Journal of
Alcoholism & Drug Dependence

McPherson et al., J Alcohol Drug Depend 2017, 5:3
DOI: 10.4172/2329-6488.1000268

Research Article Open Access

Understanding the Factors that Impact Relapse Post-residential Addiction Treatment, a Six Month Follow-up from a Canadian Treatment Centre

Carson McPherson[1,2], **Holly Boyne**[1,3] **and Rida Waseem**[4]

[1]*Cedars Cobble Hill, V0R 1L0, Canada*

[2]*Royal Roads University, BC V9B 5Y2, Canada*

[3]*University of Guelph-Humber, Toronto, ON M9W 5L7, Canada*

[4]*University of British Columbia, BC V6T 1Z4, Canada*

[*]**Corresponding author:** Carson McPherson, Cedars Cobble Hill, Box 250, 3741 Holland Ave, Cobble Hill BC, V0R 1L0, Canada, Tel: 866-716-2006; E-mail: carson@cedarscobblehill.com

Received date: May 16, 2017; **Accepted date:** June 08, 2017; **Published date:** June 16, 2017

Abstract

Although substance use disorder is a detrimental disease that negatively affects millions of Canadians each year, recovery is possible. Varying factors, however, may impact the likelihood of recovery after the affected individual completes treatment. Understanding the related factors associated with post-treatment outcomes would allow substance use disorder professionals to foster positive outcomes, and if appropriate, provide additional support for individuals in need. This study, therefore, examines the following factors on outcomes six months following discharge from residential substance use disorder treatment: length of stay, completion of treatment, post-treatment 12-Step and other mutual help group attendance, post-treatment drug monitoring, age, gender, and drug of concern. Being male, post-treatment 12-Step and other mutual help group attendance, post-treatment drug monitoring, and treatment completion were found to be significantly related to abstinence at six months following residential treatment. The influence of length of stay in treatment, age, and drug of concern on relapse was found to be insignificant. Utilizing the findings of this study can assist healthcare professionals in promoting recovery for patients with substance use disorder.

Keywords: Substance use disorder; Residential treatment; 12-Step; Drug monitoring; Treatment completion

Introduction

Substance use disorder is a health issue that affects millions of people across Canada each year [1]. Although substance dependence is detrimental, recovery is both attainable and sustainable with the proper supports [1]. Half or more of individuals with substance use disorder recover over time [2,3]. Residential substance use disorder treatment, in particular, provides a supportive and therapeutic environment for individuals in need of a greater level of services than outpatient treatment services can provide [4]. Although there are benefits of sustainable recovery, little is known about the various factors that are related to, or predict long-term recovery [5]. This study, therefore, seeks to examine how length of stay, completion of treatment, post-treatment 12-Step and other mutual help group attendance, post-treatment drug monitoring, age, gender, and drug of concern are related to outcomes six months following discharge from a Canadian residential substance use disorder treatment centre.

Influencing Factors in Substance Use Disorder Recovery

Length of stay

The length of time an individual stays in residential treatment is a commonly debated subject amongst treatment professionals. The majority of studies examining length of stay on abstinence rates post-residential treatment find a direct relationship between longer duration of stay and higher abstinence rates [6-10]. In a study solely examining women in residential treatment, abstinence rates were lower for women who had short stays (1-30 days), compared to women who had longer lengths of stay [8]. Similarly, individuals who attended a long-term residential treatment program for dual diagnosis (unlimited length of stay, with a goal to achieve discharge by two years) were found to be more likely to be abstinent at six months post-treatment compared to the short-term (three to six month) residential treatment program for dual diagnosis [6]. However, other studies have found that length of stay in residential treatment does not affect abstinence status post-treatment [11,12].

Understanding the influence length of stay has on abstinence can be difficult, as the majority of studies that examine relapse rates post-treatment are in outpatient settings. In particular, the treatment goals in these studies are often unclear, making it difficult to compare outcomes across outpatient and residential treatment. A study examining the duration of substance use disorder for individuals within an outpatient treatment clinic found that patients with 1-14 days of care had lower abstinence rates compared to patients who stayed longer than these 14 days in treatment [13]. Similarly, individuals who have longer treatment retention in an outpatient program were previously found to have higher rates of abstinence five years after treatment completion, compared to individuals with shorter treatment duration [14]. Despite the inability to apply these studies in a residential setting, taken together, residential treatment has reduced rates of relapse compared to outpatient day treatment at six months post-treatment [15]. Residential treatment, therefore, has an advantage on abstinence rates in the short-term following treatment, compared to

outpatient treatment when the therapeutic nature and structure of treatment is similar [15].

Completion of treatment

In addition to length of stay, completion of residential treatment may also be a factor in predicting abstinence rates post-treatment. Length of stay and completion of treatment are separate entities, with length of stay referring to the amount of days or weeks spent in treatment, and completion of treatment referring to the successful progression through the program as determined by the treatment provider [16]. However, few studies have examined length of stay and completion of treatment as possible factors of substance use disorder outcomes [16]. Treatment completion has previously been linked to abstinence for both residential treatment and methadone maintenance programs [17]. In a study examining factors associated with abstinence in heroin use post-residential substance use disorder treatment, fully abstinent clients were about twice as likely to have completed their treatment programme 94 days after leaving treatment, compared to clients who used heroin on one third or less days than their pre-treatment use, and clients who continued to use heroin at the same frequency [11]. Similarly, in a female sample, women who did not complete treatment had lower abstinence rates 6-12 months post-treatment, regardless of length of stay [8]. Clients who completed treatment in 3-5 months had a 78% rate of abstinence post-treatment, compared to 46-52% of non-completers, and 59% of clients who completed less than three months of treatment [7].

Post-treatment 12-step attendance

Participation in 12-Step self-help groups, such as Alcoholics Anonymous (AA) or Narcotics Anonymous (NA), is commonly used as a aftercare post-treatment [18]. In the literature, attendance at 12-Step self-help groups has continuously been established as related to, or predictive of abstinence and better outcomes post-treatment [13,18-20]. In a study examining male veterans across 12-Step, cognitive-behavioural, and eclectic (both 12-Step and cognitive-behavioural) oriented inpatient programs, it was found that patients in 12-Step programs alone were more likely to be abstinent and free of substance use problems (45% abstinent, 34% free of substance use problems) compared to patients in cognitive-behavioural treatment alone (36%; 30%), and eclectic programs (40%; 27%) one year after treatment completion [13]. Increased involvement with AA or NA made patients more likely to be abstinent one year after formal treatment, with lower psychological distress and psychiatric symptoms compared to patients with less involvement [13]. A longitudinal study examining the efficacy of AA and NA programs two years and four-to-five years after intake at residential substance use treatment found that more frequent attendees were increasingly likely to be abstinent compared to both non-attenders and less than weekly attendees [19]. Additionally, patients with a stronger belief in AA-related philosophy at treatment entry predicted a reduction in substance-related problems four years after residential substance use disorder treatment [20]. At one year after residential treatment, AA-related coping predicted a reduction in substance-related problems, in addition to mediating the relationship between belief in AA philosophy at treatment entry and reduction of substance-related problems four years after residential treatment [20]. Furthermore, Mutual Help Programs such as Self-Management and Recovery Training (SMART Recovery) and LifeRing Secular Recovery (LifeRing) have been proven to be efficacious in promoting abstinence [21-23].

Drug monitoring post-treatment

Drug monitoring through drug testing may be used post-treatment in order to promote recovery [24]. Drug testing is often used to verify the validity of self-reported drug use post-treatment [25]. In research examining substance use disorder outcomes, urine alcohol and drug tests are considered the 'gold standard,' although it is important to combine them with self-reports [26]. In the area of opiate dependence and chronic pain, drug testing is an essential component of treatment adherence monitoring [27]. Although there is little research examining the efficacy of drug monitoring across programs, previous studies that have examined specific programs involving drug monitoring have found positive results [26,28,29]. One study, for example, examined a residential centre's continuing care intervention called 'My First Year in Recovery,' which included integrative care management, a recovery for life contract, random urine drug screening, an online recovery network, circle of support, and an interactive recovery library curriculum for clients [26]. Patients had frequent and random alcohol and drug testing, with no serious consequences for failed tests [26]. The program was found to be effective, as participants had low rates of drug and alcohol use as determined by random tests [28]. A more widespread program involving drug monitoring is the cluster of Physician Health Programs (PHPs), which provides assistance to physicians across the United States [28]. For physicians who have completed treatment for substance use disorder, PHP requires frequent (an average of twice a month) drug and alcohol testing for five years post-treatment, with absolutely zero tolerance for positive screenings [28]. PHPs have been successful in reducing relapse and promoting long-term recovery. Another study examined drug monitoring tied to consequences post-treatment in their examination of 'Hawaii's Opportunity Probation with Enforcement' (HOPE) program for individuals on probation with a history of substance use disorder and significant socioeconomic difficulties [29]. The HOPE program has also demonstrated efficacy for random drug testing post-treatment [29]. Despite the efficacy of these programs, drug monitoring post-treatment is rarely used, as many patients only receive a single drug test upon treatment admission [28]. There has been an expressed need for sustained, random drug monitoring for at least five years post-treatment in order to facilitate a stable recovery and create the opportunity for re-intervention if needed [28].

Age

Studies examining age and abstinence rates have continuously found that older patients have higher rates of abstinence post-treatment [14,30-32]. In one study examining abstinence rates, older participants (50+) had a rate of abstinence of 54% one year post-treatment, while younger (<50) participants had a rate of abstinence of 34% [30]. Age (less than 50 years old or older than 50) was found to be a significant predictor of abstinence one year post-treatment for people with 100% confidence in abstinence at discharge and lower levels of intake situational confidence [30]. Similarly, in a study examining remission and relapse from substance use disorders in individuals with comorbid schizophrenia, individuals who remitted abuse or dependence were significantly older [31]. These differences in abstinence rates are linked to other factors related to age that positively impact abstinence post-treatment, such as higher self-efficacy, longer length of treatment, lower rates of substance dependence, lower rates of hostility, fewer family and friends who encourage substance use, greater motivation, and greater treatment retention [14,30,32,33]. In a study comparing treatment outcomes five years later in younger adults

(18-39), middle-aged (40-54), and older adults (55-77) found that after controlling for substance diagnosis, gender, treatment retention, and social networks, age was no longer a significant predictor of abstinence, suggesting that these other factors explain the impact of greater age on abstinence [14]. However, the authors found that abstinence rates were higher for older adults for all substances except for individuals solely using alcohol, for which there was no significant difference between age groups [14]. Older adults were found to have lower depth of involvement in 12-Step programs, potentially due to practical barriers in attendance, differences in social interaction for older adults, and greater reliance on a spouse [14]. Additionally, older adults have been found to be more likely to have abstinence as the goal of treatment [33].

Gender

The gender of the individual in substance use disorder treatment may influence the likelihood of relapse post-treatment. In particular, men appear to be more likely to experience relapse compared to women [34,35]. However, other studies have found that men and women do not differ significantly with regards to their relapse rates [36-38]. These contradictory findings in the literature may be due to the other factors, such as ethnic differences [39]. In terms of long-term substance use, males tended to use their primary substance longer than women in a sample with post-traumatic stress disorder and substance use disorder comorbidity, with men using for an average of 17 years, while women used it for an average of 11 years [40]. Additionally, marital status may be a possible influence on relapse rates between males and females. For females, marriage and marital stress have been found to be risk factors of alcohol relapse, while marriage lowered the risk of relapse for men [34]. Additionally, women may be more sensitive to negative affect and interpersonal problems before relapsing, while men may be more likely to have positive experience prior to relapse [34,41]. In terms of the relapse situation itself, women report drinking less often than men, but drink to intoxication more often than men [41]. Men, on the other hand, relapse alone more often than women [41].

Drug of concern

Abstinence rates post-treatment may differ according to the drug of concern that the individual is using. However, the literature in this area primarily focuses on other factors that may impact abstinence, such as treatment completion, relapse rates, AA attendance and NA attendance [21,42,43]. In a study examining treatment completion in parents with substance use disorder and children in the child welfare system, parents who used heroin were significantly less likely to complete treatment compared to parents who used alcohol, cocaine, or marijuana [43]. In contrast, another study found that cocaine as the primary drug predicted relapse in women who attended residential treatment, but not for other drugs of concern [42]. Additionally, alcohol use may have a unique role [43]. When alcohol is consumed in addition to a separate primary drug, it may impact the likelihood that an individual will relapse to the primary non-alcohol drug [44]. Similarly, another study found significantly better recovery rates for individuals who used drugs other than tobacco in addition to alcohol, especially if the drug was a sedative such as alcohol or narcotics [45]. For individuals who consume both alcohol and nicotine, continued nicotine use may impact relapse rates for resuming alcohol consumption [45]. In a five-year follow-up study following residential substance use disorder treatment, participants who used opiates and attended meetings were more likely to be abstinent five years later [19]. Participants who used narcotics however, had increased rates of abstinence at follow-up with no other additional benefits in attendance [19].

Methods

Participants for this study were recruited from Cedars at Cobble Hill (Cedars), a residential substance use disorder centre located on Vancouver Island in British Columbia, Canada. Cedars serves both male and female patients with substance use disorder and process addictions (such as gambling disorder, eating disorders, and sex addiction) with abstinence-based inpatient treatment. Patients receive multiple bio psychosocial treatments throughout their individualized program, including cognitive behavioural therapy, dialectical behavioural therapy, multidimensional family therapy, group therapy, individual therapy, and other treatment modalities. As treatment at Cedars is individualized, there is no predefined length of stay for enrolled patients. Treatment completion, therefore, is defined as the conclusion of the residential component of the patients' program based on an agreement between the patient and his/her assigned case manager.

A total of 206 participants completed all parts of the study, all of whom met the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) criteria for substance use disorder. A total of 277 participants completed the baseline of the study. 71 participants were lost between baseline and follow-up. Participation in the study was voluntary, with no negative repercussions or change in their care if patients did not want to participate. The study underwent an internal organizational ethics review, completed by a committee of various clinical and non-clinical functions of the organization that adjudicate research proposals to be completed at Cedars. A convenience sample was used for this study, as the investigators used data from a single agency with a limited sample size. Thus, follow-up at six months involved only those who were reachable at that interval. At Cedars, patients also undergo an admission process that takes 2 to 3 hrs, as each patient receives a full medical evaluation with a registered nurse and a physician. With the physician, patients undergo a comprehensive review of their medical history. During intake, participants are interviewed using various diagnostic tools to identify the presence and severity of their substance use disorder, such as the World Health Organization Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), and the Drug Abuse Screening Test (DAST).

Procedure

At intake, participants were informed that Cedars conducts research with patients who give informed consent. At six months following treatment discharge, participants were contacted to participate in a 20-30 min follow-up telephone survey for this particular study. This phone survey consisted of questions regarding the participants' experiences while they were in treatment, participation in continuing care, adherence to recommendations of the assigned case manager, and substance use (if any) post-treatment. Questions were developed in collaboration with physicians at Cedars, who noticed trends in patients and suggested factors to examine. With this collaboration, it is our hope that this study can be utilized for knowledge translation, as the physicians' expertise informed our research, so the findings of this research can inform practice. As identified by physicians at Cedars, the possible factors examined in the survey included length of stay in residential treatment, 12-Step group participation post-treatment, drug

monitoring post-treatment, completion of residential treatment, age, gender and primary drug of concern. Additionally, participants were asked about their rate of abstinence from treatment discharge to present, according to three categories: complete relapse (consistent use of substances with no periods of abstinence), 1-3 slips but otherwise abstinent (a single instance of using any psychoactive substance after treatment), and complete abstinence (no substance use). Similarly, length of stay was categorized into five categories: 1-20 days, 21-30 days, 31-45 days, 46-60 days, and more than 61 days. All factor categories, abstinence statuses, and length of stay categories were converted into a Likert type scale for analysis.

Results

Participants

Of the total 206 participants, 79 (38.3%) were females and 127 (61.7 %) were males. The average age of participants was 39.21 years (SD=12.3). In terms of the frequency of individuals in different age groups, 69 participants (33.3 %) were aged 18-30, 89 (43 %) were aged 31-50 and 49 (23.7 %) were aged 51-70. Out of 204 people who identified as having a primary drug of concern, the most prevalent was alcohol with 147 participants (72.1%), followed by opiates and heroin with 22 participants (10.8%) and 6 participants (2.9%), respectively. Other substances, including cocaine, crack cocaine, amphetamine, and cannabis, accounted for the remaining 29 participants (14.2 %). The average age of first use for the participants' primary drug of concern was 14.86 years (SD=8.39). The average length of residential treatment was 47.6 days (SD=11.6). Of the 206 participants in the study, 189 (91.7 %) successfully completed treatment, while 17 (8.3%) did not.

Out of 206 participants, 201 identified their ethnicity. Of the 201 respondents, 187 (93 %) identified themselves as Caucasian, 8 (4 %) as Indigenous, 6 (3 %) as other. Of all participants, 203 responded to the question identifying their marital status. Of the 203 respondents, 91 (44.8 %) reported their marital status as single, 71 (35 %) reported as married, 16 (7.9%) reported as separated, 12 (5.9 %) reported divorced, 10 (4.9 %) reported as common-law, and 3 (1.5 %) reported their status as widowed.

Research Questions and Data Analysis

Is there a gender difference for abstinence levels?

The descriptive analysis showed that out of 79 females, 49 participants (62 %) were abstinent, 20 (25.3 %) had 1-3 slips, 10 were in relapse (12.7 %). For 127 males, 102 participants (80.3 %) were abstinent, 20 (25.7 %) had 1-3 slips, and 5 were in relapse (3.9 %). Overall, the abstinent rate was 73.3 % across participants, with 19.4 % of the sample having 1-3 slips, and 7.3 % experiencing full relapse at 6 months post-treatment (Table 1).

To understand if there were a gender differences for abstinence levels, the three level categorical abstinence variables was converted into a continuous scale. A higher score indicates a trend toward abstinence, while a lower score trends toward relapse. The independent sample t-test showed that there was a significant gender difference for abstinence, t (127.64)=-2.929, p=0.004. This shows that abstinence varies for males and females. The negative t value and mean difference suggests that more males display a trend towards abstinence than females in this sample (Table 2).

6 month Abstinence						
Gender			**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Female	Valid	Relapse	10	12.5	12.7	12.7
		1-3 Slips	20	25	25.3	38
		Abstinent	49	61.3	62	100
		Total	79	98.8	100	-
	Missing	System	1	1.3	-	-
	Total		80	100	-	-
Male	Valid	Relapse	5	3.9	3.9	3.9
		1-3 Slips	20	15.7	15.7	19.7
		Abstinent	102	80.3	80.3	100
		Total	127	100	100	-

Table 1: 6 month abstinence.

Is there an association between length of stay and abstinence at six months post-residential addiction treatment?

The average length of stay for the participants in this study was 47.6 days (SD= 11.6). Seven participants stayed at Cedars for 1-20 days, 13 stayed for 21-30 days, 47 stayed for 31-45 days, 123 stayed for 46-60 days, and 16 stayed for more than 61 days. Participants in the 'more than 61 days' category reported the highest abstinence rate of 81.3%. The second highest rate of abstinence was reported for participants in the category with '31-45 days' in treatment, at 80.9%, followed by '46-60 days' with an abstinence rate of 72.4%, '21-30 days' at 61.5% and finally '1-20 days' at 42.9%.

A chi square test of goodness of fit determined that the effect between length of stay and abstinence was non-significant, χ^2 (8)=8.133, p=0.421. However, the variations in the percentages do

show an interesting relationship, whereby a slightly shorter length of stay (31-45 days) had higher abstinence rates than a slightly longer length of stay (40-60 days). Future studies should explore this variation with a larger sample size.

Independent Samples Test										
		Levenes Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
6 month data coded	Equal Variances assumed	26.471	0	-3.159	204	0.002	-0.27	-0.086	-0.439	-0.101
	Equal variances not assumed			-2.929	127.64	0.004	-0.27	-0.092	-0.435	-0.088

Table 2: Independent samples test.

Is there an effect between frequency of 12-Step and other mutual self-help group attendance and abstinence at six months post-residential addiction treatment?

Participation in 12-Step or similar mutual self-help groups post-residential treatment was categorized into five separate responses. Those who reported attending group meetings 'only when I feel like it' (10 participants), reported an abstinence rate of 30%. Those that responded as having 'never' attended any groups (15), reported an abstinence rate of 53.3%. Participants reporting attending groups '1-2 per week' (24) had an abstinence rate of 66.7%, while those attending '3-5 per week' (115) reported an abstinence rate of 76.5%, and those attending 'daily' (42) reported the highest abstinence rate of 85.7%.

The homogeneity assumption was violated, therefore, the robust tests of equality of means was calculated (Table 3). The equality of mean (Welch test) shows that there is an effect of 12-Step and other mutual self-attendance on abstinence at six months, F (4, 35.589)=4.138, p=0.007.

Robust Tests of Equality of Means				
6 month data coded				
Statistic[a]		df1	df2	Sig.
Welch	4.138	4	35.589	0.007
Brown-Forsythe	5.537	4	38.501	0.001
[a]Asymptomatically F distributed				

Table 3: Equality of mean for 12-step attendance and abstinence.

Multiple Comparisons						
Dependent Variable: 6 month data coded						
Games-Howell						
					95% Confidence Interval	
(I) Six Months Freq	(J) Six Months Freq	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Daily	3-5 per week	0.103	0.083	0.728	-0.13	0.33
	1-2 per week	0.208	0.136	0.545	-0.18	0.6
	Only when I feel like it	1.033*	0.298	0.038	0.05	2.02
	Never	0.567	0.238	0.169	-0.16	1.29
3-5 per week	Daily	-0.103	0.083	0.728	-0.33	0.13
	1-2 per week	0.105	0.127	0.919	-0.26	0.47
	Only when I feel like it	0.93	0.295	0.064	-0.05	1.91
	Never	0.464	0.233	0.317	-0.25	1.18
1-2 per week	Daily	-0.208	0.136	0.545	-0.6	0.18
	3-5 per week	-0.105	0.127	0.919	-0.47	0.26

	Only when I feel like it	0.825	0.313	0.125	-0.17	1.82
	Never	0.358	0.257	0.637	-0.4	1.12
Only when I feel like it	Daily	-0.567	0.238	0.169	-1.29	0.16
	3-5 per week	-0.464	0.233	0.317	-1.18	0.25
	1-2 per week	-0.358	0.257	0.637	-1.12	0.4
	Only when I feel like it	0.467	0.369	0.716	-0.64	1.58
*The mean difference is significant at the 0.05 level.						

Table 4: 12-step attendance and abstinence at six months post-treatment.

More specifically, a post-hoc test shows that there is a difference in abstinence for individuals who attended the group 'daily' and 'only when they feel like it,' p=0.038. This difference can be observed in (Table 4).

Is there an effect between participation in drug monitoring and abstinence at six months post-residential addiction treatment?

There was a significant association between attendance of drug monitoring group and abstinence, χ^2 (2)=13.196, p=0.001. The strength of association is moderately strong according to Cramer's V=0.253, p=0.001 (Table 5 and 6). Participants who attended drug monitoring post-treatment were more likely to be abstinent at six months following treatment discharge.

Chi-Square Tests			
	Value	df	Asymptomatic Significance (2-sided)
Pearson Chi-Square	13.196[a]	2	0.001
Likelihood Ratio	14.591	2	0.001
Linear-by-Linear Association	11.536	1	0.001
N of Valid Cases	206	-	-
[a]0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.17			

Table 5: Drug monitoring and abstinence at six months post-treatment.

Symmetric Measures			
		Value	Approximate Significance
Nominal by Nominal	Phi	0.253	0.001
	Cramer`s V	0.253	0.001
N of Valid Cases	-	206	-

Table 6: Strength of association drug monitoring and abstinence.

Is there an association between completion of residential treatment and abstinence at six months post-residential addiction treatment?

There was a significant association between completion of residential treatment and abstinence, χ^2 (2)=13.676, p=0.001. The strength of association is moderately strong, according to Cramer's V=0.258, p=0.001 (Tables 7 and 8). Participants who completed treatment (as defined by mutual agreement between the patient and his/her case manager) were significantly more likely to be abstinent at six months post-treatment.

Is there an effect between age and abstinence at six months post-residential addiction treatment?

There was a non-significant association between age and abstinence χ^2 (10)=17.882, p=0.057. The strength of association is moderately strong, that is Cramer's V=0.295, p=0.057.

Chi-Square Tests			
	Value	df	Asymptomatic Significance (2-sided)
Pearson Chi-Square	13.676[a]	2	0.001
Likelihood Ratio	11.866	2	0.003
N of Valid Cases	203	-	-
[a]2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.24.			

Table 7: Treatment completion at six months post-treatment.

Is there an effect of drug of concern on abstinence at six months post-residential addiction treatment with age as covariate?

No significant effect of drug of concern on abstinence was found after controlling for age (covariate), F (12, 192)=0.710, p=0.741. This shows that even after removing the effect of covariate (age), there was no effect of drug of concern on abstinence. The covariate, age, was not significantly related to the abstinence, F (1, 192)=2.526, p=0.114. Both F statistics show that drug of concern does not have an effect on abstinence in the presence or absence of age as a covariate (Table 9).

Symmetric Measures					
		Value	Asymptotic Standardized Error[a]	Approximate T[b]	Approximate Significance
Nominal by Nominal	Phi	0.258	0.121	2.758	0.001
	Cramer`s V	0.258			0.001
Ordinal by Ordinal	Gamma	0.649			
N of Valid Cases		206			0.006
[a] Not assuming the null hypothesis					
[b] Using the asymptomatic standard error assuming the null hypothesis					

Table 8: Treatment abstinence at six months post-treatment.

Tests of Between-Subjects Effects						
Dependent Variable: 6 month data coded						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**	**Partial Eta Squared**
Corrected Model	4.508[a]	13	0.347	0.928	0.525	0.059
Intercept	70.865	1	70.865	189.747	0	0.497
Age	0.944	1	0.944	2.526	0.114	0.013
Drug_Primary	3.183	12	0.265	0.71	0.741	0.042
Error	71.706	192	0.373	-	-	-
Total	1534	206	-	-	-	-
Corrected Total	76.214	205	-	-	-	-
[a] R Squared=0.059 (Adjusted R Squared=-0.005)						

Table 9: Drug of concern and abstinence at six months post-treatment.

Discussion

Through an examination of length of stay in residential treatment, 12-Step group participation post-treatment, drug monitoring post-treatment, completion of residential treatment, age, gender, and primary drug of concern, the present study adds to the current literature on descriptors of abstinence post-residential treatment.

Overall, 73.3% of the sample remained abstinent at 6 months post-treatment, with 19.4% experiencing 1-3 slips post-treatment, and 7.3% experiencing relapse. A previous study found that roughly 66% of patients treated for substance use disorder in a residential setting were abstinent in the past month 6 months post-treatment [46]. The complete abstinence of 73.3% of the sample for the 6 months following treatment points to the efficacy treatment at Cedars. However, it is important to note that these are short term outcomes post-treatment, and the abstinent rate will likely decrease with time.

The present study found a significant difference between relapse rates among males and females. In particular, males were more likely to be abstinent compared to females. This finding is in contrast with previous studies, which posit that females are more likely to be abstinent [34,35]. This difference may be due to the fact that both males and females took part in the same residential program, with no gender-specific treatment. Women with substance use disorder are often required to attend treatment that is not specifically designed for them, lacking the gender-specific aspects of the living female experience that may promote recovery [47-49]. This disparity between male and female outcomes identifies a need to create more female-specific treatment to further support women in their path of recovery.

In the present study, the effect between length of stay and abstinence six months post-residential treatment was non-significant, consistent with the findings of a previous study [11]. However, participants who stayed longer than 61 days in treatment reported the highest abstinence rate (81.3%), while participants who stayed 1-20 days in treatment reported the lowest abstinence rate (73.3%) in the sample. This trend, although non-significant in the present study, has been observed in past studies [6-10]. In addition, it is interesting to note that the second highest length of stay category in regards to abstinence was 31-45 days in treatment, despite the fact that the 46-60 day length of stay was the most popular among patients in the sample. As Cedars does not have predefined length of stay requirements for its programs, further research is planned to uncover the factors and working points that impact the mutual conclusion of one's treatment stay.

The present study found a significant effect of 12-Step and other mutual self-attendance group participation post-treatment on abstinence six months following treatment discharge. In particular, individuals who attended these groups on a daily basis were significantly more likely to be abstinent at six months compared to individuals who attended the group only when they felt like it. Previous studies have also found the efficacy of regular attendance at 12-Step groups [13,19]. Participants who attended 12-Step and other self-attendance groups may have done so for preventive measures, rather than participants who attended the group when they felt like it and possibly when difficulties arose. However, this can only be speculated from the results of abstinence rates in the present study, and warrants further research. The relationship between daily attendance of 12-Step programs and abstinence also supports the mentality of many addiction professionals in promoting clients to attend '90 meetings in 90 days,' a tradition often associated with AA [50]. Although daily attendance to 12-Step and other mutual self-attendance groups was found to be related to abstinence, it is valuable for the individual to set an individualized achievable and sustainable goal for themselves, whether that involves daily attendance or weekly attendance, for example [50].

The present study also found a significant relationship between drug monitoring and abstinence six months following residential addiction treatment. This is consistent with the findings of previous studies, which have posited that monitoring promotes recovery from substance use disorder [26,28,29]. Although the present study found drug monitoring to be significantly related with abstinence outcomes, monitoring is rarely used in the path to recovery [28]. In addition, the present study found a significant effect regarding treatment completion; a moderately strong effect was found between treatment completion and abstinence at six months following residential treatment. This is consistent with the findings of previous studies, which also examined abstinence rates post-treatment [8,11]. As individualized treatment is tailored to the patient's unique needs, the patient and case manager's mutual agreement that the individual is ready to leave the residential portion of their treatment is valuable in impacting abstinence rates, although the length of stay amongst patients may vary.

In addition to these findings, the present study found no significant relationship between age and abstinence, and drug of concern and abstinence at six months post-treatment. 72.1% of participants used alcohol as a primary drug of concern, compared to opiates (10.8%), heroin (2.9%), and other drugs of concern accounting for the last 14.2%. This is consistent with the drug use rates in Canada as alcohol is the most commonly used drug, with 80% of adults reporting its use in the past year, compared to 8.4% using cannabis, 0.7% using cocaine/crack, and 0.4% using hallucinogens [51]. With the current opioid crisis in British Columbia, one could expect that the percentage of participants who use opioids would be higher. However, there are significant barriers among people with opioid use disorder in accessing treatment, such as unemployment and limited insurance, which may account for this discrepancy [52]. Although statistically insignificant, participants who used cocaine as their primary drug of concern had lower abstinence rates (55.6%) compared to participants who used opiates (71.4%), alcohol (74.1%), or other drugs of concern (80%). It is important to note that participants in the present study utilizing opiates as the primary drug of concern were not actively involved in Opiate Antagonistic Treatment (OAT), as often used in treatment for opiate use disorder [53]. A cedar does use Suboxone for individuals who use opiates, but generally for no longer than an 8-10 day period depending on their Clinical Opiate Withdrawal Scale score. This study, therefore, supports the efficacy of psychological treatments in opiate use disorder [54].

Demographically, it is relevant to note the ethnicity and gender effects in the sample. The vast majority of participants in the present study were Caucasian (93%), limiting the ability to compare between ethnicities and minimizing the generalizability of these findings to other ethnicities. Previous studies, however, have found ethnicity as a factor in substance use disorder relapse post-treatment, particularly for ethnic minorities [5,55,56]. Future studies should examine the possible impact of ethnicity on relapse rates in residential settings.

Limitations and Future Research

Although the present study adds to the literature of factors associated with relapse post-residential treatment, it is not without its limitations. A significant limitation to this study is the use of a convenience sample, which reduces the generalizability of the study's results. The study would benefit from reproduction with a larger sample size, longitudinal analysis, and varying types of collection of data (i.e., drug monitoring results, case manager notes, and physician notes in addition to self-reporting). Utilizing a sample with a greater diversity of ethnicities would also allow the opportunity to examine possible differences in relapse rates across ethnicities. Furthermore, future studies examining abstinence rates length of stay would benefit from identifying the optimal length of stay to promote abstinence among varying populations.

Conclusion

The present study examined the relationship between length of stay in residential treatment, 12-Step group participation post-treatment, and drug monitoring post-treatment, completion of residential treatment, age, gender, and primary drug of concern on abstinence six months following discharge from residential treatment. Being male, 12-Step group participation, drug monitoring, and treatment completion were found to be significantly related to abstinence six months post-treatment. Length of stay, age, and primary drug of concern were found to be insignificant. The results of the present study can inform treatment providers in supporting clients to participate in 12-step programs and drug monitoring post-treatment, in addition to encouraging treatment completion in order to promote positive outcomes.

References

1. http://www.cclt.ca/Eng/topics/addiction-recovery/Pages/default.aspx
2. Dennis, ML, Scott CK, Funk R, Foss MA (2005) The duration and correlates of addiction and treatment careers. J Subst Abuse Treat 28: S51-S62.
3. White WL, Kelly JF, Roth JD (2012) New addiction-recovery support institutions: Mobilizing support beyond professional addiction treatment and recovery mutual aid. J Groups Addict Recov 7: 297-317.
4. http://www.health.gov.bc.ca/library/publications/year/2011/adult-residential-treatment-standards.pdf
5. Hser Y (2007) Predicting long-term stable recovery from heroin addiction: Findings from a 33-Year follow-up study. J Addict Dis 26: 51-60.
6. Brunette MF, Drake RE, Woods M, Hartnett T (2001) A comparison of long-term and short-term residential treatment programs for dual diagnosis patients. Psychiatric Services 52: 526-528.

7. Broers B, Giner F, Dumont P, Mino A (2000) Inpatient opiate detoxification in geneva: Follow-up at 1 and 6 months. Drug Alcohol Depend 58: 85-92.
8. Greenfield L, Burgdorf K, Chen X, Porowski A, Roberts T, et al. (2004) Effectiveness of longterm residential substance abuse treatment for women: Findings from three national studies. Am J Drug Alcohol Abuse 30: 537-550.
9. Conners NA, Grant A, Crone CC, Whiteside-Mansell L (2006) Substance abuse treatment for mothers: Treatment outcomes and the impact of length of stay. J Subst Abuse Treat 31: 447-456.
10. Chang G, Martin KB, Tang M, Fleming JA (2016) Inpatient hospitalization for substance use disorders one year after residential rehabilitation: predictors among US veterans. Am J Drug Alcohol Abuse 42: 56-62.
11. Gossop M, Stewart D, Browne N, Marsden J (2002) Factors associated with abstinence, lapse or relapse to heroin use after residential treatment: Protective effect of coping responses. Addiction 97: 1259-1267.
12. Harris AHS, Kivlahan D, Barnett PG, Finney JW (2011) Longer Length of Stay Is Not Associated with Better Outcomes in VHA's Substance Abuse Residential Rehabilitation Treatment Programs. J Behav Health Serv Res 39: 68-79.
13. Moos RH, Finney JW, Ouimette PC, Suchinsky, RT (1999) A comparative evaluation of substance abuse treatment: I. treatment orientation, amount of care, and 1Year outcomes. Alcohol Clin Exp Res 23: 529-536.
14. Satre, DD, Mertens JR, Arean PA, Weisner C (2004) Fiveyear alcohol and drug treatment outcomes of older adults versus middleaged and younger adults in a managed care program. Addiction 99: 1286-1297.
15. Greenwood GL, Woods WJ, Guydish J, Bein E (2001) Relapse outcomes in a randomized trial of residential and day drug abuse treatment. J Subst Abuse Treat 20: 15-23.
16. Zarkin GA, Dunlap LJ, Bray JW, Wechsberg WM (2002) The effect of treatment completion and length of stay on employment and crime in outpatient drug-free treatment. J Subst Abuse Treat 23: 261-271.
17. Stark MJ (1992) Dropping out of substance abuse treatment: A clinically oriented review. Clin Psychol Rev 12: 93-116.
18. Fiorentine R (1999) Client Engagement in Drug Treatment. J Subst Abuse Treat 17: 199-206.
19. Gossop M, Stewart D, Marsden J (2008) Attendance at Narcotics Anonymous and Alcoholics Anonymous meetings, frequency of attendance and substance use outcomes after residential treatment for drug dependence: A 5year followup study. Addiction 103: 119-125.
20. Laffaye C, McKellar JD, Ilgen MA, Moos RH (2008) Predictors of 4-year outcome of community residential treatment for patients with substance use disorders. Addiction 103: 671-680.
21. Hester RK, Lenberg KL, Campbell W, Delaney HD (2013) Overcoming Addictions, a Web-Based Application, and SMART Recovery, an Online and In-Person Mutual Help Group for Problem Drinkers, Part 1: Three-Month Outcomes of a Randomized Controlled Trial. J Med Internet Res 15: e134.
22. Atkins RG, Hawdon JE (2007) Religiosity and participation in mutual-aid support groups for addiction. J Subst Abuse Treat 33: 321-331.
23. Nicolaus M (2012) Empowering Your Sober Self: The LifeRing Approach to Addiction Recovery. J Groups Addict Recov 7: 118-129.
24. DuPont RL, Seppala MD, White WL (2016) The three missing elements in the treatment of substance use disorders: Lessons from the physician health programs. J Addict Dis 35: 3-7.
25. Johnson K, Pan Z, Young L (2008) Therapeutic community drug treatment success in Peru: a follow-up outcome study. Subst Abuse Treat Prev Policy 3: 26.
26. McKay JR, Knepper C, Deneke E, O'Reilly C, DuPont RL (2016) An Initial Evaluation of a Comprehensive Continuing Care Intervention for Clients with Substance Use Disorders: My First Year of Recovery (MyFYR). J Subst Abuse Treat 67: 50-54.
27. Gilbert JW, Wheeler GR, Mick GE (2010) Importance of urine drug testing in the treatment of chronic noncancer pain: implications of recent medicare policy changes in Kentucky. Pain Physician 13: 167-186.
28. DuPont RL, Skipper GE (2012) Six Lessons from State Physician Health Programs to Promote Long-Term Recovery. J Psychoactive Drugs 44: 72-78.
29. https://www.ncjrs.gov/App/Publications/abstract.aspx
30. Ilgen M, McKellar J, Tiet Q (2005) Abstinence Self-Efficacy and Abstinence 1 Year After Substance Use Disorder Treatment. J Consult Clin Psychol 73: 1175-1180.
31. Cuffel BJ, Chase P (1994) Remission and Relapse of Substance Use Disorders in Schizophrenia Results From a One-Year Prospective Study. J Nerv Ment Dis 182: 342-348.
32. Oslin DW, Pettinati H, Volpicelli JR (2002) Alcoholism Treatment Adherence: Older Age Predicts Better Adherence and Drinking Outcomes. Am J Geriatr Psychiatry 10: 740-747.
33. Satre DD, Mertens J, Areán PA, Weisner C (2003) Contrasting outcomes of older versus middle-aged and younger adult chemical dependency patients in a managed care program. J Stud Alcohol 64: 520-530.
34. Walitzer KS, Dearing RL (2006) Gender differences in alcohol and substance use relapse. Clin Psychol Rev 26: 128-148.
35. Grella CE, Scott CK, Foss MA, Dennis ML (2008) Gender Similarities and Differences in the Treatment, Relapse, and Recovery Cycle. Evaluat Rev 32: 113-137.
36. Annis HM, Sklar SM, Moser AE (1998) Gender in relation to relapse crisis situations, coping, and outcome among treated alcoholics. Addict Behav 23: 127-131.
37. Janowsky DS, Morter S, Hong L, Howe L, Silva S (1997) Myers Briggs Type indicator differences between major depressive disorder and bipolar disorder patients. Biol Psychiatry 42: 270S.
38. Bradizza CM, Stasiewicz PR, Paas ND (2006) Relapse to alcohol and drug use among individuals diagnosed with co-occurring mental health and substance use disorders: A review. Clin Psychol Rev 26: 162-178.
39. Evans EA, Grella CE, Washington DL, Upchurch DM (2017) Gender and race/ethnic differences in the persistence of alcohol, drug, and poly-substance use disorders. Drug Alcohol Depend 174: 128-136.
40. Brown PJ, Stout RL, Mueller T (1999) Substance use disorder and posttraumatic stress disorder comorbidity: Addiction and psychiatric treatment rates. Psychol Addict Behav 13: 115-122.
41. Rubin A, Stout RL, Longabaugh R (1996) Gender differences in relapse situations. Addiction 91: 111-120.
42. Knight DK, Logan SM, Simpson DD (2001) Predictors of program completion for women in residential substance abuse treatment. Am J Drug Alcohol Abuse 27: 1-18.
43. Choi S, Ryan JP (2006) Completing substance abuse treatment in child welfare: The role of co-occurring problems and primary drug of choice. Child Maltreat 11: 313-325.
44. Staiger PK, Richardson B, Long CM, Carr V, Marlatt GA (2013) Overlooked and underestimated? Problematic alcohol use in clients recovering from drug dependence. Addiction 108: 1188-1193.
45. Stuyt EB, Gundersen DC, Shore JH, Brooks E, Gendel MH (2009) Tobacco use by physicians in a physician health program, implications for treatment and monitoring. Am J Addict 18: 103-108.
46. Finney JW, Moos RH (1992) The long-term course of treated alcoholism: II. Predictors and correlates of 10-year functioning and mortality. J Stud Alcohol 53: 142-153.
47. Nelson-Zlupko L, Dore MM, Kauffman E, Kaltenbach K (1996) Women in recovery. J Subst Abuse Treat 13: 51-59.
48. Covington S (2002) Helping women recover: Creating gender-responsive treatment. The handbook of addiction treatment for women: Theor Pract pp: 52-72.
49. Walitzer KS, Dermen KH, Barrick C (2009) Facilitating involvement in Alcoholics Anonymous during outpatient treatment: A randomized clinical trial. Addiction 104: 391-401.

50. Gossop M (1992) Severity of dependence and route of administration of heroin, cocaine and amphetamines. Br J Addict 87: 1527-1536.
51. http://www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/_2012/summary-sommaire-eng.php
52. Becker WC, Fiellin DA, Merrill JO, Schulman B, Finkelstein R, et al. (2008) Opioid use disorder in the United States: insurance status and treatment access. Drug Alcohol Depend 94: 207-213.
53. Stotts AL, Dodrill CL, Kosten TR (2009) Opioid dependence treatment: options in pharmacotherapy. Expert Opin Pharmacother 10: 1727-1740.
54. Petry NM, Martin B (2002) Low-cost contingency management for treating cocaine-and opioid-abusing methadone patients. J Consult Clin Psychol 70: 398-405.
55. Ellickson PL, Mcguigan KA, Klein DJ (2001) Predictors of late-onset smoking and cessation over 10 years. J Adolesc Health 29: 101-108.
56. Farley M, Golding JM, Young G, Mulligan M, Minkoff JR (2004) Trauma history and relapse probability among patients seeking substance abuse treatment. J Subst Abuse Treat 27: 161-167.