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Rural substance use treatment centers in the United States: an assessment of treatment quality by location

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Abstract

Background—While previous research has added to the understanding of rural residents' unique health challenges, much remains to be learned about the provision of substance use disorder (SUD) treatment in rural areas. A key question is difference in structural resources and quality of care between rural and urban treatment centers.

Objective—To examine differences in treatment quality in rural and urban centers and to determine if differences in treatment quality are contextualized by centers' structural resources.

Methods—Utilizing combined data from two representative samples of SUD treatment centers ($N=591$), we used a series of multivariate regressions to analyze the association between center rurality and various indicators of structural characteristics and treatment quality. Interaction effects were further examined between structural characteristics and treatment quality indicators.

Results—We found that structural and quality differences between rural and urban treatment centers were present. Rural centers had reduced access to highly educated counselors, were more likely to be nonprofit, dependent on public funding, offered fewer wraparound services, and had less diverse specialized treatment options. Our results also indicated that rural centers were less likely to prescribe buprenorphine as part of their treatment but were more likely to employ nursing staff and offer specialized treatment for adolescents. Rural center access to a physician contextualized the association between center rurality and the more limited provision of wraparound services.

Conclusion—Our findings suggest that treatment quality differs between urban and rural centers in complex ways that are subject to resource availability.

Keywords

Rural SUD Treatment; Treatment Quality

Introduction

In addressing substance use disorders (SUD), individual-level research over the past decade has added to the understanding of rural residents' characteristics and unique health

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Declaration of interest

challenges.^{1–12} Less is known about the provision of SUD treatment services in rural areas. The purpose of this study is to utilize a diverse sample of SUD treatment centers in the United States (U.S.) to assess differences in treatment quality by rurality and explore the possible structural mechanisms through which these differences occur. In particular, previous studies suggests that staffing, funding, and profit orientations differ between rural and urban treatment centers,^{10,13–16} which may influence rural treatment centers' provision of competitive and effective treatment services.

Center-specific Structures and Treatment Quality

Qualified staff is essential to administer evidence-based practices (EBPs), which require specialized training. They also enable centers to coordinate care in more intensive or focused settings while increasing the level of institutional awareness concerning innovative care strategies.^{17–18} However, attracting and maintaining qualified health professionals is more difficult in rural areas because of greater compensation and career opportunities in urban locations.^{13,15,16}

Beyond center staff, funding and profit characteristics also shape treatment environments. Smaller populations and poverty in rural areas mean that SUD treatment centers are more likely to be nonprofit and publicly funded.^{10,14} Nonprofit status and a reliance on state or federal dollars may limit rural centers' capacity to adopt entrepreneurial operating strategies, restricting investments in treatment quality.²⁰ For example, the influence of profit status and funding source on pharmacotherapy, a key treatment innovation, has been demonstrated by other studies.^{21–24}

These structural differences between rural and urban centers likely contextualize possible relationships between center rurality and treatment quality. The National Institute on Drug Abuse (NIDA) defines quality treatment as a multidimensional concept that encompasses core and wraparound services²⁵. Core services include pharmacotherapy, behavioral therapy, self-help/peer support facilitation, continuing care, and assessment, while wraparound services include medical, social, and family services.

Core and wraparound services have empirical support demonstrating their efficacy in SUD treatment. For example, pharmacotherapy has been shown to be effective, especially when combined with psychosocial therapies.^{26,27} Continuing care helps clients to continue their recovery even after formal treatment.^{16,28} Additionally, offering wraparound services has been consistently shown to improve outcomes by addressing the multidimensional problems of addiction.^{29–32} While these treatments are helpful for SUD clients regardless of location, rural centers' provision of these services may be especially important because their clients have reduced access to public transportation and community services.^{33,34}

Despite their proven effectiveness and a demonstrated need in rural areas, many of NIDA's core and wraparound services²⁵ may be challenging to offer in rural settings because of staffing limitations and reduced entrepreneurial engagement. For example, qualified personnel are needed to safely administer and monitor pharmacotherapy, evidence-based behavioral therapies, continuing care, and some wraparound services. Previous studies have found that centers with a physician on staff are more likely to offer pharmacotherapy³⁵ and

primary medical care,³⁶ and centers with more counselors that have advanced degrees are more likely to implement innovative treatments.^{17–18}

Patient-specific programming is another indicator of treatment quality, and specialized treatment tracks for adolescents, women, and other minorities have been shown to be effective.^{37,38} In rural locations where SUD treatment centers are less plentiful,^{1,39} the ability of a single treatment center to accommodate diverse clients' needs is even more important. Unfortunately, structural limitations in rural areas may preclude their provision. Finally, satisfactory treatment outcomes are linked to adequate duration of treatment.⁴⁰ However, research suggests that rural treatment centers are more likely to offer outpatient care¹¹ and less likely to offer more extensive care like intensive outpatient care.⁷ This too may be due to restricted staffing and funding resources.

While rural centers may be less likely to offer many treatment services, there may be no difference between rural and urban centers for core services that require little structural investment. These include intake assessment, such as the easily administered Addiction Severity Index (ASI)⁴¹ and self-help peer support groups, like those affiliated with the twelve-steps. Centers can facilitate twelve-step involvement by offering onsite space for peer meetings, which requires little structural support.

Current Study

Few studies have examined how rural and urban SUD treatment centers differ in treatment provision^{6,7}. Those that have examined treatment quality utilize limited measures of quality and/or use bivariate comparisons that do not adequately control for relevant center characteristics and other quality indicators. Using a multidimensional concept of treatment quality and multivariate models, the current study examines differences in care quality between rural and urban treatment centers, using a diverse sample of SUD treatment centers across the US. We make the following hypotheses:

H1: Rural centers will differ from urban centers in five structural characteristics.

Compared to urban centers:

H1a: Rural centers will have fewer counselors with advanced degrees.

H1b: Rural centers will be less likely to have a physician on staff.

H1c: Rural centers will be less likely to have a medical nurse on staff.

H1d: Rural centers will be more likely to be nonprofit.

H1e: Rural centers will be more likely to be publicly funded.

H2: Center rurality will be inversely related to key treatment quality indicators.

Compared to urban centers:

H2a: Rural centers will be less likely to offer pharmacotherapies.

H2b: Rural centers will be less likely to offer, evidence-based behavioral therapies,

H2c: Rural centers will be less likely to provide wraparound services.

H2d: Rural centers will be less likely to provide continuing care.

H2e: Rural centers will be less likely to provide specialized treatment tracks.

H2f: Rural centers will be less likely to provide level of care diversity.

H3: Rural and urban centers will not differ in their use of formal SUD assessment or in their use of twelve-step support groups.

H4: The inverse relationship between center rurality and each measure of treatment quality will be explained by rural center's reduced access to qualified staff, nonprofit status, and greater dependence on public funding.

Sample

Data from this study come from two studies conducted from the National Treatment Center Study, which is a family of national studies of SUD programs in the U.S. These studies are designed to document and monitor changes in the organization, management, services, and staffing of treatment programs throughout the U.S. This study uses two, combined datasets of SUD treatment centers; a nationally representative sample of centers collected between June 2009 and January 2012 and a sample of primarily privately funded centers collected between June 2009 and end of 2011 (N=636).

Centers were selected through a statistical sampling process so that they were geographically representative. All counties in the U.S. were assigned to one of 10 geographic strata of equivalent population sizes. From this, random sampling of counties within strata was conducted. Computation of treatment centers in those sampled counties was completed primarily using federal and state treatment directories. Sampling of centers was proportional across strata, and centers declining to participate in the study were replaced by random selection of alternate centers within the same geographic strata.

For selection in the national study, centers were required to have at least 25% of their patients as primarily alcohol dependent (n=307). For selection in the private study, centers were considered eligible if they received less than 50% of their annual operating revenues from government grants or contracts and offer treatment for alcohol and drug problems at a level of care at least equivalent to structured outpatient programming as defined by the American Society of Addiction Medicine's Patient Placement Criteria (n=329). Medicaid and Medicare were not regarded as "block" funding because these are not guaranteed sources of revenue for centers in the way that "block" grants are, and thus are more similar to private sources. After removing some centers due to missing data, 591 centers were retained for analysis.

Interviews for both studies were conducted onsite, and face-to-face, with administrative and clinical directors. Data about internal management practices were provided by the administrative director. Information about patient care was provided by the clinical director. The response rate for the national study was 68% while the response rate for the private study was 87.7%.

Measures

Our analysis included measures for staffing characteristics, profit status, funding, pharmacotherapy, behavioral therapy, wraparound services, continuing care, specialized treatment tracks, level of care, assessment, self-help/peer support, center size, and accreditation. These measures are described in Table 1. In a series of statistical regressions, each of our measures served as a dependent variable while all other variables not being assessed as a dependent variable were included as controls.

As our key independent variable of interest, we used the rural-urban continuum codes published by the United States (US) Department of Agriculture to measure center rurality. The codes have nine classifications for every county in the US and Puerto Rico, and most health services research uses the designation of metropolitan statistical areas (MSAs) to differentiate between rural and urban areas^{6,42}. MSAs range from code 1 to code 3, while non-MSAs range from code 4 to code 9. To create our measure of center rurality, we coded the centers that were classified as non-MSAs according to the USDA's rural-urban continuum codes (codes 4–9) as rural. These centers were given a numeric value of 1. All other centers were located in counties that corresponded to USDA's rural-urban continuum codes 1–3. These were given a numeric value of 0.

Analytic Strategy

We first conducted descriptive statistics, chi-square, and independent t-tests to examine differences between rural and urban centers on each of our variables. We continued with a series of multivariate regressions, utilizing each structural characteristic and treatment quality indicator as a dependent variable, while controlling for all other measures. Significant treatment quality variables were further explored for interaction effects between center rurality and each structural characteristic.

For dichotomously measured outcomes (e.g. physician on staff, medical nurse on staff, profit status, publicly-funded, use of pharmacotherapies, use of behavioral therapies, self-help/peer support, assessment, continuing care, adolescent treatment track, female treatment track) logistic regression was utilized. For the model with percent counselors with a Master's degree or higher as the dependent variable, ordinary least squares regression was used. Finally, for the three remaining count indicators (e.g. wraparound scale, other specialized track scale, and levels of care scale) negative binomial regression was used. The negative binomial regression was preferred for the count variables because there was significant evidence of overdispersion as compared to the Poisson model. All analyses were conducted in SPSS 22. No evidence of multicollinearity was detected prior to analysis⁴³. Centers that were missing on any of our study variables (7.1%) were excluded from analysis. This left us with a final sample size of 591 centers.

Results

Table 1 shows the descriptive statistics for the sample while Table 2 shows the results of the chi-square and t-test comparisons between rural and urban centers. Rural centers represented 20% of our sample. The presence of expert staff was relatively low across centers. On

average, the proportion of counselors with a Master's degree or higher was less than half (47.8%). Furthermore, only 16% of centers had a physician on staff, while 47% of centers had a medical nurse on staff. Only the percent of counselors with a Master's degree or higher was marginally different between rural and urban centers, with rural centers having a lower mean percentage of highly educated counselors ($p < .10$).

We found statistically significant differences between the funding and profit status of rural and urban centers. Twenty-eight percent of centers were for-profit and 33% of centers were primarily publicly funded, but rural centers were less likely to be for-profit ($\chi^2=6.72$; $df=1$; $p < .05$) and more likely to be publicly funded ($\chi^2=11.19$; $df=1$; $p < .01$).

Among our treatment quality indicators, a great deal of variability was evident. Fewer than 25% of the centers offered buprenorphine, acamprosate, and/or tablet naltrexone and only 9% of centers offered injectable naltrexone. Fewer rural centers used buprenorphine than urban centers ($\chi^2=6.428$; $df=1$; $p < .05$). In contrast, CBT was the most utilized behavioral therapy with 90% of the centers offering it, while 33% and 45% of the centers offered CM and MET, respectively.

Turning to wraparound services, the mean score for the wraparound scale was 4.0, indicating that, across centers, the average number of wraparound services offered was four of the possible 13 wraparound services. The mean of services offered in rural centers was significantly lower than the mean in urban centers ($t=2.61$; $df=589$; $p < .01$). Concerning continuing care, 56% offered aftercare services once treatment was concluded.

Forty-one percent of centers offered a separate track for adolescents, but more rural centers did than urban centers ($\chi^2=12.19$; $df=1$; $p < .001$). Over half (58%) of the centers offered a specialized track for female clients. Across all centers, the average number of specialized tracks was one, and the mean was even lower for rural centers ($t=2.79$; $df=589$; $p < .01$). Concerning levels of care, the average mean was 2.3, and the mean for rural centers was lower than that for urban centers ($t=3.04$; $df=589$; $p < .01$).

We found that 40% of the centers utilized the ASI at intake, and over half of the centers held twelve-step meetings onsite. While there was no significant difference concerning the use of ASI between rural and urban centers, fewer rural centers held twelve-step meetings onsite ($\chi^2=5.42$; $df=1$; $p < .05$).

Table 3 displays the results of the multivariate regressions. All results shown are for center rurality (1=rural center; 0=urban center). In each regression, all structural and treatment quality indicators not being used as the dependent variable were included as controls, but the results for these variables are not shown.

Concerning our first hypothesis regarding rurality and structural characteristics, Table 3 shows the results for the associations between center rurality and the percent of a center's counselors with a Master's degree or higher (H1a), having a physician on staff (H1b), and having a medical nurse on staff (H1c). The association was statistically significant and negative for percent counselors with a Master's degree or higher ($b=-7.82$; $se=3.63$; $p < .05$), indicating that rural centers were less likely to have counselors with advanced degrees than

urban centers. Center rurality also had a significant but positive association with having a medical nurse on staff ($b=.96$; $se=.30$; $p<.01$). While profit status was not significantly related to center rurality in the multivariate analysis (H1d), public funding was significant and positive ($b=.83$; $se=.26$; $p<.01$), supporting H1e.

Concerning our second hypothesis, significant differences in terms of treatment quality were evident in our multivariate analyses. Consistent with H2a, center rurality and buprenorphine had a negative association ($b=-.90$; $se=.39$; $p<.05$), so that rural centers were less likely than urban centers to offer buprenorphine, but contrary to our expectations, there were no significant associations between rurality and the provision of other SUD medications (H2a) or behavioral therapies (H2b).

Consistent with H2c, center rurality was also negatively associated with offering wraparound services ($b=-.16$; $se=.06$; $p<.01$), indicating that centers in rural locations offered fewer wraparound services than those in urban locations. Contrary to H2d, there was no relationship between center rurality and provision of continuing care. As expected, the association between center rurality and specialized track offerings (H2e) was also significant and negative ($b=-.32$; $se=.13$; $p<.05$). Nevertheless, center rurality had a significant and positive association with offering an adolescent treatment track ($b=.83$; $se=.24$; $p<.001$). The association between center rurality and levels of care (H2f) was negative and marginally significant ($b=-.13$; $se=.08$; $p<.10$). Finally, consistent with H3, we did not find significant associations between center rurality and use of the ASI or of twelve-step meetings.

To explore possible moderating influences of organizational characteristics on the relationships between center rurality and the significant treatment quality indicators (H4), we repeated the multivariate regressions but added interaction terms between center rurality and each structural characteristic in turn. Before creating the interaction term for rural location by the variable for percent counselors with a Master's or higher, the counselor variable was centered at its mean.⁴⁴

Only one interaction was statistically significant. In the negative binomial regression using wraparound services as the dependent variable, the interaction term between center rurality and physician on staff was statistically significant and positive ($b=0.56$; $se=0.14$; $p<.001$). Figure 1 shows the slopes for the interaction term between center rurality and having a physician on staff when examining the provision of wraparound services. The slope for centers with a physician is significant ($m=.30$; $t=2.49$; $p<.05$) as well as the slope for centers without a physician ($m=-.257$; $t=-4.04$; $p<.001$). The graph illustrates that rural centers without a physician on staff offer fewer wraparound services than their counterparts in urban locations. Conversely, centers that employ a physician are more likely to offer wraparound services when located in a rural location.

Discussion

The purpose of this study was to explore structural and treatment differences between rural and urban SUD treatment centers. First, we hypothesized that rural centers would have reduced access to qualified staff, be more likely to be nonprofit and publically funded.

Second, we anticipated that center rurality would be inversely related to the provision of several quality treatment services, although we did not anticipate any rurality effect on the use of the ASI or twelve-step support. Finally, we predicted that these inverse relationships would be moderated by center staff, profit status, and funding. Our hypotheses were largely supported with a few notable exceptions.

We found evidence that rural and urban centers differ in terms of staff quality. Rural centers had a lower percentage of counselors with advanced degrees, likely due to the difficulty of recruiting and maintaining qualified staff in rural areas.¹⁶ This is problematic for rural SUD treatment because counselors with advanced degrees tend to have greater knowledge of treatment innovations and are likely to facilitate their adoption.¹⁸

On the other hand, rural treatment centers were more likely to employ a medical nurse on staff than their urban counterparts. If there are plenty of healthcare options nearby, urban centers may be less likely to employ nurses, since they can easily refer a client to a medical provider. Another possibility is that rural centers may employ nurses in lieu of physicians, who have higher salaries. However, post-hoc analysis (not shown) of a possible interaction between center rurality and having a physician on staff was not significantly related to the presence of nursing staff.

Our funding and profit status predictions were supported. The bivariate models showed that rural centers were more likely to be nonprofit and publicly funded. Only the publicly funded finding was supported in the multivariate models. This is explained by smaller populations and higher poverty levels in rural areas, which make sustaining for-profit or privately-funded ventures problematic.³

Concerning treatment quality, we found support for our hypothesis that rural centers would offer fewer services. While rates of adoption of innovative practices were relatively low for both rural and urban centers, with the exception of the use of CBT, rural centers were less likely to offer buprenorphine. Lower rural use of buprenorphine may reflect that while there has been an increase in the illicit use of OxyContin in rural areas⁴⁵, rural SUD clients are more likely to cite alcohol as their primary abused substance¹¹. Furthermore, they offered fewer wraparound services, even though their provision in rural centers may be particularly crucial, and fewer specialized treatment tracks. Nonetheless, it should be noted that there were no differences in the use of other pharmacotherapies or across any of the behavioral therapies.

While rural centers were less likely to offer a greater variety of specialized tracks, they were more likely to offer specialized treatment for adolescent patients. Research has suggested that adolescents' treatment outcomes improve when they receive treatment in programs designed specifically for their needs.³⁷ Given increased binge drinking and methamphetamine use among rural youth,³ the greater likelihood of rural centers to offer treatment tailored to adolescents is encouraging.

We hypothesized that two of NIDA's treatment quality indicators, peer support and intake assessment, would not differ by center rurality because of their limited demand on center resources. While the bivariate models indicated that a greater percentage of rural centers

offered meeting space for twelve-step groups than urban centers, this finding was not supported in the multivariate model. No difference was found for ASI use.

Finally, staffing characteristics became important for center provision of wraparound services. Centers with a physician on staff offered more wraparound services when located in a rural location than when located in an urban one. This may be explained by reduced community services and increased distance between service providers in rural communities.^{33,34} Rural centers are less able to refer clients to local services so their ability to facilitate wraparound services is aided by in-house capabilities. Having a physician on staff may facilitate a center's ability to offer medically-based wraparound services, especially in rural locations where these professionals are more difficult to access.

Limitations

Several limitations should be noted. Location of a treatment program in a rural area does not necessarily mean that the clientele are limited to that particular catchment area. Centers may differentially attract clients from regional or national catchment areas. Additionally, patients may seek confidentiality in distant and remote rural locations. A similar logic is connected to the belief that recovery may be expedited if patients are far away from the surroundings that apparently nurtured their addiction. While these concerns may temper our findings in unmeasured ways, they do not rule out that our sub-sample comprises the only option for rural residents in a particular location, regardless of the geographic source of other patients.

Furthermore, our findings cannot be generalized to treatment programs not open to the general public, such as correctional facility or VA programs. Also, the data are based on self-reports by administrative and clinical directors, raising issues of bias. Nevertheless, reliance of self-reports is consistent with other organizational and federal surveys of treatment programs. Finally, although all of NIDA's treatment components are included in the study, it is possible that other important treatment quality indicators were excluded.

Conclusion

The purpose of this study was to contrast the structural and treatment characteristics of SUD treatment centers located in rural and urban settings. We found key structural differences in access to highly educated counseling staff, profit status, and funding that might suggest center difficulty in quality treatment provision, but rural centers were more likely to enhance adolescent treatment by providing specialized treatment tracks and more likely to have nursing staff. Nevertheless, we found evidence for treatment deficiencies in rural centers as well. They were less likely to offer buprenorphine, offered fewer wraparound services, and had less diverse specialized treatment options. There were no differences detected for the remaining treatment quality indicators measured.

We hypothesized that treatment deficiencies in rural centers may be due to structural limitations, and wraparound service provision was contextualized by an interaction between center rurality and having a physician on staff. This highlights the importance of exploring not just differences in available treatment but the corresponding, and possible compounding, structural realities of rural treatment centers.

Beyond the relationship between center rurality, service provision, and structural support, future scholars should also consider the implementation of treatment services by center location. While beyond the scope of this particular study, an analysis of delivery quality would expand the literature concerning rural SUD treatment.

This study is timely given the ongoing changes due to the Patient Protection and Affordable Care Act (ACA).⁴⁶ Core and wraparound services, which address the multiple co-occurring needs of patients, are likely to increase in importance with the proposed integration with primary care.⁴⁷ The ACA may shift delivery patterns of some treatment services and provide new structural challenges and opportunities for SUD centers. Centers that have already adopted pharmacotherapy may be at an advantage in their ability to integrate in the age of healthcare reform. In this regard, rural centers may face greater challenges in their ability to expand their services to provide enhanced linkages with primary care and other wraparound services, particularly if they face additional constraints in maintaining qualified staff.

Overall, our findings indicate that treatment differences between rural and urban locations are complex and subject to resource availability. Future research is needed to continue to explore the delivery of high-quality treatment services, particularly the use of treatment innovations, over time in rural and urban areas.

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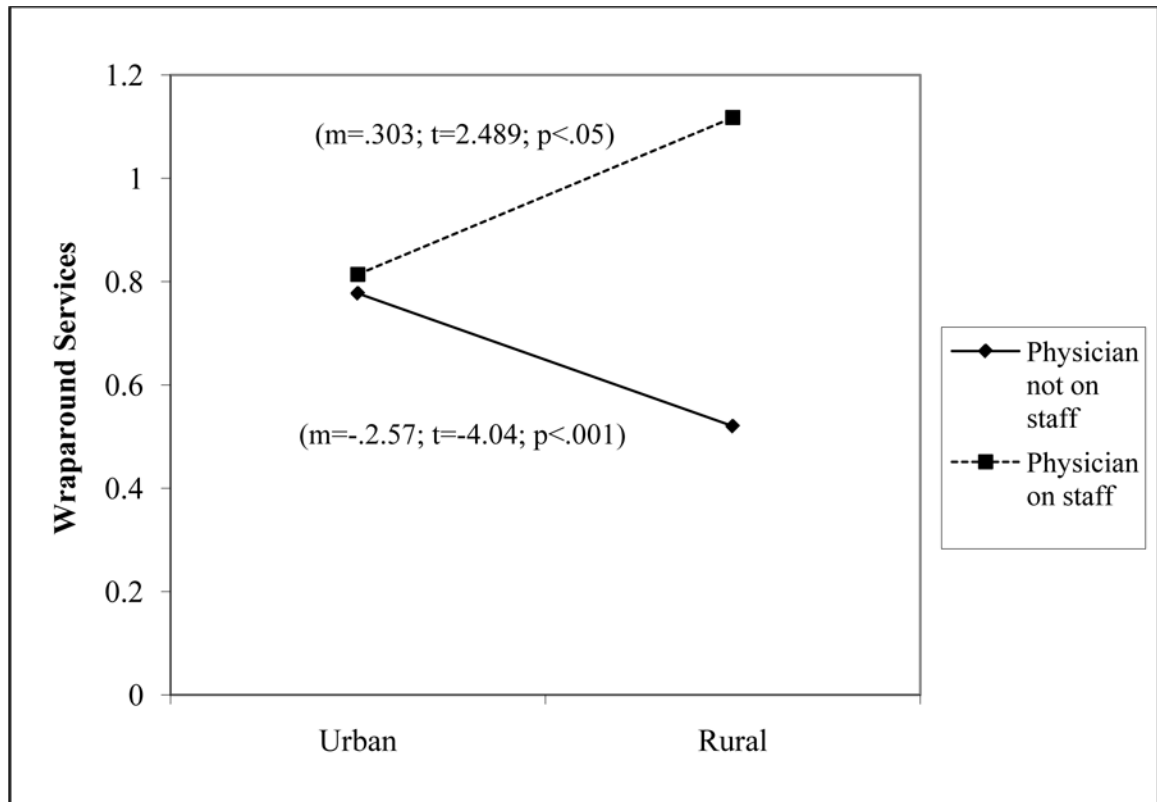


Figure 1. Graph of interaction between rural and physician on staff; dependent variable is wraparound services

Table 1

Descriptive Statistics Key Independent Variable

	M/%	SD/n	Description
Center Rurality	19.9%	118	1=rural location; 0=urban location
Structural Characteristics			
Percent Counselors with Master's Degree or Higher	47.8	35.3	percent measure of employed counselors with an advanced degree, ranging between 0%–100%
Physician on Staff	15.9%	94	1=MD on staff; 0=no MD on staff
Medical Nurse on Staff	47%	278	1=nurse on staff; 0=no nurse on staff
For-profit Status	28.3%	167	1=for-profit; 0=nonprofit
Primarily Publicly Funded	32.8%	194	1=receives at least 51% of funding from Federal, state, or local grant sources; 0=receives less than 51% of funding from these sources
Treatment Quality Indicators			
<i>Pharmacotherapy</i>			
Buprenorphine	24.2%	143	1=offers buprenorphine; 0= does not
Acamprosate	24.3%	142	1=offers acamprosate; 0= does not
Injectable Naltrexone	8.6%	51	1=offers injectable naltrexone; 0=does not
Tablet Naltrexone	19.5%	115	1=offers tablet naltrexone; 0=does not
<i>Behavioral Therapy</i>			
Cognitive Behavioral Therapy	90.2%	533	1=offers CBT; 0=does not
Contingency Management	32.8%	194	1=offers CM; 0=does not
Motivational Enhancement Therapy	45%	266	1=offers MET; 0=does not
<i>Wraparound Services</i>			
NIDA Wraparound Scale	4.0	2.4	a count of 13 possible wraparound services, including primary medical care, mental health services, dental care, HIV testing, Hepatitis C testing, education services, housing services, transportation services, legal services, family counseling services, childcare services, vocational services, and financial services
<i>Continuing Care</i>			
Aftercare	56%	331	1=offers aftercare; 0=does not
<i>Specialized Treatment/Levels of Care</i>			
Adolescent Treatment Track	40.9%	242	1=offers an adolescent track; 0=does not
Female Treatment Track	58.2%	344	1=offers a female track; 0=does not
Other Specialized Track Scale	1.1	1.3	a count of 6 possible treatment tracks, including separate programs for clients who are Spanish-speaking, relapsers, impaired professionals, HIV positive, LGBT, or elderly
Levels of Care Scale	2.3	1.2	a count of 5 possible levels of care, including residential, partial hospitalization, inpatient, intensive outpatient, and outpatient
<i>Assessment</i>			
Addiction Severity Index	40.4%	239	1=uses the ASI; 0=does not
<i>Self Help/Peer Support</i>			
Twelve Step Meetings Held Onsite	52.8%	312	1=provides meeting space for 12-step support; 0=does not
Controls			
Size (logged)	2.6	1.11	a continuous logged measure of the number of fulltime equivalents employed by the center, ranging between 0–6.81

	M/%	SD/n	Description
National Accreditation	46.7%	276	1=is nationally accredited by the Joint Commission, the Commission on Accreditation of Rehabilitation Facilities, or the Council on Accreditation; 0=is not accredited

N=591

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Table 2 χ^2 & t-test Comparisons

	Rural M/%	Urban M/%	
Structural Characteristics			
Percent Counselors with Master's Degree or Higher	42%	49.2%	†
Physician on Staff	11.9%	16.9%	
Medical Nurse on Staff	50.0%	46.3%	
For-profit Status	18.6%	30.7%	*
Primarily Publicly Funded	45.8%	29.6%	**
Treatment Quality Indicators			
<i>Pharmacotherapy</i>			
Buprenorphine	15.3%	26.4%	*
Acamprosate	23.7%	24.1%	
Injectable Naltrexone	5.9%	9.3%	
Tablet Naltrexone	21.2%	19.0%	
<i>Behavioral Therapy</i>			
Cognitive Behavioral Therapy	94.1%	89.2%	
Contingency Management	29.7%	33.6%	
Motivational Enhancement Therapy	39.8%	46.3%	
<i>Wraparound Services</i>			
NIDA Wraparound Scale	3.5	4.2	**
<i>Continuing Care</i>			
Aftercare	57.6%	55.6%	
<i>Specialized Treatment/Levels of Care</i>			
Adolescent Treatment Track	55.1%	37.4%	***
Female Treatment Track	56.8%	58.6%	
Other Specialized Track Scale	0.8	1.2	**
Levels of Care Scale ^d	2.0	2.4	**
<i>Assessment</i>			
Addiction Severity Index	43.2%	39.7%	
<i>Self Help/Peer Support</i>			
Twelve Step Meetings Held Onsite	43.2%	55.2%	*
Controls			
Size (logged) ^e	2.6	2.6	
National Accreditation	40.7%	48.2%	

N=591

p<.001;**
p<.01;*
p<.05;†
p<.10

Table 3

Results for Key Independent Variable, Center Rurality[‡]

	Logistic Regressions			OLS Regression			Negative Binomial		
	b	s.e	o.r.	b	s.e	B	b	s.e	exp(b)
Structural Characteristics									
Percent Counselors with MA or Higher				-7.852	3.637	-0.089			*
Rural									
Physician on Staff									
Rural	-0.252	0.358	0.778						
Medical Nurse on Staff									
Rural	0.975	0.304	2.652						**
For-profit Status									
Rural	-0.501	0.296	0.606						
Primarily Publicly Funded									
Rural	0.828	0.262	2.288						**
Treatment Quality Indicators									
Pharmacotherapy									
Buprenorphine									
Rural	-0.901	0.387	0.406						*
Acamprosate									
Rural	0.466	0.371	1.594						
Injectable Naltrexone									
Rural	-0.776	0.616	0.460						
Tablet Naltrexone									
Rural	0.649	0.400	1.914						
Behavioral Therapy									
Cognitive Behavioral Therapy									
Rural	0.579	0.453	1.784						
Contingency Management									
Rural	-0.044	0.257	0.956						
Motivational Enhancement Therapy									

	Logistic Regressions			OLS Regression			Negative Binomial		
	b	s.e	o.r.	b	s.e	B	b	s.e	exp(b)
Rural	-0.382	0.233	0.683				-0.157	0.057	0.854
Wraparound Services									
NIDA Wraparound Scale									
Rural									
Continuing Care									
Aftercare									
Rural	0.395	0.236	1.485						
Specialized Treatment/Levels of Care									
Adolescent Treatment Track									
Rural	0.828	0.238	2.289	***					
Female Treatment Track									
Rural	0.146	0.249	1.157						
Other Specialized Track Scale									
Rural							-0.319	0.129	0.727
Levels of Care Scale									
Rural							-0.132	0.076	0.876
Assessment									
Addiction Severity Index									
Rural	0.063	0.238	1.065						
Self Help/Peer Support									
Twelve Step Meetings Held Onsite									
Rural	-0.221	0.262	0.801						

N=591

*** p<.001;

** p<.01;

* p<.05;

† p<.10

‡ each model controls for all quality indicators and organizational controls; coefficients for these variables are not shown