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## The Diffusion of Acamprosate for the Treatment of Alcohol Use Disorder: Results from a National Longitudinal Study

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### Abstract

To consider how the Affordable Care Act may impact the diffusion of acamprosate, an evidence-based treatment for alcohol use disorder (AUD), the present study estimated the associations between acamprosate availability, Medicaid revenues, and private insurance revenues. Data were collected from organizational leaders of national samples of 307 specialty treatment centers in 2009-2012 and 372 treatment centers in 2011-2013. Notably, there was not a significant change in the percentage of organizations offering acamprosate over the study period. However, greater reliance on Medicaid and private insurance as sources of revenue was positively associated with the availability of acamprosate. In addition, acamprosate availability was positively associated with access to physicians and the presence of on-site primary medical care, while centers that placed greater emphasis on confrontational group therapy were significantly less likely to offer acamprosate for AUD treatment. To the extent that the ACA is expanding the number of insured individuals enrolled in Medicaid and commercial insurance sold through health insurance exchanges, this study suggests that the ACA may hold promise for expanding the availability of this EBP for AUD treatment. Future research is needed to measure whether this potential impact actually occurs within the specialty treatment system over time.

### 1. Introduction

The evolving context of health reform in the US with the ongoing implementation of the Affordable Care Act (ACA) renders an examination of the use of evidence-based practices (EBPs) such as pharmacotherapy for alcohol use disorder (AUD) treatment both timely and significant. Emerging evidence has shown that ACA has reduced the percentage of individuals who are uninsured (Cantor, Monheit, DeLia, & Lloyd, 2012; Martinez & Cohen,

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2014). It is anticipated that many of these newly insured individuals, particularly those covered by Medicaid, have AUD or other substance use disorders (SUDs) (Buck, 2011). This growing number of Americans covered by Medicaid and private insurance, coupled with ACA's mandates regarding the extension of treatment parity and the inclusion of SUD treatment as essential benefits in health plans, is expected to profoundly impact the SUD treatment field (Beronio, Glied, & Frank, 2014; Garfield & Druss, 2012; McLellan & Woodsworth, 2014; Pating, Miller, Goplerud, Martin, & Ziedonis, 2012; Roy III & Miller, 2012).

While these expected impacts have been heralded, their actual forms are emerging slowly through the phased nature of ACA's implementation. For example, major efforts to enroll individuals in health insurance plans were not seen until late 2013 (Henry J. Kaiser Foundation, 2014), more than three years after the legislation was passed. Thus, the full impact of ACA on specialty treatment will not be known for some time.

One of the broad goals of ACA is to enhance the quality of health care, as seen in its mandated inclusion of SUD treatment as an essential health benefit (McLellan & Woodsworth, 2014). With the ACA's increasing and stabilizing revenue for SUD treatment via the expanding number of insured individuals, quality improvement should be facilitated. Thus, in the short-term, the potential impact of ACA can be considered by examining whether revenues from the two primary types of insurance that are expected to expand as ACA implementation moves forward, namely Medicaid and private insurance, are associated with the availability of EBPs.

The present study focuses on the diffusion of acamprosate, an EBP for AUD approved by the US Food and Drug Administration (FDA) in 2004. Initial studies documented that acamprosate was superior to placebo (Kiefer et al., 2003; Whitworth et al., 1996) and confirmed its safety (Carmen, Angeles, Ana, & Maria, 2004). Other studies did not find clinically meaningful improvements in alcohol consumption (Morley et al., 2006; Richardson et al., 2008). Meta-analyses have shown, however, that acamprosate improves the likelihood of abstinence and duration of continuous abstinence (Carmen et al., 2004) and that it is more effective than tablet naltrexone for these outcomes (Maisel, Blodgett, Wilbourne, Humphreys, & Finney, 2013). It may be particularly useful for patients who have successfully completed detoxification and when it is paired with psychosocial counseling (Maisel et al., 2013).

Although acamprosate has been available for more than a decade, its diffusion in specialty treatment settings has been modest. In its initial year of availability in the US, only 7% of SUD treatment programs offered this medication (Ducharme, Knudsen, & Roman, 2006). More recent organizational research has documented varying rates of adoption, typically showing availability in less than one-third of programs (Abraham, Knudsen, Rothrauff, & Roman, 2010; Knudsen, Abraham, & Roman, 2011; Knudsen, Roman, & Oser, 2010). There is some evidence of greater availability of acamprosate in private-sector programs (Roman, Abraham, & Knudsen, 2011). In addition, its availability has been correlated with other organizational features, such as workforce characteristics, being embedded within a hospital, and accreditation (Abraham et al., 2010; Ducharme et al., 2006; McCormick et al., 2006).

Much of this prior work has relied upon cross-sectional data, and none have simultaneously considered the financial factors of Medicaid and private insurance revenues.

Drawing upon data from a longitudinal study of US AUD treatment programs, this study examines two research questions. First, is there evidence of increased diffusion, defined as availability of acamprosate as a treatment option, over time? Second, is greater reliance on Medicaid and private insurance as sources of revenue associated with the availability of acamprosate?

## 2. Methods

### 2.1. Sample and data collection

This study utilized data collected during two rounds of interviews from national samples of US treatment organizations that offer specialty treatment for AUD. The initial round of data collection occurred from June 2009 to January 2012, while the second round of data collection began in October 2011 and ended December 2013. Both rounds utilized similar sampling and data collection strategies.

Sampling for the first round of data collection relied upon SAMHSA's 2008 Substance Abuse Treatment Services Locator, from which organizations in the 48 continental states (i.e., all states except Alaska and Hawaii) and the District of Columbia were randomly selected for eligibility screening by telephone. Random sampling ensured that the final sample included treatment programs in large metropolitan areas, mid-sized cities, small towns, and rural areas. Four criteria were employed to establish sample eligibility. First, organizations were required to provide AUD treatment to the general public (thus excluding military facilities, Veterans Administration, and correctional agencies from participation). Second, the organization was required at the time of screening to be treating patients of whom at least 25% had a primary diagnosis of AUD. Third, organizations were required to employ at least two full-time equivalent employees (thus, excluding individuals in private practice). Fourth, organizations were required to offer a level of AUD treatment at least equivalent or greater than the American Society of Addiction Medicine's definition of structured outpatient treatment. This final criterion excluded those organizations that only offer detoxification services, only provide DUI/DWI education services, or only dispense medications to treat opioid use disorders. These four criteria continued to be employed during the second round of data collection.

In both waves of data collection, eligible organizations were scheduled for face-to-face interviews with the administrator and clinical director (when the latter position existed within the treatment center). Written obtained consent was obtained from participants before the interview began. In the first wave of data collection, 307 organizations participated (response rate = 65%). For the second round of data collection, attempts were made to re-interview administrators and clinical directors from the baseline sample of organizations that continued to meet eligibility criteria. To account for attrition (e.g., program ineligibility, closures, refusals) and to increase the statistical power of the study, additional organizations were recruited to participate in the second wave of data collection. These additional organizations were randomly selected and screened using the same eligibility criteria

described above. A total of 372 treatment organizations participated in the latter round of data collection (response rate = 85%). In total, the dataset combining the two rounds of data collection contained 679 observations from 479 distinct organizations. Of these 479 organizations, 200 participated in both interviews (65% of the initial cohort), 107 participated in the first round only, and 172 were newly recruited for the second phase of data collection. The Institutional Review Boards of the University of Georgia and the University of Kentucky approved the study procedures.

## 2.2. Measures

Availability of acamprosate was measured through two items. First, participants were asked whether any medications were prescribed to treat substance use disorders or psychiatric conditions within the organization. If participants provided an affirmative response to this initial question, they were then asked whether acamprosate was currently prescribed by the treatment center to patients with AUD. The resulting dichotomous variable differentiated centers that prescribed acamprosate (coded 1) from those that did not prescribe this medication (coded 0).

The primary independent variables of interest were measures of sources of funding, which were emailed to participants prior to the face-to-face interviews. During the interview, participants were asked to indicate the percentage of past-year revenues that were received from Medicaid and from private insurance.

In addition to these measures of revenues, respondents were asked about the organization's structure, staffing, and treatment culture because these variables have commonly been examined in prior research on the adoption of EBPs (Garner, 2009; Glasner-Edwards & Rawson, 2010). Organizational structure was measured by government ownership (1=governmental owner, 0=private owner), being embedded in a hospital (=1, 0=not embedded in a hospital), profit status (1=for-profit, 0=not for profit), accreditation by an either the Joint Commission or the Commission on the Accreditation of Rehabilitation Facilities (1=accredited, 0=non-accredited), levels of AUD care offered by the organization, and availability of on-site primary care. The typology of level of AUD care categorized organizations into those that only offered outpatient care (reference category), those offering a combination of outpatient and inpatient/residential services, or those that only deliver inpatient/residential AUD care. The dichotomous measure of primary care differentiated centers with on-site primary care from those that did not offer this service.

Staffing was measured by the number of counselors employed, the percentage of counselors holding a master's-level degree or greater, and access to physicians. The number of counselors represented our measure of organizational size. An analysis of its distribution indicated that the median organization had 5 counselors and 75% of organizations had 10 or fewer counselors. However, some very large organizations skewed this variable, so this variable was natural log-transformed. The percentage of master's-level counselors served as a measure of workforce professionalism, as prior research has found it to be positively correlated with pharmacotherapy (Abraham, Knudsen, Rieckmann, & Roman, 2013; Abraham et al., 2010). The typology of physician access differentiated between organizations that employed at least one physician (reference category), those that had no

staff physicians but contracted with at least one physician, and those with neither staff nor contract physicians.

Four treatment culture variables were measured in which participants were asked the extent to which the treatment program emphasized the twelve-step model, the medical model of addiction, spiritual counseling, and confrontational group therapy. A six-point Likert response scale (0=no extent to 5= very great extent) was used for each variable.

### 2.3. Statistical analysis

Descriptive statistics were computed for these measures within a dataset that combined the two waves of data. The characteristics of the samples from the two rounds of data collection were compared using chi-square tests and t-tests, depending on the level of measurement.

Missing data on these variables within the 679 observations were addressed using multiple imputation by chained equations in *Stata 13.1*. Relying upon listwise deletion would have reduced the number of observations by 15.2% and diminished the number of unique organizations included in the analysis by 11.7%. The imputation command included the dependent variable, the two measures of revenues, and the structural, staffing, and cultural characteristics. Using the appropriate link function for each type of variable (i.e., logistic regression for dichotomous variables, multinomial logistic regression for unordered categorical variables, ordinal regression for ordered categorical variables, predictive mean matching for continuous variables), twenty datasets were generated. The decision to generate twenty imputed datasets is consistent with recommendations that the number of imputed datasets should exceed the percentage of observations with missing data (White, Royston, & Wood, 2011).

Similar to other longitudinal analyses of SUD treatment programs (D'Aunno, Pollack, Frimpong, & Wuchiett, 2014), the current study employed random-effects logistic regression to estimate models of the dichotomous dependent variable (“xtlogit” in *Stata 13.1*, coupled with the “mi estimate” command for the imputations described above). This analytic strategy accounts from repeated observations from some organizations (Diggle, Liang, & Zeger, 1994), while also using the full samples from each round of data collection. A series of initial models were estimated with each model containing a dichotomous variable for time (i.e., 2<sup>nd</sup> round of data collection vs. 1<sup>st</sup> round of data collection) and a single independent variable. All independent variables that were significant at  $p < .05$  (two-tailed test) plus the dummy variable for time were then entered into the final multivariate model of acamprosate availability.

## 3. Results

Table 1 presents descriptive statistics for the study variables using the combined dataset. About 17% of organizations reported use of acamprosate to treat AUD. In the average treatment organization, Medicaid and private insurance were modest sources of revenue. Less than 10% of organizations were owned by governments or embedded within hospitals. Almost one-quarter of organizations operated on a for-profit basis, and about 40% of organizations were accredited. The majority (61%) of sampled organization only offered

outpatient AUD treatment. Few organizations (13%) offered on-site primary care medical services, which was perhaps not surprising given that only about 28% of programs had at least one physician on staff. Of the four measures of treatment culture, emphasis on the twelve-step model was the most strongly endorsed, but its mean was near the midpoint of the response scale. Confrontational group therapy had the lowest mean of the four treatment culture measures.

Comparisons of the two waves of data collection indicated that organizational characteristics of participating treatment organizations were highly similar (not shown). The only significant difference was that percentage of programs embedded within hospitals was lower in the second round of data collection (6.5%,  $n=24$ ) than in the first round (11.7%,  $n=36$ ,  $\chi^2=5.65$ ,  $df=1$ ,  $p=.017$ ).

Initial models, which contained a single independent variable plus the dichotomous indicator for round of data collection, identified several independent variables that were correlated with the availability of acamprosate. In these initial models (Table 2, Column 1), the percentages of revenues from Medicaid and private insurance were both positively associated with the odds of acamprosate availability. Other variables that were positively associated with acamprosate availability in these initial models were accreditation, the presence of on-site primary medical care, and the percentage of master's-level counselors. Compared to programs with at least one physician on staff, acamprosate was less likely to be available in programs with a contract physician or no access to physicians. The association between greater emphasis on confrontational group therapy and acamprosate availability was negative in its initial model.

The second column of Table 2 presents the final multivariate model. There was no significant increase in acamprosate availability between the two rounds of data collection. After controlling for the other organizational characteristics, the two financial variables remained positively correlated with the odds of acamprosate availability. A ten percentage point increase in Medicaid revenues was associated a 9.4% increase in the odds that acamprosate was offered for the treatment of AUD [ $9.4 = 100(e^{(.009)(10)} - 1)$ ]. Private insurance revenues were more strongly associated with acamprosate availability, such that an increase of ten percentage points was associated with a 35.0% increase in the odds of availability [ $35.0 = 100(e^{(.030)(10)} - 1)$ ]. Organizations with on-site primary medical care were more than twice as likely as organizations without primary care services to offer acamprosate, even after controlling for physician access and the other variables in the model. Differences for the physician typology remained statistically significant. The odds of acamprosate availability were 46.3% lower in centers with a contract physician and 76.6% lower in centers without access to physicians, relative to organizations with at least one physician on staff. Emphasis on confrontational group therapy was negatively associated with acamprosate availability, such that each one-unit increase in emphasis on this treatment approach was associated with a 27.0% decrease in the odds that centers offered acamprosate.

In a supplemental analysis, the final multivariate model was re-estimated for the sub-sample of organizations that participated in both waves of data collection (not shown). The model was generally similar to the analysis for the full sample with regard to the variables that



achieved statistical significance, the direction of the associations, and the magnitude of the relationships. The exception was for on-site primary care; in the sub-sample analysis, this variable did not achieve statistical significance.

## 4. Discussion

Data from a national longitudinal study of specialty AUD treatment indicated that availability of acamprosate remained low and did not increase over the study period. Although there was not significant growth in its availability over time, other aspects of AUD treatment organizations, including financing, medical integration, staffing, and treatment philosophy were associated with acamprosate availability.

Greater reliance on Medicaid and private insurance for revenues were both positively associated with the odds of acamprosate availability. These findings are consistent with research on other pharmacotherapies, such as medications for nicotine dependence (Knudsen & Roman, in press). These two types of revenues may indicate that a greater proportion of patients have a pharmacy benefit that can support payments for pharmacotherapy. In contrast, other types of funding, such as the federal block grants or state contracts, typically cover treatment “slots” through an allocation that is intended to cover all the services delivered to those patients; under that type of funding, costly innovations such as medications, may be less feasible from the treatment center's perspective because they increase costs without an increase in reimbursement.

The findings regarding Medicaid and private insurance are somewhat promising given that the ACA is already reducing the number of uninsured Americans (Cantor et al., 2012; Martinez & Cohen, 2014; Sommers, Buchmueller, Decker, Carey, & Kronick, 2013) and has extended parity for SUD treatment to more insurance plans (Beronio et al., 2014; Garfield & Druss, 2012). ACA's impact has been amplified in states that have chosen to expand Medicaid, as these states have seen significantly greater reductions in the uninsured population when compared to non-expansion states (Sommers, Gunja, Finegold, & Musco, 2015). To the extent that treatment organizations begin treating more insured patients, the current findings would suggest a hypothesis that access to pharmacotherapy will increase over time. However, it is important to note that these sources of reimbursement were quite limited in the average treatment organization, which is consistent with recent data on the very low rate of specialty treatment utilization among current Medicaid recipients (Mark, Wier, Malone, Penne, & Cowell, 2015). Prior research has indicated that many treatment programs do not accept insurance for payment (Andrews, 2014; Cummings, Wen, Ko, & Druss, 2014; Terry-McElrath, Chiqui, & McBride, 2011). The ability of treatment organizations to begin billing insurers for reimbursement using electronic medical records will represent a substantial change for many treatment organizations (Molfenter, Capoccia, Boyle, & Sherbeck, 2012). The current findings suggest that developing this capacity and attracting insured patients may have benefits for the diffusion of EBPs, such as acamprosate. In addition, there may be additional benefits for organizations that develop their capacity to bill insurers and attract insured patients in terms of medical staffing. A supplemental analysis of these data (not shown) found that treatment programs with staff or contract physicians had significantly greater percentages of past-year revenues from Medicaid and

private insurance, relative to centers with no access to physicians. Such programs also employed significantly greater numbers of counselors.

There are reasons to be cautious in interpreting these findings given the complexity of ACA's implementation. While the ACA has reduced the number of uninsured Americans, emerging evidence also points to several potential sources of variation in its overall impact. SUD services are included as an essential health benefit (EHB) under ACA, yet states have discretion over the specifics of that coverage; states can choose between several strategies to select an insurance plan as the benchmark for EHBs (Frank, Beronio, & Glied, 2014). Recent analyses of the insurance plans offered through the ACA's federal insurance exchange have documented that they provide less generous coverage for prescription medications than employer-sponsored health plans, with considerable variability in the co-payment and co-insurance required from patients (Buttorff, Andersen, Riggs, & Alexander, 2015). Furthermore, the extension of parity for SUD treatment benefits under ACA has not been fully implemented within the health plans offered in the health insurance exchanges (Berry, Huskamp, Goldman, & Barry, 2015). Tracking the impact of the ACA for individuals with SUDs and the organizations that deliver SUD treatment services will require future studies to consider the intersections between multiple level of analysis, from states and insurance plans to organizations and individuals.

While the finding about how access to physicians is positively associated with the availability of acamprosate is to be expected, this study is one of the first to examine whether integration of primary care services is associated with the availability of any of the medications to treat SUD. In the full sample, this association was significant even when access to physicians and other organizational characteristics were controlled in the final model, suggesting that integration of primary care has independent value for the diffusion of acamprosate. The positive association between these two variables is also promising in the context of health reform, where the integration of SUD services and health care is widely touted (Laudet & Humphreys, 2013). Much of the attention has been focused on integrating SUD services into medical practices through strategies such as accountable care organizations and health homes (Bao, Casalino, & Pincus, 2013) as well as greater implementation of screening, brief intervention, and referral to treatment (SBIRT) models (Ghitza & Tai, 2014; Tai & Volkow, 2013). The current study shows that early integration of medical services into SUD treatment settings is advantageous for the diffusion of pharmacotherapy to treat AUD, even after controlling for access to physicians. Some caution in interpretation may be warranted because the sub-sample analysis did not find this association; the smaller sample may have reduced statistical power to detect this relationship. Future studies should continue to study the role of integration of medical services in SUD treatment in promoting the diffusion of EBPs.

While the inclusion of longitudinal data is a strength of the research design, there are several limitations that should be acknowledged. First, all measures were aimed at the organizational-level and were generally obtained from a single respondent who acted as a key informant. Our focus on center leadership should result in respondents with the greatest breadth of knowledge about the organization, but reliance on a single respondent can introduce self-report, social desirability, and recall bias. Second, the response rate for the



first round of data collection was lower than several of our prior studies. Because this first round of interviews was conducted with a new sample of organizations for which we had no prior information, we could not examine response bias by comparing participating and non-participating centers in this first round. Our response rate for the second round of data collection was higher. When we compared participating treatment centers in the two rounds of data collection on funding, organizational structure, resources, and staffing measures, the organizational characteristics of the samples were highly similar. The only difference was for embeddedness in a hospital setting, which declined in the second wave; this difference is not entirely surprising given that hospital-based programs are at higher risk of closure and hence, seem to be on the decline (Knudsen, Roman, & Ducharme, 2005). Third, these findings are focused on availability—not the implementation—of acamprosate. Our prior work has shown that even within programs that offer acamprosate, the percentage of patients actually receiving this medication is low (Knudsen & Roman, 2014). Future research should attend to testing methods to increase both the availability and implementation of medications to treat SUDs beyond the potential impacts of changes in the systems of treatment financing.

Although the diffusion of acamprosate has not increased over time, it is promising that two key sources of AUD treatment funding—Medicaid and private insurance—were positively associated with its availability, even after taking into account key medical resources within treatment organizations. Both of these types of funding are expected to become more influential in the era of health reform, but ongoing longitudinal research is needed to document whether that expectation becomes reality and whether such changes yield increases in the availability of EBPs for the treatment of AUD.

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**Highlights for Review**

We examined diffusion of acamprosate for alcohol use disorder in treatment centers.

Availability of acamprosate did not change over time.

Centers more reliant on Medicaid revenues were more likely to use acamprosate.

Centers more reliant on private insurance were more likely to offer acamprosate.

**Table 1**

Descriptive statistics for study variables in a longitudinal national sample of AUD treatment organizations

|   | Mean (SD) or % (N) |
|---|--------------------|
| Availability of acamprosate at the treatment center                 | 16.9% (113)        |
| Percentage of past-year revenues from Medicaid                      | 19.2 (26.2)        |
| Percentage of past-year revenues from private insurance             | 12.0 (20.9)        |
| Owned by a government (city, county, or state)                      | 8.9% (60)          |
| Embedded in a hospital  | 8.9% (60)          |
| For-profit  | 22.3% (151)        |
| Accredited by Joint Commission or CARF                              | 40.7% (272)        |
| Level of AUD care   |                    |
| Outpatient-only   | 60.7% (403)        |
| Combination of outpatient and inpatient/residential                 | 23.3% (155)        |
| Inpatient/residential-only  | 16.0% (106)        |
| On-site primary care  | 12.7% (85)         |
| Number of counselors  | 10.3 (35.8)        |
| Number of counselors, natural-log transformed                       | 1.8 (0.9)          |
| Percentage of counselors holding a master's-level degree or greater | 44.3 (35.3)        |
| Access to physicians  |                    |
| At least one staff physician  | 27.5% (182)        |
| No staff physicians, but at least one physician on contract         | 32.6% (216)        |
| Neither staff nor contract physicians                               | 39.9% (264)        |
| Treatment emphasis on twelve-step model *                           | 3.2 (1.7)          |
| Treatment emphasis on medical model of addiction *                  | 2.7 (1.7)          |
| Treatment emphasis on spiritual counseling *                        | 2.3 (1.6)          |
| Treatment emphasis on confrontational group therapy *               | 1.4 (1.5)          |
| Round of data collection  |                    |
| Round 1, 2009-2012  | 45.2% (307)        |
| Round 2, 2011-2013  | 54.8% (372)        |

Abbreviations: AUD, alcohol use disorder; CARF, Committee for Accreditation of Rehabilitation Facilities.

\* These variables were measured on a six-point Likert scale that ranged from 0=no extent to 5=very great extent.

**Table 2**

Random effects logistic regression models of availability of acamprosate

|   | Initial Models Odds Ratio (SE) | Multivariate Model Odds Ratio (SE) |
|---|--------------------------------|------------------------------------|
| Time  |                                |                                    |
| First round (June 2009-January 2012)                                | Reference                      | Reference                          |
| Second round (October 2011-December 2013)                           | .861 (.124)                    | .824 (.147)                        |
| Percentage of past-year revenues from Medicaid                      | 1.008 (.003) *                 | 1.009 (.004) *                     |
| Percentage of past-year revenues from private insurance             | 1.027 (.005) ***               | 1.030 (.006) ***                   |
| Owned by a government (city, county, or state)                      | 1.021 (.586)                   | ---                                |
| Embedded in a hospital  | 1.778 (.568)                   | ---                                |
| For-profit  | .951 (.243)                    | ---                                |
| Accredited by Joint Commission or CARF                              | 2.264 (.589) **                | 1.572 (.426)                       |
| Level of AUD care   |                                |                                    |
| Outpatient-only   | Reference                      | Reference                          |
| Combination of outpatient and inpatient/residential                 | 1.113 (.318)                   | ---                                |
| Inpatient/residential-only  | 1.139 (.363)                   | ---                                |
| On-site primary care  | 2.935 (.813) ***               | 2.406 (.661) **                    |
| Number of counselors (natural-log transformed)                      | 1.399 (.176) **                | 1.134 (.159)                       |
| Percentage of counselors holding a master's-level degree or greater | 1.009 (.003) **                | 1.004 (.004)                       |
| Access to physicians  |                                |                                    |
| At least one staff physician  | Reference                      | Reference                          |
| No staff physicians, but at least one physician on contract         | .482 (.116) **                 | .537 (.145) *                      |
| Neither staff nor contract physicians                               | .155 (.047) ***                | .234 (.080) ***                    |
| Treatment emphasis on twelve-step model                             | 1.037 (.061)                   | ---                                |
| Treatment emphasis on medical model of addiction                    | 1.09 (.055)                    | ---                                |
| Treatment emphasis on spiritual counseling                          | .994 (.068)                    | ---                                |
| Treatment emphasis on confrontational group therapy                 | .844 (.070) *                  | .730 (.070) **                     |

Notes: Results represent the pooled results from 20 datasets containing 679 observations in which multiple imputation by chained equations was used to address missing data within observations. Initial model for time only included this variable; all other initial models included time and a single independent variable. The multivariate model includes all independent variables that were significant at  $p < .05$ .

\*  
 $p < .05$

\*\*  
 $p < .01$

\*\*\*  
 $p < .001$