential treatment for individuals with co-occurring substance use and mental health disorders.

**Keywords** gender differences, co-occurring disorders, dual diagnosis, substance abuse and mental health disorder, retention, predictors, residential treatment

Length of stay (LOS) in substance abuse treatment is a strong predictor of treatment outcomes with longer lengths of stay in treatment associated with lower post-treatment substance use rates (DeLeon & Schwartz, 1984; Greenfield et al. 2003; Simpson, Joe, & Rowan-Szal, 1997). Longer periods of treatment engagement are also associated with lower readmission rates (Moos & Moos, 1995). Although the significance of remaining in treatment is well established, leaving treatment prior to completion or against clinical advice remains a treatment concern (Ball, Carroll, Canning-Ball, & Rounsaville, 2006) and is associated with poor treatment outcomes (Deane, Wootton, Hsu, & Kelly, 2012).

Treatment retention is a widely used proxy for treatment outcomes such as substance use relapse, recidivism to crime, and sustained recovery. Factors related to both treatment program characteristics and individual patient characteristics have been investigated for their impact on retention in treatment. Program factors such as therapeutic alliance, the use of motivational interviewing, gender-specific programming, gender-specific interventions, payment source, and inclusion of treatment for co-morbid mental health issues have all been studied for their impact on retention.

Therapeutic alliance is strongly associated with remaining in treatment (Marsh, Angell, Andrews, & Curry, 2012; Simpson, Joe, Rowan-Szal, & Greener, 1997) and treatment attendance (Mullins, Suarez, Ondersma, & Page, 2004) but appears to impact outcomes somewhat less significantly than retention or attendance (Simpson, Joe, & Rowan-Szal, 1997). Motivation for treatment is considered a robust predictor of retention (Adamson, Sellman, & Frampton, 2009). The impact of using motivational interviewing or enhancement on retention has mixed findings with positive results for the early stages of treatment retention (Carroll et al., 2006). However, Mullins and colleagues (2004) found that the use of

motivational interviewing did not demonstrate significant improvement over education counseling. Gender-specific programming has been found to be a significant factor in both treatment retention and outcomes for women (Ashley, Marsden, & Brady, 2003; Greenfield et al., 2008; Greenfield, Cummings, Kuper, Wigderson, & Koro-Ljungberg, 2013). Further studies have found that attention to issues, such as employment, trauma, and mental health in a gender-specific manner resulted in positive retention and treatment outcomes (Adams et al., 2011; Brady & Ashley, 2005; Grella, 2008; Green, Polen, Dickinson, Lynch, & Bennett, 2002; Greenfield, Back, Lawson, & Brady, 2010). Payment source has also been associated with LOS in treatment with private insurance patients having shorter lengths of stay (Brady & Ashley, 2005). The recognition of the co-occurring nature of psychiatric disorders and substance use disorder and the need to simultaneously treat both has resulted in the development of specialty treatment programs based on an integrated model (SAMHSA, DASIS Report, 2003), positively impacting both outcomes and retention.

Personal and substance use characteristics have been found to be inconsistent predictors of treatment retention and outcomes (Hiller, Knight, Leukefeld, & Simpson, 2002; Hser, Joshi, Maglione, Chou, & Anglin, 2001; Joe, Simpson, & Broome, 1998, 1999). Age is the only socio-demographic characteristic that consistently predicts retention in substance abuse treatment regardless of gender, with older age associated with longer lengths of stay (Adams et al., 2011; Hall, Prendergast, Wellisch, Patten, & Cao, 2004; Pelissier, Motivans, & Rounds-Bryant, 2005). Primary drug of choice has been investigated as a predictor of retention in 90-day residential treatment with alcohol use associated with longer retention when compared to other substance use (Deane, et al., 2012). Drug Abuse Treatment Outcomes Survey data analysis revealed that programs serving patients with greater psychological severity and higher cocaine and alcohol use had shorter lengths of stay (Simpson, Joe, & Brown, 1997). Patients with a higher motivation at intake are also more likely to remain in treatment than those with lower motivation at intake (Simpson et al., 1997). A history of trauma (Tull, Gratz, Coffey, Weiss, & McDermott, 2013; Logan, Walker, Jordan, & Leukefeld, 2006), stress response (Tull et al., 2013), multiple life stressors (Kelly, Blacksin, & Mason, 2001; Comfort, Sockloff, Loverro, & Kaltenbach, 2003), and self-efficacy (Cummings, Gallop, & Greenfield, 2010) have also been found to impact retention.

A study of insured outpatient treatment attendees revealed that having fewer and less severe drug problems improved retention and that there were gender differences in the factors that impacted retention (Mertens & Weisner, 2000). In women, higher retention was associated with being married, having a higher income, not being African American, having lower psychiatric severity, and being unemployed; and in men, age, employer involvement, and abstinence goals were predictors of higher retention (Mertens & Weisner, 2000). By contrast, a study of 268 patients at a publicly funded outpatient center, patient

substance use did not predict retention; however, being male, Caucasian and having higher severity in employment composite score as measured by the ASI were associated with longer retention and greater attendance in outpatient treatment (McCaul, Svikis, & Moore, 2001).

Overall, women appear to be less likely to use substance use treatment services (Wu, Ringwalt, & William, 2003; Kim et al. 2011), and are among those at most risk for not accessing mental health treatment when needed (Roll, Kennedy, Tran, & Howell, 2013). Although, in general, women use substances for shorter periods of time prior to entering treatment than men, they appear to enter treatment with greater severity of issues (Greenfield et al., 2010; Piazza, Vrbka, & Yeager, 1989; Hernandez-Avila, Rounsaville, & Kranzler, 2004; Arfken, Klein, di Menza, & Schuster, 2001). Some research has shown significant differences in retention by gender (Arfkin et al., 2001; Kim et al., 2011; Choi, Adams, MacMaster, & Seiders, 2013) and others have stipulated that while gender itself has not been predictive of retention, issues traditionally associated with gender, such as child-care, employment and trauma, are related to variations found in retention by gender (Mertens & Weisner, 2000; Green et al., 2002; Tull et al., 2013; Greenfield et al., 2007). Despite having more severe and complex problems, studies found that incarcerated women with substance abuse histories were less likely to relapse than their male counterparts (Fiorentine, Anglin, Gil-Rivas, & Taylor, 1997; Gil-Rivas, Fiorentine, & Anglin, 1996; Grella, Stein, & Greenwell, 2005). This "gender paradox" in has been explained by the hypothesis that women engage more readily and actively in counseling and other treatment services (Fiorentine et al., 1997; Kim et al., 2011).

In studies focusing on factors impacting the retention of women in treatment, higher income and education and lower psychiatric severity are often predictors of higher retention and completion rates (Mertens & Weisner, 2000; Kelly et al., 2001). The impact of psychiatric severity on employability and thus the level of distress and anxiety on substance abusing women has been suggested (Hernandez-Avila et al., 2004) which could lead to shorter stays in treatment for women. Women also appear to benefit most from single-gendered treatment groups (Cummings et al., 2010; Greenfield et al., 2013; Greenfield et al., 2008; Green et al., 2002).

In summary, research indicates that there are significant differences by gender in the factors that influence treatment retention. Although women have less access to services overall, once they enter treatment; they do so with more serious substance dependencies, and with more health and social problems than do men (Kim et al., 2011; Wu et al., 2003). Women are also more likely than men to use, and benefit from, services available in comprehensive programs (Greenfield et al., 2013; Green et al., 2002). Through prior investigation of this dataset, Choi and colleagues (2013) found that in private residential treatment, age, gender, types of drug used, ASI medical and psychiatric severity scores and URICA readiness to change scores predicted treatment retention at 30 days of their

initial treatment. The prior study used bivariate analysis to identify independent variables significantly correlated with 30-day treatment retention, then used logistic regression to determine predictors of treatment outcomes (Choi et al., 2013). Based on the prior study (Choi et al., 2013) and what we know from the available literature on the impact of gender on treatment retention, specifically Merten and Weisner (2000), this study was designed to further examine the effect of gender on treatment retention using survival analyses, and to identify factors that predict treatment retention in each gender while enrolled specifically in private, residential treatment for individuals with co-occurring mental health and substance use disorders.

## METHODS

### Setting

Data were collected at three private residential facilities that provide integrated substance abuse and mental health treatment services in Memphis, Tennessee, Malibu, California, and Palm Springs, California. Foundations Recovery Network (FRN), a private for-profit substance abuse treatment provider offering residential and outpatient substance abuse treatment services, operates all three programs. Service recipients' at all three facilities are drawn from across the United States and Canada. Treatment services are based on an integrated model of mental health and substance abuse services consisting of both individual and group evidence-based interventions (Foundations Recovery Network, 2010). In most cases, the expected LOS is between 28 and 40 days. Recommended length of time in treatment is individualized on the basis of clinical assessment and medical necessity; however, other factors may contribute to the actual LOS.

### Participants

All program participants who enter residential services are offered an opportunity to participate in an ongoing evaluation during the initial phase of treatment. A trained intake person located at each facility describes the evaluation, reviews and obtains informed consent, and collects the locator information for post discharge interviews. The Addiction Severity Index (ASI) (McClellan, 1983; McClellan et al., 1992) from the initial clinical assessment is used as the baseline ASI assessment if informed consent is obtained. Masters' level clinicians complete the initial clinical assessment within the first 4 days following admission to FRN's residential programs. Data are collected at three additional time points: 1, 6, and 12 months post discharge. A community-based Institutional Review Board reviewed study protocols to assure the protection of Human Subjects.

Data for this study are drawn only from the baseline interview and LOS in treatment days. The participants were 1,317 individuals who voluntarily sought residential treatment at one of the three treatment centers. All participants received an intake assessment by a multidisciplinary team which provides the basis for an individual treatment plan to address substance use, psychiatric disorder, and medi-

cal and social service needs. At this time, the evaluation data was collected for those individuals who were willing to consent to participating in the evaluation process. Compared to all patients who attended treatment during the same time period, the population who agreed to participate in the research project was not appreciably different in terms of demographic characteristics. The average age for the overall population was 36.6 versus 36.0 for the study population. The overall population was 60.8% male and the study population was 59.1%. Caucasians represented the largest percent by far in both the general population and the study group. The average LOS was 29.90 for the overall population compared to 32.08 for our sample. Co-occurring disorders were assessed over the course of treatment starting with initial screening, assessment, and psychiatric evaluation. A master's level clinician conducted a complete psychiatric evaluation with one of the programs psychiatrists within 72 hours after arriving to the residential treatment facility. Each patient is assigned to one of the program's licensed clinicians who utilize the information gathered through initial screening and assessment to develop the initial treatment plan with the patient during an initial individual session with the first week of treatment. Ongoing psychiatric and individual therapy sessions are utilized along with weekly treatment team meetings to update each patient's treatment plan, including updates/confirmation of specific co-occurring substance use and psychiatric disorders. This process provides input from a multidisciplinary team of clinicians in order to thoroughly assess co-occurring disorders throughout treatment as symptoms may change or become clearer during the course of treatment. Retention was measured in treatment days through a retrospective review of discharge records, which also included the baseline interview data.

### Instruments

*Addiction Severity:* The scalable questions that make up the composite scores of the Addiction Severity Index (ASI) (McClellan et al., 1992) were utilized to measure addiction severity. The ASI was developed to measure problem severity in each of seven potential problem areas that include: medical, employment, alcohol, drug, legal, family/social, and psychiatric problems. In order to ensure that each question within a given problem area is given the same weight in calculation of the composite score each item in a subscale is divided by its maximum value and by the total number of questions in a composite. This scoring yields a score from 0 to 1 in each composite.

*Readiness for Change:* The University of Rhode Island Change Assessment (URICA) (DiClemente & Hughes, 1990) is a measure of readiness to change that has been studied with a range of different populations. The instrument consists of 32 statements that subjects endorse on a 5-point scale from strongly agree to strongly disagree. The URICA yields scores on each of four scales; Precontemplation, Contemplation, Action, and Maintenance, or each of the stages of change described by Prochaska, DiClemente, & Norcross (1992). In addition, the scores from

these scales are used to create a Readiness to Change composite score. The Readiness to Change score was derived for this study in the same manner used in Project MATCH Research Group (1997). The average Contemplation, Action, and Maintenance scores were added and the Precontemplation score was subtracted from the sum. The Readiness to Change score was used as a predictor variable in subsequent analysis.

*Treatment Retention:* This study focuses on treatment retention. Retention status was observed and calculated by days between a program start date and a discharge date. Data were collected on all admissions between February 1, 2008 and through July 31, 2010 with final observation of discharge data on August 31, 2010.

### Data Analysis

Initial analyses consisted of basic descriptive statistics and bivariate analyses to identify and examine any gender difference on any pre-treatment demographic and use-related factors as well as components of treatment retention. Next, a life table was developed to investigate the trajectory of treatment retention by gender. Finally, Cox regression was employed to investigate the impact of various predictors of treatment retention by gender. One of the essential features of Cox regression is that the technique allows for the unbiased analysis of time to event data controlling for covariates. The event of interest in the current study is a discharge from treatment. Like logistic regression, the exponential of the coefficients from the Cox model gives the relative risk of the odds for the covariate. Cox regression also proves superior to ordinary least squares regression (OLS), in that the Cox regression algorithm allows for censoring of persons who discontinued or did not experience the event (treatment retention in the current study) during the study period. In this study, Cox regression was developed in three steps. Model 1 contains demographic characteristics, types of substance use disorders, types of mental health disorders, and treatment location. Model 2 also includes the various scalable ASI subscale measures. Finally, in Model 3, the score of readiness to change was added in the final model.

## RESULTS

### Sample Description

Demographic, substance use, and mental health disorder and treatment characteristics are provided in Table 1. The mean age in this study sample was 36 years ( $SD = 12.1$ ) with 40.9% of the sample being female. The majority of study participants (90.2%) were Caucasian, 8.1% were African American, and 1.7% were Latino. Nearly 56% were employed in last 30 days. Approximately 67% had alcohol-related disorders (alcohol abuse or dependence), 18.8% had opioid related disorders (opioids abuse or dependence), and 18.1% had cocaine-related disorders (cocaine abuse or dependence). In terms of identified mental health disorders, the majority of study participants (82.9%) had a diagnosis of an anxiety disorder, followed by major depression (74.9%), and mood dis-

order (26.6%). The majority of participants (80%) were diagnosed with more than one mental health disorder. Of the 1,317 study participants, 43.7% stayed in treatment for at least 30 days. The average LOS in treatment for the study sample was 32.08 days ( $SD = 19.29$ ).

### Bivariate Analysis

Bivariate analyses were conducted to determine the relationship between various independent variables and gender using chi-square and *t* tests. The results of bivariate analyses are displayed in the second and third column of Table 1. Statistically significant differences were found in participants' age, employment in last 30 days, and race/ethnicity. Men in this study were younger than women. Men also had a higher rate of employment in the last 30 days (60.0%) compared to women (46.6%). In terms of race and ethnicity, women were more predominately Caucasians (94.1%) compared to men (87.5%). Women stayed in treatment longer than men by an average of approximately four and a half days. In addition, women had a higher rate of treatment retention (47.7%) at 30 days compared to men (40.9%).

Statistically significant gender differences were found in six of the seven domains of the ASI composite score measurement. Women had higher mean ASI composite scores in the areas of medical, employment/support, family/social relationships, and psychiatric issues indicating greater severity in these areas than men. Men had higher mean ASI scores in areas of drug, and legal measures than women. ASI composite score for alcohol severity were slightly higher in men. Men entered treatment with higher URICA scores in the precontemplative stage. Women were less likely to be in the precontemplative stage and therefore more likely to be in a stage reflecting greater readiness for change; however, overall URICA and other URICA subscale scores did not reflect significant differences between men and women. Gender differences were also found in type of substance use and mental health disorder. Men had higher rates of cocaine and cannabis use disorders as compared to women. Women had higher rates of major depression, anxiety disorders, mood disorders, and eating disorders compared to men.

### Life Table

The life table was developed to investigate the trajectory of treatment retention by gender. Figure 1 illustrates the survival lines indicating time to discharge for both men and women. Observation of Figure 1 revealed that the survival lines are similar for the first 20 days of treatment. These lines split into different trajectories after approximately 20 days which continues to broaden as time progresses. The largest gap appears from 30 days forward. At 30 days, approximately 30% of men remained in treatment compared to 40% of women. Comparison of the survival lines was performed using the Wilcoxon (Gehan) statistic (13.415,  $df = 1$ ,  $p < .000$ ). The result further highlights the statistical significance of the differences in the trajectories of these lines.

TABLE 1. Sample description

	Total Sample <i>N</i> = 1,317 Mean (SD)	Men <i>N</i> = 778 (59.1%) Mean (SD)	Women <i>N</i> = 539 (40.9%) Mean (SD)
Age**	36 (12.11)	36.08 (11.94)	38.26 (12.26)
ASI: Medical***	.26 (.36)	.21 (.33)	.34 (.38)
ASI: Employment/Support**	.40 (.27)	.38 (.28)	.43 (.26)
ASI: Alcohol	.38 (.34)	.40 (.33)	.38 (.35)
ASI: Drug*	.17 (.16)	.18 (.16)	.16 (.16)
ASI: Legal*	.11 (.21)	.12 (.21)	.10 (.20)
ASI: Family/Social Relationships***	.30 (.26)	.28 (.25)	.34 (.26)
ASI: Psychiatric***	.49 (.20)	.45 (.21)	.55 (.18)
Readiness for Change	10.77 (1.56)	10.66 (1.61)	10.94 (1.47)
Precontemplation***	1.67 (.52)	1.73 (.54)	1.57 (.46)
Contemplation	4.41 (.44)	4.38 (.46)	4.45 (.41)
Action	4.27 (.47)	4.25 (.45)	4.30 (.49)
Maintenance	3.75 (.64)	3.75 (.63)	3.76 (.64)
Days in Treatment***	32.08 (19.29)	30.17 (16.4)	34.85 (22.5)
	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)
Treatment Retention at 30 days**	575 (43.7)	318 (40.9)	257 (47.7)
Race/Ethnicity***			
African American	107 (8.1)	83 (10.7)	24 (4.5)
Caucasian	1,188 (90.2)	681 (87.5)	507 (94.1)
Latino	22 (1.7)	14 (1.8)	8 (1.5)
Employment in last 30 days-Yes***	733 (55.7)	467 (60.0)	250 (46.4)
No	584 (44.3)	311 (40.0)	289 (53.6)
Type of Substance Use Disorders			
Alcohol	885 (67.2)	515 (66.2)	370 (68.6)
Cocaine***	238 (18.1)	170 (21.9)	68 (12.6)
Cannabis*	88 (6.7)	60 (7.7)	28 (5.2)
Opioid	248 (18.8)	147 (18.9)	101 (18.7)
Poly Substance	145 (11.0)	87 (11.2)	58 (10.8)
Others	29 (2.2)	4 (1.3)	6 (2.3)
Type of Mental Health Disorders			
Major Depression***	986 (74.9)	540 (69.4)	446 (82.7)
Anxiety Disorder***	1090 (82.8)	617 (79.3)	473 (87.8)
Mood Disorder**	350 (26.6)	186 (23.9)	164 (30.4)
Bi-Polar Disorder	16 (1.2)	11 (1.4)	5 (0.9)
Eating Disorder*	9 (0.7)	2 (0.3)	7 (1.3)
ADHD	10 (0.8)	5 (0.6)	5 (1.9)
Dementia	19 (1.4)	13 (1.7)	6 (1.1)
Missing***	89 (6.8)	70 (9.0)	17 (3.5)
Locations			
A	291 (22.1)	176 (22.6)	115 (21.3)
B	64 (4.9)	29 (3.7)	35 (6.5)
C	962 (73.0)	573 (73.7)	389 (72.7)

\**p* < .05. \*\**p* < .01. \*\*\**p* < .00.

### Cox Regression

Table 2 provides the results of models constructed to assess relative effects on the likelihood of retention for individuals with co-occurring substance abuse and mental disorders. The results for men suggest that age, an ADHD diagnosis, location, and ASI employment subscale composite score were associated with treatment retention. In interpreting these results, it is important to note that a hazard ratio greater than 1 indicates a higher likelihood

of treatment retention. Age was significantly and positively related to retention. The Exp (b) of 1.009 indicates that for each increase in age by a year, the likelihood of treatment retention increased by 0.9%. Men diagnosed with ADHD were 41% more likely to stay in the treatment longer than men diagnosed with mood disorder. The ASI employment score was significantly and negatively associated with the likelihood of retention for men. Men with higher ASI employment scores, reflecting greater

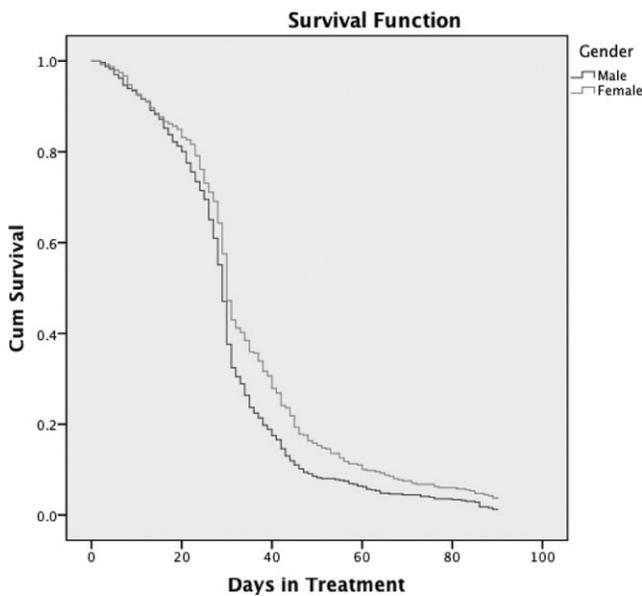


FIGURE 1. Life Table—Treatment Retention by Gender.

severity of employment issues, were less likely to stay in treatment. There were significant differences in male retention rates predicted by treatment location. Readiness to change was not predictive of treatment retention for men.

The Cox regression model for women suggests that cocaine use, depression, location, ASI alcohol subscale composite score, and readiness to change were significantly correlated with treatment retention. Women who were cocaine dependent were approximately 41% less likely to remain in treatment compared to women who were alcohol dependent. However, having a higher ASI drug subscale composite score (indicating greater severity) was not predictive of retention; but greater severity on the ASI alcohol subscale composite was predictive of treatment retention for women. The likelihood of remaining in treatment improved by 56% for every point increase on the ASI alcohol composite subscale. In addition, women diagnosed with depression were 92% more likely to remain in treatment longer than women diagnosed with a mood disorder. Location was also predictive of the decision to remain in treatment in women. Women who were scored in the precontemplative or contemplative stages on the URICA readiness to change scale were significantly less likely to remain in treatment than those who scored in the action or maintenance stages of change.

## DISCUSSION

The purpose of the current study was to (1) examine gender effects on treatment retention, and (2) identify factors that predict treatment retention for men and women in private residential treatment for individuals with co-occurring substance abuse and mental health disorders. This study identifies significant differences by gender in treatment retention for individuals with co-occurring substance abuse and mental health disorders. The find-

ings indicate that women are more likely to stay in treatment compared to men. Men with co-occurring substance abuse and mental health disorders in this study had more difficulty staying in treatment than women. For example, men stayed an average of 30.17 days in treatment, 4.5 days fewer than women (34.85 days). Similarly, women were significantly more likely to remain in treatment for 30 days. Typically, more intensive treatment has been associated with lower retention for women. For example, Arfken and colleagues (2001), in their study of publicly funded residential and intensive outpatient treatment in a major metropolitan area, found that women had lower retention and completion rates than men. In contrast, in a study of substance abuse care provided in primary care settings women remained in treatment on average longer than men (Kim et al., 2011). However, both studies, as well as much of the research evaluating treatment retention have been conducted in publicly funded programs. This research provides an important evidence that funding source may be an over-riding factor in patient decisions to remain in private, residential treatment.

The study also finds that different factors appear to contribute to the likelihood of remaining in treatment for each gender. Women appear to enter treatment with greater severity in the areas of medical, employment/support, family/social relationships, and psychiatric measures evidenced by higher mean ASI composite scores. This reflects findings in studies by Greenfield and colleagues (2010) and others noted in the literature review.

Consistent with the literature, age is associated with treatment retention in men with older men more likely to remain in treatment longer (Adams et al., 2011; Hall, Prendergast, Wellisch, Patten, & Cao, 2004; Pelissier, Motivans, & Rounds-Bryant, 2005); however, this was not the case with women. Age was not found to be predictive of treatment retention in females.

Drug use characteristics impacted treatment retention differently for males and females. Similar to the Drug Abuse Treatment Outcomes Survey data analysis results, cocaine use in women was associated with shorter stays in treatment (Simpson, Joe, & Brown, 1997) when compared to alcohol as the control group. In contrast to Simpson, Joe and Brown (1997), women whose ASI alcohol subscale composite score indicated greater severity than their counterparts were more likely to stay in treatment. This was similar to results found by Deane and colleagues (2012) who found that women who used alcohol were likely to remain longer in treatment than those who used other drugs.

Women with depression were also more likely to remain in treatment longer than their counterparts with mood disorders. Men diagnosed with ADHD were significantly more likely to remain in treatment for longer compared to those diagnosed with a mood disorder. Mertens & Weisner, 2000 found that lower psychiatric severity was related to improved retention; however we did not find that psychiatric severity measured by the ASI psychiatric subscale was influential in retention for either gender.

Similar to findings in the literature (Grella, Stein, & Greenwell, 2005) women did enter treatment with greater

TABLE 2. Cox regression models for treatment retention

Variables	Model for Men					Model for Women				
	B	SE	Exp (B)	p-Value	95% CI	B	SE	Exp (B)	P-Value	95% CI
Age	.009	.005	1.009	.048	(1.000–1.018)	-.003	.005	.997	.575	(.986–1.008)
Caucasian <sup>1</sup>	-.271	.147	.762	.065	(.571–1.017)	-.262	.275	.760	.339	(.449–1.318)
Employed in last 30days–yes	-.029	.127	.971	.819	(.756–1.247)	-.220	.148	.803	.137	(.600–1.073)
Opiate Abuse/Dependence <sup>2</sup>	.195	.142	1.216	.168	(.921–1.605)	.107	.143	1.113	.452	(.842–1.472)
Cocaine Abuse/Dependence <sup>2</sup>	-.155	.133	.857	.243	(.660–1.111)	-.541	.169	.582	.001	(.418–.811)
Cannabis Abuse/Dependence <sup>2</sup>	.043	.127	1.044	.735	(.814–1.339)	.136	.163	1.146	.403	(.833–1.575)
Poly Substance Abuse/Dependence <sup>2</sup>	.020	.148	1.020	.892	(.763–1.365)	-.255	.166	.775	.123	(.560–1.072)
Depression <sup>3</sup>	.025	.144	1.025	.862	(.773–1.360)	.656	.207	1.928	.002	(1.285–2.892)
Anxiety Disorder <sup>3</sup>	-.149	.167	.861	.371	(.621–1.195)	-.006	.217	.994	.977	(.649–1.521)
Bipolar <sup>3</sup>	-.132	.621	.876	.829	(.264–2.907)	-.594	1.206	.552	.622	(.052–5.565)
Eating Disorder <sup>3</sup>	-1.385	1.031	.250	.179	(.033–1.889)	-.011	.436	.989	.980	(.421–2.324)
ADHD <sup>3</sup>	1.528	.594	4.611	.010	(1.438–14.782)	.267	.527	1.306	.612	(.465–3.666)
Dementia <sup>3</sup>	.282	.332	1.326	.396	(.691–2.544)	-.121	.531	.886	.819	(.313–2.508)
Missing Mental Disorders–Yes	.048	.246	1.049	.847	(.647–1.699)	.138	.560	1.148	.805	(.383–3.443)
Location A <sup>4</sup>	-.313	.286	.731	.272	(.418–1.279)	-1.182	.286	.307	.000	(.175–.537)
Location B <sup>4</sup>	.320	.123	1.377	.009	(1.083–1.750)	.049	.151	1.051	.744	(.781–1.413)
ASI: Medical	-.085	.149	.918	.566	(.686–1.229)	-.052	.157	.950	.742	(.698–1.292)
ASI: Employment	-.549	.218	.577	.012	(.376–.886)	-.244	.288	.784	.397	(.446–1.378)
ASI: Alcohol	-.020	.172	.817	.240	(.584–1.144)	.446	.191	1.562	.019	(1.075–2.269)
ASI: Drug	-.077	.544	.926	.888	(.319–2.689)	1.061	.570	2.890	.062	(.946–8.830)
ASI: Legal	-.188	.244	.828	.441	(.513–1.337)	-.468	.287	.626	.103	(.356–1.100)
ASI: Family/Support	-.011	.208	.989	.958	(.658–1.487)	-.236	.233	.790	.311	(.500–1.247)
ASI: Psychiatric	-.463	.351	.629	.187	(.316–1.253)	-1.612	.570	2.890	.062	(.946–8.830)
Readiness to Change										
Precontemplation	.181	.121	1.199	.133	(.946–1.519)	-.393	.181	.675	.029	(.474–.962)
Contemplation	-.153	.170	.858	.366	(.615–1.196)	-.549	.241	.577	.023	(.360–.926)
Action	.040	.142	1.041	.778	(.788–1.374)	.144	.158	1.155	.362	(.847–1.575)
Maintenance	.053	.089	1.055	.549	(.886–1.255)	-.195	.102	.823	.054	(.674–1.004)
-2 Log Likelihood			4868.477					3326.112		
$\chi^2$ , <i>df</i> , <i>p-value</i>			58.795,27,000***					82.221, 27, .000***		

<sup>1</sup>African American and Latino were the reference group.

<sup>2</sup>Alcohol abuse/dependences and others were the reference group.

<sup>3</sup>Mood disorders was the reference group.

<sup>4</sup>Location C was the reference group.

severity of 4 of the 7 subscale composite scores in the ASI. However, despite entering treatment with less severity in ASI employment composite score than females, employment issues were a factor in predicting retention for males but not females.

Females in the early stages of readiness were less likely to remain in treatment; however, readiness for change as measured by the URICA was not a factor in predicting retention for men. This is in contrast to the results of Adamson, Sellman, & Frampton (2009) whom results report that motivation is of the most robust predictors of retention.

This study also found differences in retention for men by location. Further investigation is required to determine the factors causing these differences; however,

an interesting point is raised. Although those three different facilities have similar therapeutic philosophies and operation systems, the findings of this study indicate the needs of recognizing the uniqueness of each program. According to Simpson, Joe and Brown (1997), each treatment facility differ in staff skills, resources, service intensity, environmental setting, and client demands which may impact their retention and effectiveness. Accordingly, treatment evaluation studies must recognize the multi-level factors—client level and program level—on treatment retention (Simpson et al., 1997; Simpson, Joe, & Brown, 1997). Organizational program planners may want to consider a variety of factors that can influence retention differences across sites, including state and

local legislative requirements, payer mix, population differences, and other factors across both the organizations and the patients that could prove to be significant.

These findings show patterns in treatment retention that are different from prior studies. There may be several reasons as to why these findings are different. Further research is needed to investigate the impact of funding source; e.g., private versus public treatment, on retention patterns in both genders. The data for this study was drawn only from private treatment which serves as both a limitation to the findings and a strength of the article due to the paucity of research drawn from this source.

These results further demonstrate what was found in the earlier study by Choi and colleagues (2013) using bivariate analysis and logistic regression to determine predictors of retention. These researchers found that gender was a significant predictor of treatment retention at 30 days in private, residential, dual diagnosis treatment. This study adds to the current body of literature investigating factors impacting retention in treatment and differences by gender in dual diagnosis treatment and identifies several key predictors which may be addressed through programming interventions. It is also important to note that historically individuals with co-occurring substance abuse and mental health disorders have low retention rates. Prior research indicates that longer lengths of stay in treatment generally predicts better treatment outcomes at follow-up (Simpson et al., 1997). Accordingly, this finding highlights the importance of early engagement efforts for both men and women developing gender-specific strategies to improve treatment retention for individuals with co-occurring substance abuse and mental health disorders.

The current study makes a unique contribution to the literature for individuals with substance abuse and mental disorders, despite some limitations. First, the results of this study may be unique to private residential treatment programs. The predictors of treatment retention in publicly funded residential treatment programs may be different. In addition, this study assumes that three treatment programs operate identically, although there is some variability in staff skills, resources, service intensity, environmental setting, and client demands which may impact their effectiveness (Simpson, Joe, & Brown, 1997). This study was limited to client-level variables and did not examine the impact of program level variables on treatment retention. Although the findings and implications are important, one important limitation may exist in the sample of research participants. While individuals who participated in the research component appear to be demographically similar to all other treatment participants, there was a slight difference in the overall LOS between individuals who participated in the research component and those did not.

In summary, the current study investigated gender-specific factors that may explain treatment retention variations for individuals with co-occurring substance abuse and mental health disorders in private residential treat-

ment settings. The findings suggest the importance of further research investigating the factors predicting retention in privately funded treatment.

### Declaration of Interest

Siobhan A. Morse is employed by Foundations Recovery Network, the operator of the sites supplying the data. She received compensation in the form of salary as Director of Research. Samuel A. MacMaster was under contract with Foundations Recovery Network, the operator of the sites supplying the data. He received compensation from Foundations Recovery Network. The authors alone are responsible for the content and writing of the article.

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**Sam Choi, Ph.D.** is a director at Tennessee Korean American Social Service Center and research fellow at Children and Family Research Center. Dr. Choi's research revolves around two main areas: the relations of service delivery to child welfare and treatment outcomes for parents with co-occurring problems and the relations of service delivery to treatment outcomes for individuals with co-occurring substance abuse and mental health problems.



**Susan M. Adams, PhD, RN**, is Faculty Scholar for Community Engaged Behavioral Health at Vanderbilt University School of Nursing in Nashville, TN. Dr. Adams' current research concerns are efficacy of trauma-informed interventions and sustained recovery for women with co-occurring substance use and mental health disorders in community based programs.

## GLOSSARY

**Co-occurring Disorders [COD]** (previously called *Dual Diagnosis*): refers to individuals who have one or more disorders relating to the use of alcohol and/or other substances of abuse as well as one or more mental health disorders. The diagnosis of co-occurring disorders is used when at least one disorder of each type occurs independent of the other and is not a cluster of symptoms resulting from one disorder alone. COD replaces the term Dual Diagnosis which can be confusing since it has been used to identify other co-morbid disorders such as a primary medical disorder and a mental health disorder.

**Cox regression** (or proportional hazards regression): is a method for investigating the effect of several variables upon the time a specified event takes to happen (such as in treatment). The method does not assume a specific "survival model," although it is not truly nonparametric because it does make the assumptions that the effects of the predictor variables on survival are constant over time and that they are additive in one scale.

**Life table**: is a statistical calculation of survival analysis that deals with "time to an event" such as death, relapse, time in treatment, or other health events. It can answer the question of the chance of survival after diagnosis or entry to treatment. It can address the variable of entry and withdrawal from treatment. The life table generates a survival curve.

**Predictors**, sometimes called independent variables, are factors or variables that can be used to "predict" or forecast the value of another variable, called the dependent or outcome variable, based on observations and measurements. Within the addictions field, predictor variables can include characteristics of an individual or population (such as age, gender, education, severity of disorder, involvement in criminal justice system, readiness to change, motivation for treatment, etc.), characteristics of the treatment environment, theoretical approach to treatment, models of service delivery, characteristics of the therapist/counselor and therapeutic alliance.

**Private residential treatment**: is a 24 hour/7 days a week treatment program for co-occurring substance abuse and mental health disorders provided in a residential

setting for extended time periods (up to 6–12 months) beyond an acute detoxification or psychiatric inpatient hospitalization stay. Residential treatment may be publicly funded (Medicaid/Medicare, state/federal block grants, or nonprofit agencies without fees) or privately funded (private insurance or direct out-of-pocket payment).

**Treatment retention**: refers to the quantity or amount of time in treatment. Most commonly treatment retentions refer to the length of stay in treatment measured by days, months, or specific time period. Historically, longer treatment retention is a consistent predictor of better post-treatment outcomes.

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**Notice of Correction:**

The order of authors and their corresponding affiliations has changed since the article's original online publication date of January 14, 2015.