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Predictors of Treatment Retention for Substance Dependent Adults with Co-Occurring Depression

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Abstract

Low attendance in addiction treatment, particularly in cases of comorbidity, has been identified as a pervasive challenge. We examine predictors of treatment retention in a sample of veterans (N = 253) participating in a clinical trial comparing two types of psychotherapy for co-occurring depression and substance use disorders. The study protocol included 24 weeks of outpatient group psychotherapy in either a newly developed Integrated Cognitive Behavioral Therapy (ICBT) or Twelve Step Facilitation Therapy (TSF). Using a model of treatment utilization developed by Aday and Anderson, we analyzed predictors categorized into predisposing factors, enabling resources, need for treatment, and type of treatment received. Outcome included total number of sessions attended (maximum of 36 sessions). Treatment retention did not differ between the two study interventions. Bivariate analyses indicated that predisposing factors were most predictive, with older participants, Caucasians, and those using only alcohol in the month before treatment attending more sessions, and individuals who had recently experienced a health event remained in treatment longer. Importantly, several factors were not related to treatment retention: marital status, education, neuropsychological functioning, financial stress, chronic health problems, treatment motivation, and psychiatric severity. In the combined model of predisposing, enabling and need factors, age and ethnicity were the only significant predictors.

INTRODUCTION

Woody Allen has been credited with saying “Eighty percent of success is showing up.” In addictions, this observation is supported by the well-documented relationship between treatment attendance and subsequent reductions in alcohol and drug use.¹⁻⁴ Unfortunately, “showing up” can be challenging in addiction settings. High dropout rates and attrition have been observed across treatment settings, interventions, and substances of abuse.^{1,5,6}

Evidence suggests that attrition rates may be higher for patients with comorbid mental health disorders. Greater psychiatric severity has been associated with addiction treatment attrition, and specifically, more depressive symptoms have been associated with shorter addiction treatment stays.^{7,8} In depression treatment, dropout rates have been found to fluctuate between 15% to over 50%.^{9,10} However, we found no studies that specifically evaluated predictors of treatment retention for substance dependent patients with depressive disorders.

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Declaration on Interests

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

This may represent an important limitation, as depressive symptoms such as loss of interest, poor concentration, and social isolation may negatively impact treatment retention.

Researchers have identified characteristics predictive of treatment retention, classified in a model of health service utilization into predisposing characteristics, enabling resources, and need factors.^{11,12} Predisposing characteristics include factors such as demographics (i.e., age, gender), social structure (i.e., education, marital status), and cognitive functioning. Enabling resources represent the assets available to individuals that plausibly facilitate treatment attendance (i.e., finances, social support). Need factors represent the severity of the presenting problem from both the perspective of the individual seeking treatment and treatment providers.

Immutable predisposing characteristics are among the most studied predictors of attendance in addictions. Older patients, males and individuals using only alcohol generally remain in treatment longer; whereas African Americans, the less educated, individuals separated from their spouses, and individuals with poorer cognitive functioning are more likely to dropout of treatment.^{13–17} Cognitive functioning may be particularly important for individuals with co-occurring depressive disorders given the adverse impacts on neurocognitive performance associated with depression. The enabling resources of better social support and employment difficulty/financial stress have been linked to higher addiction treatment retention.^{1,15} Regarding factors of addiction treatment need, patient motivation and physical health problems have been investigated, based on the premise that experiencing a health problem may provide a window of opportunity when individuals experience heightened motivation to reduce alcohol use.^{18–20} Research has primarily focused on acute physical health events (i.e. heart attack) with chronic health problems (i.e. diabetes) being less studied.

Participants in the current study were veterans recruited into a clinical trial comparing two outpatient group psychotherapy interventions for individuals with co-occurring substance use disorders and depression. Consistent with prior literature, results from this clinical trial have documented a significant relationship between greater treatment exposure (more intervention sessions attended) and better outcomes for substance use and depression in both intervention groups.²¹

In addition to patient characteristics, treatment and provider characteristics may also be important predictors of treatment retention. Studies have typically examined whether the treatment “matches” or is a “good fit” for the individual.²² Both of our study interventions were delivered in outpatient group sessions that were equal in length of session (1 hour), number of sessions provided (36 total sessions over 24 weeks), modality (group), and VA setting. Therefore, we could not compare attendance based on these dimensions. However, two different types of psychotherapy treatment were provided, allowing us to examine the impact of intervention type on treatment retention. Our Integrated Cognitive Behavioral Therapy (ICBT) combined elements of Cognitive-Behavioral Depression Treatment and Cognitive-Behavioral Coping Skills Training of Addiction (CBT) into each group session.^{23,24} In contrast, our Twelve Step Facilitation (TSF) was based on the TSF intervention in Project Matching Alcoholism Treatments to Client Heterogeneity (MATCH) modified for the group format and focused solely on alcohol and drug use.²⁵

Due to the dual diagnosis nature of the population, we hypothesized that attendance would differ in our two interventions. Our ICBT treatment explicitly addressed depression symptoms in each session, whereas the TSF condition did not. Thus, the ICBT intervention might be perceived as a better match by individuals with co-occurring depression and consequently improve retention.

In the present study, we evaluate predisposing, enabling, and need predictors of treatment retention in a sample of alcohol/substance dependent adults with comorbid depression, addressing several limitations in the literature. First, studies examining predictors of addiction treatment retention specifically for individuals with co-occurring non-substance mental health disorders are limited. Second, we extend current research examining the impact of acute health problems to investigate both acute and chronic health problems as predictors of treatment retention. Finally, we also examine whether addiction treatment retention varies by the type of treatment received (ICBT versus TSF) in a sample with co-occurring depression.

METHODS

Participants

Current analyses included 253 participants entering outpatient treatment at the Veterans Affairs San Diego Healthcare System (VASDHS). Participants were recruited from referrals to the VA Substance Abuse Mental Illness (SAMI) program, a dual diagnosis outpatient clinic. Dates of recruitment for participants included in the present study were March 2000 to November 2007. The study was approved by VA and University of California, San Diego Institutional Review Boards. Inclusion criteria for study participation were: (a) presence of current DSM-IV diagnosis of alcohol, cannabinol, and/or stimulant dependence and (b) DSM-IV diagnosis of major depressive disorder (MDD) independent of alcohol/substance use. Substance-independent MDD was established via (a) meeting criteria for a current major depressive episode, and (b) a lifetime diagnosis of MDD, with at least one major depressive episode independent of substance use. Participants were excluded if: (a) they met criteria for DSM-IV diagnosis of bipolar disorder, psychotic disorder, or opiate dependence through intravenous administration (due to the availability of opioid agonist treatment), (b) they resided more than 50 miles away from VASDHS (making attendance difficult), or (c) they had documented memory deficits that would impair accurate recall for assessments. With the exception of bipolar disorder and psychotic disorders, other co-occurring Axis I or Axis II disorders (e.g., PTSD, Antisocial Personality Disorder) were not excluded.

Procedures

After initial screening for eligibility to participate was completed, the study was described to potential participants and written informed consent was obtained. Participants consented to: (a) assignment to 24 weeks of either ICBT or TSF group treatment, (b) assessment interviews at intake, mid-treatment, end of treatment, and quarterly thereafter for a total of 18 months, (c) random toxicology screens at group sessions (standard care in SAMI clinic) and follow-up interviews, (d) VA standard protocol medication management appointments with a SAMI psychiatrist, and (e) not participate in other formal treatment for depression or substance dependence during the 24 week intervention period other than the VA psychiatrist medication appointments and Twelve-Step meetings in the community.

Interventions

Consecutive admissions to the SAMI program eligible for the study were sequentially assigned to the treatment group with the next entry date. Groups had entry times every four weeks and the ICBT and TSF entry times were staggered. Thus, participants entered with a maximum of a two-week waiting period. The feasibility of this design has been previously reported.²⁶ Both interventions had two consecutive 12-week phases of treatment. The initial phase involved twice weekly 60-minute group sessions and the second phase consisted of once weekly 75-minute group sessions.

Individuals in both groups received monthly individual medication management appointments using standard VA medication protocol. The VA formulary guideline during the study time period required the use of fluoxetine, citalopram, or tricyclic antidepressants as first line antidepressants. If these agents failed then bupropion, paroxetine, or sertraline could be used. If two SSRIs and two nonSSRIs failed then mirtazepine could be used. If failure to respond occurred with mirtazepine then venlafaxine could be used. SSRIs used at the VASDHS include fluoxetine, citalopram, paroxetine, and sertraline.

Integrated Cognitive Behavioral Therapy (ICBT)—ICBT, newly developed for this study, combined two empirically validated treatments: Cognitive-Behavioral Depression Treatment and Cognitive-Behavioral Coping Skills Training of Addiction evaluated in Project MATCH.^{23,24} For this study, the intervention was modified from the Project Match manual to allow group versus individual delivery and entry points at the beginning of any module. Phase I of ICBT included three modules (managing cognitions, increasing healthy activities, and improving social network), with each module consisting of eight sessions delivered over four weeks. Each module topic addressed managing depression symptoms as well as increasing skills for avoiding substance relapse. In Phase II, the skills introduced in Phase I were reviewed and reinforced.

Twelve-Step Facilitation (TSF) Therapy—TSF is a formal therapist-guided group intervention that was based on the Project Match TSF treatment.²⁵ As with ICBT, the manual was modified to allow for group delivery, entry at the beginning of each module, three modules in Phase I, and review and reinforcement in Phase II. One module addressed Alcoholics Anonymous/Narcotics Anonymous (AA/NA) Steps 1–3, another module focused on topics common in AA/NA meetings and Twelve-Step literature, and a third module covered AA/NA Steps 4 and 5. If participants raised issues related to depression symptoms, TSF themes were utilized or participants were advised to discuss depression symptoms at medication appointments with the psychiatrist.

Diagnostic Measure

Diagnoses—The Composite International Diagnostic Interview (CIDI), developed by the World Health Organization, utilizes a structured interview to evaluate independent psychiatric symptoms separately from psychiatric symptoms associated with medical conditions or substance use/withdrawal.²⁷ The CIDI was administered by a trained research assistant to attain participants' psychiatric and substance use disorder diagnoses within one week of obtaining informed consent.

Predisposing Characteristics Measures

Demographics/Substance Use—The Addiction Severity Index (ASI) evaluates the nature and severity of problems associated with substance use in seven functional domains: medical, employment, alcohol use, drug use, legal, family/social, and psychiatric.²⁸ For the purposes of the present study, the ASI provided the following predisposing pretreatment demographic factors: gender, ethnicity, marital status, age, and education. The ASI also provided type of substances used in the 30 days prior to treatment entry.

Neuropsychological Functioning—The neuropsychological measures, and references to normative data used to convert raw scores to demographically-corrected T-scores, are: Wechsler Adult Intelligence Scale – III Digit Symbol, Vocabulary, and Block Design subtests; Stroop Color and Word subtests and Interference score; Trail Making Test – A and B; Wisconsin Card Sorting Test – Perseveration errors; California Verbal Learning Test – trials 1–5 total, recognition discrimination, and long delay free recall; American National Adult Reading Test; and Rey-Osterreith Complex Figure copy and 30 minute delay.^{29–38} A

global T-score was computed as the average of all available T-scores. A participant was required to have scores on 80% of the tests for a global score to be calculated.

Enabling Resources Measures

Finances—Chronic financial stress was assessed as part of a standardized global life stress assessment interview. Participants indicated which stressors they had experienced in the three months preceding treatment entry using a checklist of 133 stressors from the Psychiatric Epidemiological Research Interview-Modified and the research interviewer then assessed additional details for each stressor.³⁹ Each reported stressor was evaluated by two trained raters using standardized rules and criteria developed for rating life stressors (Bedford Life Events and Difficulties Scheduled [LEDS]).⁴⁰ Based on LEDS guidelines, raters coded each identified stressor as either an acute stress event (specific date of occurrence) or chronic stress difficulty (on-going stressors persisting more than four weeks) and rated the severity of the stressor. For current analyses, stressors were dichotomized to reflect presence (1) or absence (0) of chronic financial difficulties.

Social Support—The Social Support Questionnaire (SSQ) assesses perceived social support via a structured interview.^{41,42} Participants were asked to identify social supports in four categories: partner/spouse, family members (up to five people), friends (up to five people), and other (up to three people such as boss, co-worker, neighbor). For each identified support, the number of days of contact with that person over an average 30-day period in the prior three months is assessed. Total social contact was used to predict attendance since frequency of contact with supports may be a better predictor of outcomes than number of supports.⁴³ Total social contact was calculated by summing the days of contact for each social support listed. Due to distributional characteristics, social support was dichotomized into two categories: low social support (0–29 contacts reported in the assessment timeframe; 51% of sample) and high social support (30–173 contacts reported in the assessment timeframe; 49% of sample).

Need for Treatment Measures

Depression Severity—The Beck Depression Inventory-II (BDI-II) is a 21-item self-report instrument that assesses the affective, cognitive, behavioral, somatic, and motivational symptoms of depression over the most recent two-week period.^{44,45} Items are rated on 4-point scale (0 to 3), with higher scores indicating higher depressive symptoms.

Physical Health—Acute health events (events occurring in the 90 days prior to the start of treatment) and chronic health stressors (on-going health stressors persisting more than four weeks) were assessed as part of the same standardized global life stress assessment interview used to assess financial stressors (see above). For current analyses, stressors were dichotomized to reflect presence (1) or absence (0) of acute health stress events (e.g., heart attack, injury, surgery), and chronic health difficulties (e.g., asthma, diabetes, arthritis).

Motivation—Motivation for treatment was assessed via three questions on the ASI (see above): (1) “How important to you now is treatment for these alcohol problems?” (2) “How important to you now is treatment for these drug problems?” and (3) “How important to you now is treatment for these psychological problems?” Participants answered these questions on a 5-point Likert scale ranging from “0” = “not at all” to “4” = “extremely.” The highest response was used as the measure of overall motivation in analyses.

Suicide—The presence (1) or absence (0) of lifetime suicide attempts prior to treatment entry was assessed by the ASI described above.

Legal Status—The presence (1) or absence (0) of legal circumstances prior to treatment entry was also assessed with the ASI described above. Legal circumstances included: (a) if treatment was being pursued for legal reasons, (b) if the individual was currently on probation/parole, (c) if the individual was awaiting action on a legal issue, and (d) the individual's belief in the seriousness of their legal status.

Posttraumatic Stress Disorder (PTSD)—PTSD was the most common co-occurring disorder in our veteran sample with both depression and substance disorders, and was assessed using the CIDI described above.

Data Analytic Plan

Analysis of variance (ANOVA) and chi-square tests were first conducted to determine the presence of any significant differences in predictors between treatment groups. Analyses were then conducted on the total sample. Sample size varied across predictors depending on whether the intake assessment was completed; we provide the sample size for each predictor in results. Our outcome variable was total number of sessions attended (maximum of 36 sessions). ANOVAs examined categorical predictors of treatment attendance and linear regression tested continuous treatment attendance predictors. Age, BDI score, and global neuropsychological functioning were analyzed as continuous predictors but are presented in the table categorically. Predictors were first examined separately in bivariate analyses. Predictor by treatment type interactions were examined, followed by a combined model incorporating all significant variables.

RESULTS

Participants

A total of 260 participants met criteria for study inclusion, provided informed consent, and were sequentially assigned to one of the two treatment conditions. Seven participants were not included in the present analyses for the following reasons: four participants died during treatment (2 in ICBT: liver/kidney failure, overdose / 2 in TSF: suicide, heart attack); two participants gave initial consent, but at the first follow-up assessment refused further participation in the study (1 ICBT, 1 TSF); and one participant was transferred to a higher level of care during early treatment (1 ICBT). The final sample ($N=253$) was primarily male (89%) and Caucasian (72%). Mean age of the final sample was 48.4 years ($SD=8.1$).

Intervention Type

Participants attended an average of 17.9 sessions ($SD = 10.7$). There were no significant differences in predictor variables between study interventions. Intervention type was not predictive of treatment attendance ($F(1, 251) = 0.05, p = .82$; ICBT $M = 18.1, SD = 10.7$; TSF $M = 17.8, SD = 10.8$) and there were no significant treatment type by predictor interactions.

Predisposing Characteristics

Age, ethnicity, and type of pretreatment substance use predicted attendance. Older participants attended significantly more sessions than younger participants, adjusted $R^2 = .087, F(1, 251) = 24.89, p < .001$, accounting for 8.7% of the variance in number of sessions attended. For every one year increase in age, number of sessions attended increased by .40 ($B = .40, \beta = .30, t(251) = 4.99, p < .001$).

We dichotomized ethnicity into Caucasian (72% of sample) and Minority (28% of sample) participants. The minority portion of our sample consisted primarily of Blacks (57.1%) and

Hispanics (32.4%), with the remaining 10.5% consisting of Asian/Pacific Islanders, American Indians, and other ethnic groups. Caucasian participants attended more sessions than Minority participants, $F(1, 251) = 8.58, p = .004$, partial $\eta^2 = .03$.

Participants who used only alcohol in the 30 days prior to beginning treatment attended more sessions than participants who used only drugs or both alcohol and drugs, $F(2, 249) = 4.22, p = .02$, partial $\eta^2 = .03$.

Gender approached significance, with males attending more sessions ($M=18.3, SD=10.7$) relative to females ($M=14.4, SD=10.7$), $F(1, 251) = 3.31, p = .07, \eta^2 = .01$. Marital status, education, and neuropsychological functioning were not significantly predictive of treatment attendance.

Enabling Resources

Participants with low social support attended more sessions relative to participants with high social support, $F(1, 212) = 6.12, p = .01$, partial $\eta^2 = .03$. Chronic financial stress was not predictive of attendance.

Needs Factors

Participants who experienced an acute health event in the three months prior to treatment attended more sessions than participants without an acute pretreatment health event, $F(1, 214) = 5.22, p = .02$, partial $\eta^2 = .03$. Chronic health stressors, treatment motivation, legal status, history of suicide attempt, PTSD diagnosis, and depression severity were not predictive of attendance.

Combined Model

A combined model including all significant predictors (age, ethnicity, pretreatment substance use, social support, acute health events) was examined. Results indicated significant model fit, adjusted $R^2 = .145, F(5, 197) = 7.84, p < .001$. The model accounted for 14.5% of the variance in number of sessions attended. Age continued to be a significant predictor of attendance ($B = .30, \beta = .26, t(197) = 3.90, p < .001$); number of sessions attended increased by .30 for every year increase in age. Ethnicity was also a significant predictor of attendance ($B = 3.02, \beta = .15, t(197) = 2.20, p < .03$); on average Caucasians attended 3.02 more sessions than Minorities. No other predictors remained significant in the combined model.

Lastly, post-hoc chi-square analyses were conducted to further examine the pattern of treatment dropout among the significant predictors, ethnicity and age. Dropout was defined as attending less than eight treatment sessions. As depicted in Figure 1, more Minorities (33.8%) dropped out of treatment than Caucasians (24.2%), $\chi^2(1, N = 253) = 2.41, p = .12$. Additionally, a larger percentage of younger participants dropped out of treatment relative to older participants. 47.2% of individuals aged 20–39 dropped out of treatment compared to 26.5% of 40–49 year olds, 22.9% of 50–59 year olds, and 7.1% of 60–69 year olds, $\chi^2(4, N = 253) = 12.99, p = .01$ (see Figure 2).

DISCUSSION

The primary purpose of this study is to expand the literature on predictors of addiction treatment retention among adults with co-occurring substance dependence and depression. While our combined model accounted for a moderate proportion of variance in attendance, we found immutable predisposing characteristics (specifically age and race) to be the most predictive with modest effect sizes.

It is notable that the two demographic groups with significantly lower attendance shared the common feature of being a minority in our sample: about 14% were under 40 years of age and 28% were racial minorities. Individuals in minority groups may perceive the experiences of other group members as irrelevant to them and consequently discount the usefulness and/or personal applicability of group discussions and feedback. Minority clients may also hesitate to disclose personal issues due to fear of being judged or criticized.

The immutable nature of such predisposing characteristics suggests that changes to improve treatment retention need to focus on treatment provision. Possible strategies to overcome disparities in treatment utilization by racial minorities have included creating culturally centered treatment programs and matching patients and therapists on race or ethnicity.^{46,47} However, the impact of these strategies has not been consistently apparent.^{47,48}

Regarding age, it has been suggested that younger age is related to greater geographic mobility and reduced familial/social support that could serve to stabilize and sustain the individual in continued treatment.⁴⁹ Incorporating computerized interventions for some sessions or involving the younger client's social support network may be worth investigating, as these strategies have shown promise in adolescent populations.^{50,51}

Another option would be to provide individually delivered interventions for members of minority groups. Increased efficiency in terms of treatment retention may offset the decreased efficiency based on the need for higher provider to client ratios in individual relative to group interventions.

While pretreatment substance use was predictive of treatment retention in bivariate analyses, the impact became insignificant in the combined model. Clinically, these results may support the need for specialized or more intensive interventions for individuals with illicit drug use disorders.

Regarding enabling resources, in bivariate analyses we found that individuals with low social support attended more treatment sessions compared to participants with high social support. This is inconsistent with prior addiction research, suggesting our results may be specific to substance-disordered individuals with co-occurring depression.¹ Depression symptoms (social isolation, low self-esteem, loss of interest) may result in decreased social support, causing individuals to place a greater value on interpersonal contacts in treatment settings. Our results suggest that limited social support is not necessarily a barrier to treatment, and perhaps acts as motivation for treatment attendance for individuals with co-occurring depression who may value the support network provided in treatment groups.

With respect to needs factors, we found that individuals who had recently experienced a health event attended approximately 20% more therapy sessions than those without a recent health event. These findings are consistent with the literature documenting associations between recent health problems and subsequent reductions in alcohol use and alcohol-related problems.^{19,20,52,53} Thus, more exposure to treatment may be one mechanism whereby health problems positively impact outcomes. In contrast to our results, O'Toole and colleagues found that if individuals reported physical health concerns as their primary motivator for treatment, they were less likely to complete treatment.⁵⁴ Differences in the samples may explain contrasting findings. In the O'Toole study, *all* participants were receiving medical treatment with the most common diagnoses being systemic bacterial infection and abscess/cellulitis in the primarily opiate dependent sample. As reporting physical health as the primary motivator for treatment was correlated with *less* serious medical conditions that required shorter and less intensive treatment (i.e., oral antibiotics), researchers in this study surmised that associated motivation might be "fleeting and transient."⁵⁴(p149)" In contrast, a minority of our sample experienced a health event prior to

treatment entry (15%), and the most predominant substance disorder was alcohol dependence. The notion that severity of a medical problem may be related to motivation is consistent with the findings of Barnett and colleagues, where higher injury severity was related to greater intention to change drinking.⁵⁵ Although significant in bivariate analyses, experiencing a recent health event was not predictive in the combined model, suggesting a modest impact or shared variance with other factors (e.g., age). Future research replicating and clarifying these findings may lead to promising intervention strategies.

The positive influence of physical health problems noted in most studies occur in relation to recent health events (i.e., injury, new diagnosis, infection, emergency department care). In contrast, chronic, persistent health problems (i.e., diabetes, arthritis, asthma) were not predictive in our study. Prior research has reported a lack of relationship between chronic health problems and addiction treatment retention and treatment outcomes.^{53,54} Our distinction between recent health events and chronic health problems may also help to explain what appears to be conflicting findings in the literature. For example, studies have reported that the medical composite score from the ASI was not predictive of treatment retention.^{15,56} However, the ASI medical composite score combines acute health issues and chronic health problems, and thus the distinct influence of recent health events is not evident when combined with chronic medical problems.

Attendance was similar for the two intervention types in our study, ICBT and TSF. We hypothesized that attendance would be higher in the cognitive behavioral intervention as the inclusion of depression topics in ICBT were considered a better fit for individuals with comorbid depression symptoms. The similar treatment retention between ICBT and TSF in our investigation is consistent with the findings for the alcohol dependent sample receiving outpatient aftercare in Project MATCH.²² Our results suggest these two interventions were similarly accepted as reflected by attendance. It is possible that our findings were influenced by the informed consent procedure in which the treatment assignment process was explained to participants. Thus, attendance may have been biased by the commitment of participants to participate in the group to which they are assigned.

Of note, we did not find several factors to be related to attendance in our sample: marital status, education, neuropsychological functioning, financial stress, chronic health stressors, treatment motivation, legal status, history of suicide attempt, co-occurring PTSD diagnosis, and depression severity. Some studies have documented similar results with different samples, settings, and interventions, reporting a lack of association between treatment retention and marital status,³ education,^{3,13,54} financial status,^{3,56} medical status,^{15,54,56} motivational factors,^{3,54,56} legal status,^{15,56} and psychiatric severity.^{15,54} Our results add to this evidence, suggesting that treatment providers may not need to consider these factors as barriers to treatment engagement. However, research findings are far from consistent for these domains (e.g., see review⁵⁷), highlighting the need for continued research focused on enhancing treatment retention.

Conclusions from this study may be limited to the study sample and methodology, and caution is warranted in generalizing to other samples and circumstances. Specifically, limitations of this study include the homogenous nature of the sample, which consisted entirely of veterans, most of whom were male and Caucasian, with prior treatment experience. Our findings may not be applicable to newly diagnosed adults engaged in treatment for the first time. Related, the sample also consisted of participants involved in a randomized psychotherapy clinical trial, and generalizability to naturalistic treatments is unclear. Participant treatment preference was not assessed, and therefore the impact of random assignment to preferred versus non-preferred treatment on attendance is not known. Furthermore, we were not able to include all enabling characteristics proposed by Aday and

Anderson's model (i.e. insurance coverage, costs) as treatment was provided within a healthcare system where all participants had access to services (Veteran's Affairs Medical Center) and study services were provided at no cost.¹¹ Lastly, we employed numerous bivariate analyses, which introduces the possibility of our results containing a type I error.

In summary, we found immutable predisposing factors to be the most predictive of treatment retention in our sample. These findings suggest the burden lies with treatment researchers and treatment providers to identify and implement treatment alternations to enhance retention. The other classification categories in the Aday and Anderson model for treatment utilization (enabling resources and perceived need for treatment) were not related to treatment attendance in our combined model, suggesting these factors may not be barriers to treatment barriers to treatment engagement for individuals with co-occurring depression and substance use disorders.¹¹ In contrast to barriers, two factors may improve treatment engagement: recently experienced physical health events and social support. Social interactions provided in professionally led group settings may be particularly valued among those with co-occurring depression who may find it difficult to initiate contact with community based recovery resources.

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References

1. Dobkin PL, De Civita M, Paraherakis A, Gill K. The role of functional social support in treatment retention and outcomes among outpatient adult substance abusers. *Addiction*. 2002; 97:347–356. [PubMed: 11964111]
2. Hoffman JA, Caudill BD, Koman JJ, Luckey JW, Flynn PM, Mayo DW. Psychosocial treatments for cocaine abuse: 12-month treatment outcomes. *J Subst Abuse Treat*. 1996; 13:3–11. [PubMed: 8699540]
3. McKay JR, McLellan AT, Alterman AI, Cacciola JS, Rutherford MJ, O'Brien CP. Predictors of participation in aftercare sessions and self-help groups following completion of intensive outpatient treatment for substance abuse. *J Stud Alcohol*. 1998; 59:152–162. [PubMed: 9500302]
4. Simpson DD, Joe GW, Rowan-Szal GA. Drug abuse treatment retention and process effects on follow-up outcomes. *Drug Alcohol Depend*. 1997; 47:227–235. [PubMed: 9306048]
5. Sinha R, Easton C, Kemp K. Substance abuse treatment characteristics of probation-referred young adults in a community-based outpatient program. *Am J Drug Alcohol Abuse*. 2003; 29:585–597. [PubMed: 14510042]
6. Wickizer T, Maynard C, Atherly A, Frederick M. Completion rates of clients discharged from drug and alcohol treatment programs in Washington State. *Am J Public Health*. 1994; 84:215–221. [PubMed: 8296943]
7. Alterman AI, McKay JR, Mulvaney FD, McLellan AT. Prediction of attrition from day hospital treatment in lower socioeconomic cocaine-dependent men. *Drug Alcohol Depend*. 1996; 40:227–233. [PubMed: 8861401]
8. Brown RA, Monti PM, Myers MG, et al. Depression among cocaine abusers in treatment: Relation to cocaine and alcohol use and treatment outcome. *Am J Psychiatry*. 1998; 155:220–225. [PubMed: 9464201]
9. Lenze EJ, Miller MD, Dew MA, et al. Subjective health measures and acute treatment outcomes in geriatric depression. *Int J Geriatr Psychiatry*. 2001; 16:1149–1155. [PubMed: 11748774]
10. Lawrenson RA, Tyrer F, Newson RB, Farmer RDT. The treatment of depression in UK general practice: Selective serotonin reuptake inhibitors and tricyclic antidepressants compared. *J Affect Disord*. 2000; 59:149–157. [PubMed: 10837883]

11. Aday LA, Andersen R. A framework for the study of access to medical care. *Health Serv Res.* 1974; 9:208–220. [PubMed: 4436074]
12. Andersen RM. Revisiting the behavioral model and access to medical care: Does it matter? *J Health Soc Behav.* 1995; 36:1–10. [PubMed: 7738325]
13. Laudet AB, Magura S, Cleland CM, Vogel HS, Knight EL. Predictors of retention in dual-focus self-help groups. *Community Ment Health J.* 2003; 39:281–297. [PubMed: 12908643]
14. Siqueland L, Crits-Christoph P, Frank A, et al. Predictors of dropout from psychosocial treatment of cocaine dependence. *Drug Alcohol Depend.* 1998; 52:1–13. [PubMed: 9788001]
15. McCaul ME, Svikis DS, Moore RD. Predictors of outpatient treatment retention: patient versus substance use characteristics. *Drug Alcohol Depend.* 2001; 62:9–17. [PubMed: 11173163]
16. Sayre SL, Schmitz JM, Stotts AL, Averill PM, Rhoades HM, Grabowski JJ. Determining predictors of attrition in an outpatient substance abuse program. *Am J Drug Alcohol Abuse.* 2002; 28:55–72. [PubMed: 11853135]
17. Aharonovich E, Hasin DS, Brooks AD, Liu X, Bisaga A, Nunes EV. Cognitive deficits predict low treatment retention in cocaine dependent patients. *Drug Alcohol Depend.* 2006; 81:313–322. [PubMed: 16171953]
18. Joe GW, Simpson DD, Broome KM. Effects of readiness for drug abuse treatment on client retention and assessment of process. *Addiction.* 1998; 93:1177–1190. [PubMed: 9813899]
19. Longabaugh R, Woolard RF, Nirenberg TD, et al. Evaluating the effects of a brief motivational intervention for injured drinkers in the emergency department. *J Stud Alcohol.* 2001; 62:806–816. [PubMed: 11838918]
20. Monti PM, Colby SM, Barnett NP, et al. Brief Intervention for harm reduction with alcohol-positive older adolescents in a hospital emergency department. *J Consult Clin Psychol.* 1999; 67:989–994. [PubMed: 10596521]
21. Lydecker KP, Tate SR, Cummins KM, McQuaid J, Granholm E, Brown SA. Clinical Outcomes of an Integrated Treatment for Depression and Substance Use Disorders. *Psychol Addict Behav.* 2010; 24:453–465. [PubMed: 20853931]
22. Project MATCH Research Group. Matching alcoholism treatments to client heterogeneity: Treatment main effects and matching effects on drinking during treatment. *J Stud Alcohol.* 1998; 59:631–639. [PubMed: 9811084]
23. Munoz, RF.; Ying, Y.; Perez-Stable, EJ.; Miranda, J. The prevention of depression: Research and practice. Baltimore, MD: John Hopkins University Press; 1993.
24. Kadden, K.; Carroll, K.; Donovan, D., et al. Cognitive-Behavioral Coping Skills Therapy Manual. Washington, DC: Project Match, NIAAA, NIH; 1994. p. 94-3724.
25. Nowinski, J.; Baker, S.; Carroll, K. Twelve-Step Facilitation Therapy Manual: A Clinical Research Guide for Therapists Treating Individuals With Alcohol Abuse and Dependence. Washington, DC: Supt. of Docs., U.S. Govt. Print. Off; 1994. National Institute on Alcohol Abuse and Alcoholism, Project MATCH Monograph series, Vol. 1. NIH Publication No. 94 - 3722
26. Drapkin ML, Tate SR, McQuaid JR, Brown SA. Does initial treatment focus influence outcomes for depressed substance abusers? *J Subst Abuse Treat.* 2008; 35:343–350. [PubMed: 18295436]
27. Robins LN, Wing J, Wittchen HU, et al. The Composite International Diagnostic Interview. An epidemiologic instrument suitable for use in conjunction with different diagnostic systems and in different cultures. *Arch Gen Psych.* 1988; 45:1069–1077.
28. McLellan AT, Kushner H, Metzger D, et al. The fifth edition of the Addiction Severity Index. *J Subst Abuse Treat.* 1992; 9:119–213.
29. Wechsler, D. Wechsler Adult Intelligence Scale. 3. San Antonio, TX: The Psychological Corporation; 1997.
30. Golden, CJ. Stroop Color and Word Test. Chicago IL: Stoelting Company; 1978.
31. Reitan, RM.; Wolfson, D. The Halstead-Reitan Neuropsychological Test Battery: Theory and Clinical Interpretation 2. Tucson, AZ: Neuropsychology Press; 1993. p. 31
32. Heaton, RK.; Grant, I.; Matthews, CG. Comprehensive norms for Expanded Halstead-Reitan Battery: Demographic corrections, research findings, and clinical applications. Odessa, FL: Psychological Assessment Resources, Inc; 1991.

33. Heaton, RK.; Chelune, GJ.; Talley, JL.; Kay, GG.; Curtiss, G. Wisconsin Card Sorting Test Manual-Revised and Expanded. Odessa, FL: Psychological Assessment Resources, Inc; 1993.
34. Delis, DC.; Kaplan, E.; Kramer, JH.; Ober, BA. California Verbal Learning Test-II (CVLT-II) Manual. San Antonio, TX: The Psychological Corporation; 2000.
35. Norman MA, Evans JD, Miller SW, Heaton RK. Demographically corrected norms for the California Verbal Learning Test. *J Clin Exp Neuropsychol*. 2000;80–94. [PubMed: 10649547]
36. Grober E, Sliwinski M. Development and validation of a model for estimating premorbid verbal intelligence in the elderly. *J Clin Exp Neuropsychol*. 1991; 13:933–949. [PubMed: 1779032]
37. Osterreith PA. Le test de copie d'une figure complexe: Contribution a l'étude de la perception et de la memoire [Copying a complex figure: Contributions to the study of perception and memory]. *Arch Psychol (Geneve)*. 1944; 30:203–353.
38. Rey A. L'examen psychologique dans les cas d'encephalopathie traumatique [The psychological examination of cases of traumatic encephalopathy]. *Arch Psychol (Geneve)*. 1941; 28:286–340.
39. Hirschfield, RMA.; Lerman, GL.; Schless, AP.; Endicott, J.; Lichtenstaeder, S.; Clayton, PJ. Modified Life Events sections of the Psychiatric Epidemiology Research Interview (PERI-M). Bethesda, MD: National Institute of Mental Health; 1977.
40. Brown, GW.; Harris, TO. Social Origins of Depression. New York, NY: Free Press; 1978.
41. Cahalan, D.; Cisin, IH.; Crossley, HM. American drinking practices: A national study of drinking behavior and attitudes (Rutgers Center of Alcohol Studies Monograph No 6). New Brunswick, NJ: 1969.
42. Sarason IG, Levine HM, Basham RB, Sarason BR. Assessing social support: The Social Support Questionnaire. *J Pers Soc Psychol*. 1983; 44:127–139.
43. Gander AM, Jorgensen LM. Postdivorce adjustment: Social supports among older divorced persons. *J Divorce*. 1990; 13:37–52.
44. Beck, AT.; Steer, RA.; Brown, GK. Manual for Beck Depression Inventory. 2. San Antonio, TX: Psychological Corporation; 1996.
45. Steer, RA.; Beck, AT. The Beck Depression Inventory-II. In: Craighead, WE.; Nemeroff, CB., editors. The Corsini Encyclopedia of Psychology and Behavioral Science. 3. Vol. 1. New York, NY: Wiley; 2000. p. 178-179.
46. Jackson MS, Stephens RC, Smith RL. Afrocentric treatment in residential substance abuse care. *J Subst Abuse Treat*. 1996; 14:87–92. [PubMed: 9218242]
47. Sterling RC, Gottheil E, Weinstein SP, Serota R. Therapist/patient race and sex matching: Treatment retention and 9-month follow-up outcome. *Addiction*. 1998; 93:1043–1050. [PubMed: 9744135]
48. Rosenheck R, Seibyl CL. Participation and outcome in a residential treatment and work therapy program for addictive disorders: The effects of race. *Am J Psychiatry*. 1998; 155:1029–1034. [PubMed: 9699689]
49. Baekeland F, Lundwall L. Dropping out of treatment: A critical review. *Psychol Bull*. 1975; 82:738–783. [PubMed: 1103201]
50. Feigelman W. Day-care treatment for multiple-drug-abusing adolescents: Social factors linked with completing treatment. *J Psychoactive Drugs*. 1987; 19:335–343. [PubMed: 3443889]
51. Weidman A. Family therapy and reductions in treatment dropout in a residential therapeutic community for chemically dependent adolescents. *J Subst Abuse Treatment*. 1987; 4:21–28.
52. Gentilello LM, Rivara FP, Donovan DM, et al. Alcohol interventions in a trauma center as a means of reducing the risk of injury recurrence. *Ann Surg*. 1999; 230:473–483. [PubMed: 10522717]
53. Tate SR, McQuaid JR, Brown SA. Characteristics of life stressors predictive of substance treatment outcomes. *J Subst Abuse Treatment*. 2005; 29:107–115.
54. O'Toole TP, Pollini RA, Ford D, Bigelow G. Physical health as a motivator for substance abuse treatment among medically ill adults: Is it enough to keep them in treatment? *J Subst Abuse Treat*. 2006; 31:143–150. [PubMed: 16919741]
55. Barnett NP, Lebeau-Craven R, O'Leary TA, et al. Predictors of motivation to change after medical treatment for drinking-related events in adolescents. *Psychol Addict Behav*. 2002; 16:106–112. [PubMed: 12079248]

56. Mertens JR, Weisner CM. Predictors of substance abuse treatment retention among women and men in an HMO. *Alcohol Clin Exp Res.* 2000; 24:1525–1533. [PubMed: 11045861]
57. Stark MJ. Dropping out of substance abuse treatment: A clinically oriented review. *Clin Psych Rev.* 1992; 12:93–116.

Figure 1.
Percentage attending fewer than eight treatment sessions by ethnicity.

Figure 2.
Percentage attending fewer than eight treatment sessions by age.

Table 1Significant ($p < .05$) predictors of mean (SD) number of treatment sessions attended.

Predisposing Characteristics		
Ethnicity	n	M (SD)
Caucasian	182	19.1 (10.9)
Minority	71	14.8 (9.8)
Age		
20–29	4	8.0 (6.5)
30–39	32	12.3 (10.0)
40–49	98	17.5 (10.4)
50–59	105	19.7 (10.7)
60–69	14	23.7 (9.5)
Pretx Substance Use		
Alcohol only	122	20.0 (10.4)
Drug only	26	16.1 (10.9)
Both	104	16.1 (10.7)
Enabling Resources		
Social Support	n	M (SD)
Low contact	108	22.1 (9.4)
High contact	105	18.9 (9.1)
Treatment Need Factors		
Health Events	n	M (SD)
With	33	23.6 (7.0)
Without	183	19.5 (9.8)