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Rural Drug Users: Factors Associated with Substance Abuse Treatment Utilization

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Abstract

The purpose of this study is to use a modified version of Andersen's (1968, 1995) Behavioral Model of Health Services Use to identify the correlates of the number of substance abuse treatment episodes received by rural drug users. Data were collected from face-to-face interviews with 711 drug users in rural areas of Ohio, Arkansas, and Kentucky. Descriptive analyses examine rural drug users' substance use histories and retrospective substance abuse treatment service utilization patterns. A negative binomial regression model indicated that selected predisposing, historical health, and enabling factors were significantly associated with the utilization of substance abuse treatment among rural drug users. Despite high levels of recent and lifetime self-reported substance use among these rural drug users, treatment services were underutilized. Future studies are needed to examine the impact of the health care system and characteristics of the external environment associated with rural substance abuse treatment in order to increase utilization among drug users.

The health service utilization patterns, including those for substance abuse treatment, among illicit drug users are not well known. Yet, there is a clear association between drug use and health problems (Hegamin, Longshore, & Monahan, 2002; Inciardi, McBride, McCoy, & Chitwood, 1994) which indicates that drug use has both indirect and direct health

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consequences, including costs associated with the increased use of high cost health services such as hospitalizations and emergency room services (French, McGeary, Chitwood, & McCoy, 2000; Leukefeld et al., 2006; Webster et al., 2005). From a health services research perspective, substances users may require multiple treatment episodes (Booth, Staton, & Leukefeld, 2001; Lundgren, Sullivan, & Amodeo, 2006) since drug dependence is a chronic medical illness (McLellan, 2002; McLellan, Lewis, O'Brien, & Kleber, 2000); however, there is limited substance abuse treatment available in rural areas (Robertson, Sloboda, Boyd, Beatty, & Kozol, 1997; Warner & Leukefeld, 2001) especially for the treatment of stimulant abuse and dependence which is on the rise in rural areas (National Survey on Drug Use and Health [NSDUH], 2005). Therefore, it is important to examine the factors associated with utilization of substance abuse treatment by rural drug users who meet lifetime DSM-IV criteria for substance dependence. Specifically, this study uses a sample of community-based stimulant users to identify the significant correlates of the number of substance abuse treatment episodes using a modified version of Andersen's (1968, 1995) Behavioral Model of Health Services as the guiding theoretical framework.

Stimulant Use in Rural Areas

According to the National Institute on Drug Abuse (NIDA) (2004, 2005, 2006), stimulants are psychoactive substances that increase activity in the central nervous system and can produce physical dependence. The stimulant drug category includes crack cocaine, powder cocaine, methamphetamines, and amphetamines because they produce an increase in alertness, attention, and energy (NIDA, 2004, 2005, 2006). There is contradictory research about stimulant availability in rural areas of the United States. Some research suggests a lower prevalence of crack cocaine and powder cocaine use in rural areas which could be attributed to limited availability (Leukefeld et al., 2002; Mateyoke-Scriver, Webster, Staton, & Leukefeld, 2004; Schoeneberger, Leukefeld, Hiller, & Godlaski, 2006), while other research indicates that cocaine and crack are readily available and use is prevalent in rural areas (Booth, Leukefeld, Falck, Wang, & Carlson, 2006; Falck, Siegal, Wang, Carlson, & Draus, 2005; Zule et al., 2007). It is possible that crack cocaine and powder cocaine are available, but may not be the drugs of choice in some rural areas.

Amphetamines, specifically methamphetamine use is becoming increasingly popular among rural populations because of its low cost and wide availability (Wermuth, 2000). In fact, Rawson, Anglin, and Ling (2002) found that methamphetamine users spend for methamphetamines one-fourth of the money that cocaine users spend on cocaine, yet methamphetamine users are under the influence for more time because of methamphetamine's long-lasting effects. Moreover, rural areas are a prime locale for the production and distribution of methamphetamine because of the availability of ingredients including agricultural fertilizer, distressed economic conditions (Stoops, Staton-Tindall, Mateyoke-Scriver, & Leukefeld, 2005), and isolation (Leukefeld et al., 2002). However, while methamphetamine production and distribution might be prominent in rural areas, there are limited opportunities for substance abuse treatment services in less densely populated areas (Warner & Leukefeld, 2001).

Health care costs related to substance use vary by type of substance used and the health and behavioral health care costs associated with stimulant use, in particular methamphetamine abuse, are on the rise (Wermuth, 2000). According to data from the Treatment Episode Data Set (TEDS), between 1997 and 2007 the proportion of admissions for primary cocaine/crack abuse decreased (15% to 13%) while the proportion of primary admission for methamphetamine/amphetamine abuse doubled (4% to 8%) (Substance Abuse and Mental Health Services Administration [SAMSHA], 2009). While TEDS doesn't break treatment admissions data into a rural and urban stratification, data from the 2004 National Survey of Substance Abuse Treatment Services (NSSATS) indicates that only 8.9% of all treatment

facilities are located in a rural non-adjacent county (Lenardson & Gale, 2007). In addition, treatment facilities housed in non-adjacent rural counties were more likely to have a combined mental health and substance abuse focus. As compared to facilities in urban or adjacent rural counties, facilities in non-adjacent rural counties were less likely to provide detoxification services, intensive outpatient care, opioid treatment, and/or transitional housing services but were more likely to offer discounted or free care (Lenardson & Gale, 2007). Thus, differences in rural and urban areas suggest that it would be important to examine the correlates of the number of substance abuse treatment episodes received by rural drug users.

Health services utilization framework

Andersen's Behavioral Model of Health Services Use has evolved over the past four decades since its development in the 1960s to explain why individuals use health services, including substance abuse treatment (Andersen, 1968, 1995). Phase I of the model examined individual-level characteristics which include (1) predisposing factors, (2) potential enabling resources, and (3) need or current illness level factors. In the 1970s, the Behavioral Model was revised in Phase II to include the health care system as a predictor of health services utilization while Phase III added external environmental characteristics (e.g., physical, political, and economic). A detailed description of the evolution of the Behavioral Model of Health Services Use is provided by Andersen (1995).

Due to data constraints, the individual-level determinants (also known as the population characteristics) are the theoretical framework used for the present study; however, need or current illness level factors are excluded from these analyses as the scope of this study is to identify the correlates of the lifetime number of substance abuse treatment episodes. Also, since all participants are active stimulant users and met lifetime DSM-IV dependence criteria, some would suggest that treatment need for the majority of participants is assumed. However, it should also be noted that spontaneous remissions do occur (Birnacki, 1986; Klingemann, 1991; Sobell, Ellingstad, & Sobell, 2000; Tuchfeld, 1981; Walters, 2000). A review of the literature has indicated a wide range in the prevalence of spontaneous remissions from substance abuse (4.3% to 56.4%) which could be dependent on both the length of time to follow-up and the definition of spontaneous remission (Walters, 2000). This study will assume treatment need by adhering to the National Institute on Drug Abuse's recommendation outlined in the Principles of Drug Addiction Treatment (2009). This guide states that although some people are successful in stopping drug use on their own, long-term drug use changes brain functioning and treatment is an essential component of positive behavioral outcomes. In addition, it is plausible that individuals who received substance abuse treatment could have desisted from substance use earlier.

In Andersen's Behavioral Model (1968, 1995), historical health factors are predisposing factors; however, Leukefeld, Logan, Martin, Purvis, and Farabee (1998) tailored this model to drug-abusing criminal offenders and included historical health factors as a separate category. Leukefeld and colleague's modified health services framework offers a more detailed tailored approach because it examines the separate contributions of predisposing factors, historical health factors, and potential enabling factors to the number of times a person has entered substance abuse treatment.

Predisposing factors encompass individual factors that exist before an illness and may influence health service utilization (Andersen, 1968, 1995). These factors are most often operationalized as age, gender, race, marital status, and education (Andersen, 1968, 1995; Booth et al., 2001; Leukefeld et al., 1998). Predisposing factors can be operationalized in terms of demographic characteristics, whereas, previous health conditions may be associated with future health services utilization. Historical health factors include major illness,

addiction, hospitalization, mental health treatment, and substance abuse treatment (Andersen, 1968, 1995; Leukefeld et al., 1998). For example, individuals with a history of psychiatric problems were eight times more likely to seek mental health treatment (Padgett, Struening, & Andrews, 1990). In other studies, substance use problems, psychological problems, and other behavioral health care problems emerged as important historical health variables in predicting health services utilization (Chassler, Lundgren, & Lonsdale, 2006; Webster et al., 2005; Webster et al., 2006).

Potential enabling factors, the third component of the model, include factors that may facilitate health care service utilization such as social support, perceptions of the availability and effectiveness of substance abuse treatment services, the ability to communicate with medical professionals, and limited stigmatization. The extent and quality of social support or relationships can influence the use of health services (Pescosolido, 1992), and a lack of social support from non-drug using peers may impede service utilization. Oftentimes, non-drug using peers are relied upon for financial needs, housing accommodations, child care, or transportation during the recovery process (Allen, 1995; Appel, Ellison, Jansky, & Oldak, 2004; Litt & Mallon, 2003). In addition, if an individual with an alcohol or drug dependence disorder perceives that treatment is not available, then they may not seek out needed health care services. Studies indicate that substance users rarely disclose their drug use status to medical professionals (Anthony & Helzer, 1991; Ashery, Carlson, Falck, & Siegal, 1995), oftentimes because of the fear of discrimination or withholding of health care services (Ashery et al., 1995).

This study examines substance abuse treatment utilization among a community-based sample of rural drug users. Participants are described across three sets of individual determinants -- predisposing factors, historical health factors, and potential enabling factors --using data from a multi-site community-based sample of rural stimulant users. A modified Behavioral Model of Health Services Use (Andersen, 1968, 1995) is used to examine the correlates of the number of lifetime substance abuse treatment episodes.

Method

Sample

Data are derived from a study of stimulant users from nine rural counties in Ohio, Arkansas, and Kentucky (n=711). Booth, Leukefeld, Falck, Wang, and Carlson (2006) provide additional information on this study of stimulant users. According to the U.S. Census (2000), each county included in the study had a population less than 50,000. To be eligible to participate in the study, potential respondents had to: (1) self report having used cocaine hydrochloride, crack cocaine, and/or methamphetamine at least once in the 30 days before entering the study, (2) be over the age of 18, (3) have not been in formal substance abuse treatment within the past 30 days, (4) reside in one of the designated rural counties, and (5) consent to participate.

A total of 711 participants were recruited by Respondent-Driven Sampling (RDS), which has proven successful for the representative recruitment of hidden populations, such as active substance users (Heckathron, 1997, 2002). Additional information on the use of RDS procedures in rural areas is available elsewhere (Falck, Siegal, Wang, Carlson, & Draus, 2005; Wang, Falck, Rahman, & Carlson, 2007). Interviews were conducted between 2002 and 2004 using Computer Assisted Personal Interviewing (CAPI). Respondents who completed the 2–3 hour interview were reimbursed \$50 for their time and effort. See Booth and colleagues (2006) for additional information on the methodology. The study was approved by the Institutional Review Boards at Wright State University, the University of Arkansas, and the University of Kentucky.

Measures

Data was collected on predisposing, historical health, and potential enabling factors. The dependent variable in the multivariate models was the self-reported retrospective number of separate lifetime occasions a person entered a substance abuse treatment program¹. Specifically the question asked “In your lifetime, on how many separate occasions, if ever, have you been a patient or client in a drug abuse treatment program (not counting self help programs like AA or NA)?”

Predisposing factors were comprised of five variables. Age was measured in number of years. The remaining variables were dichotomous measures (0=no; 1=yes) and included whether the participant was male, white, and had a high school diploma. Marital status was measured where 1=single/never married and 0=all other categories (i.e., married, widowed, separated, divorced, and living as married).

Historical health factors were two dichotomous variables (0=no; 1=yes). A variable was derived from the Addiction Severity Index Version 5 (ASI) (McLellan et al., 1990) to assess the lifetime prevalence of mental health treatment. In addition, participants were asked if they were ever court mandated to attend substance abuse treatment.

Four scales comprised the potential enabling factors (see Appendix A for all items included in the scales). First, the non-drug using social support scale included five items and values ranged from 5 (low level of social support) to 20 (high level of social support) ($\alpha=.85$). Second, the treatment perceptions scale was comprised of two items which measured the extent to which treatment was available and effective in these rural areas. This scale ranged from 2 (not available) to 10 (extremely available) ($\alpha=.70$). Third, the communication with a medical doctor scale ranged from 3 (no communication) to 15 (excellent communication) ($\alpha=.69$). This three-item scale assesses the extent to which participants are comfortable and have talked to a physician about their drug use as well as the degree to which participants' doctors know about their drug use. Fourth, seven items comprised the stigmatization for being a drug user scale, which ranged from 7 (no stigmatization) to 35 (extremely stigmatized) ($\alpha=.73$).

Analytic Approach

DSM-IV-TR (American Psychiatric Association, 2002) criteria were used to measure any lifetime substance dependence and only the participants who met this criteria were included in the analyses ($n=620$). The dependent variable of interest was the self-reported retrospective number of separate lifetime occasions a rural drug user entered substance abuse treatment. Cross-sectional research designs have been used in other studies to examine the health services utilization model (Padgett et al., 1990; Webster et al., 2005). Independent variables were selected a priori and included predisposing, historical health, and potential enabling factors. Since linear regression models can result in inefficient, inconsistent, and biased estimates when applied to count outcomes (Long & Freese, 2001), negative binomial regression was utilized to examine the independent correlates of substance abuse treatment utilization among rural drug users. Moreover, because there is significant evidence of overdispersion in the model ($G^2=172.21$, $p<.001$), negative binomial regression was used rather than Poisson regression (Long & Freese, 2001). All analyses were conducted using STATA, version 8.0 (College Station, TX). Twelve cases were excluded from the multivariate analyses because they were missing data on one of the variables of interest. The results of the negative binomial regression model display the model χ^2 , pseudo R^2 , β

¹Eligibility criteria for participation in this study include not having been in treatment in the past 30 days. Therefore, this lifetime measure of the number of separate lifetime occasions a person entered treatment excludes the 30 days before the baseline interview.

coefficients, standard errors, and the incident rate ratios (IRRs). Since the negative binomial distribution is nonlinear, the β coefficients are not directly interpretable but can be transformed into IRRs (defined as e^{β}), which are similar to odds ratios. The IRRs describe the change in the number of substance abuse treatment episodes associated with a one-unit increment in an explanatory variable.

Results

Descriptive Analyses

In this sample, rural drug users who met lifetime DSM-IV criteria for any type of substance dependence disorder ($n=620$) were predominantly young white males (see Table 1). About half were single (48%) and had completed a high school diploma (58%). Rural drug users reported several historical health factors. Specifically, over one-third had received mental health treatment (41%) and 12% of rural drug users had been court mandated to attend substance abuse treatment. Across the potential enabling factors, participants reported a relatively high level of social support from non-drug using peers. Rural drug users were at the midpoint on the treatment perceptions scale, but fell slightly below the mean on the communication with a medical doctor scale and the stigmatization scale.

The lifetime prevalence of alcohol and most illicit drugs were high among rural drug users (see Table 2). Marijuana was the most frequently used illegal drug by rural drug users and participants reported using marijuana about every other day. During the past 30 days, rural drug users reported using alcohol about 11 days, using crack about 7 days, using powder cocaine 4 days, using non-prescription pain killers about 5 days, and using non-pharmaceutical methamphetamines about 4 days. In addition, these rural drug users initiated their alcohol and other illicit drug in their teens and early twenties.

Table 3 displays the overall history of substance abuse treatment utilization across the lifespan among rural drug users. More than half (51%) of the participants had never received any substance abuse treatment. Of those who did participate in substance abuse treatment, the majority (72%) reported receiving substance abuse treatment in their rural county of residence. On average, these participants reported receiving treatment once in their lifetime ($S.D.=2.03$). One-fifth of rural drug users had participated in substance abuse treatment services in the past three years (21%), but only 12% reported that they had made a serious effort to get into treatment during the same timeframe. Almost half of rural drug users attended a self-help group in their lifetime (52%), but only 16% attended in the past year.

Multivariate Analyses

The results of the negative binomial regression model identifying the correlates of the number of separate occasions a rural drug user had entered a substance abuse treatment program are displayed in Table 4. Two predisposing factors were significant correlates of the number of substance abuse treatment episodes. First, older drug users were significantly more likely than younger drug users to have engaged in multiple treatment episodes. Second, being male was associated with a 36% increase in the number of times in substance abuse treatment.

Both of the historical health factors were related to the number of separate occasions a rural drug user entered treatment during his/her lifetime. Having ever received mental health treatment was associated with a 53% increase in the number of times in substance abuse treatment. Having ever been court mandated to substance abuse treatment increased the odds of the number of separate occasions a person entered treatment by 2.77.

Only one of the potential enabling factors was significantly associated with the number of times a rural drug user received substance abuse treatment. Specifically, rural drug users who reported greater communication with medical doctors were more likely to have received multiple episodes of substance abuse treatment across the lifespan. Due to temporal ordering, this coefficient should be interpreted cautiously and can only denote correlation, not causation.

Discussion

Researchers have called for additional studies to examine repeated substance abuse treatment episodes within the context of the chronicity of addiction (Chassler et al., 2006; Hser, Joshi, Anglin, & Fletcher, 1999; McLellan, 2002). This call was the impetus for the present study which examined substance abuse treatment among rural drug users with a modified version of Andersen's (1968, 1995) Behavioral Model of Health Services Use to identify the significant correlates of the retrospective number of times a person entered substance abuse treatment across the lifespan. More than half (51%) of the rural drug users in this study reported never having received substance abuse treatment, despite the fact that all of the participants met DSM-IV criteria for lifetime alcohol or drug dependence. In other words, these rural drug users reported high levels of recent and lifetime substance use, yet underutilized addiction treatment services.

Limited availability and utilization of treatment in this rural population of drug users is consistent with both site-specific studies (Metsch & McCoy, 1999; Schoeneberger et al., Godlaski, 2006; Warner & Leukefeld, 2001) as well as with other national studies including the National Epidemiologic Survey on Alcohol and Related Conditions (Dawson et al., 2005) and the National Survey on Drug Use and Health (Wright, Sathe, & Spagnola, 2007). While more than one-fourth of the US population resides in rural areas, only 8.9% of all treatment facilities are located in rural counties that are not adjacent to an urban county (Lenardson & Gale, 2007). Treatment availability may be limited in rural areas because rural communities have difficulties recruiting and retaining health care professionals, including mental health care workers and counselors. These difficulties could be attributed to lower salaries, limited opportunities for continuing education, fewer resources, and longer hours (Robertson et al., 1997). Moreover, research suggests that outpatient substance abuse treatment services are limited in rural areas and rural counties have less specialized treatment services, smaller program budgets and fewer staff members (Bouffard & Smith 2005; Dempsey, Bird, & Hartley, 1999; Knudsen, Johnson, Roman, & Oser, 2003). Thus, limited substance abuse treatment availability could account for the low levels of service utilization.

When health services utilization was examined, all three components of a modified Behavioral Model were associated with the number of times substance abuse treatment services were utilized by rural drug users. According to the multivariate model, the predisposing characteristics of age and being male were positively related to the number of times a rural drug user received substance abuse treatment services. While it was expected that older participants would have participated in more treatment episodes, previous research suggests that females are less likely to utilize substance abuse treatment services (Booth & McLaughlin, 2000; McCance-Katz, Carroll, & Rounsaville, 1999; Westermeyer & Boedicker, 2000). The higher substance abuse treatment service utilization among male drug users in rural areas could be associated with more extensive drug use and/or criminal histories than females enrolled in this study.

Historical health factors played a significant role in the number of separate occasions a person entered a drug abuse treatment program. High rates of co-morbidity among

individuals with mental health problems and drug abuse problems are commonplace (Grant et al., 2004; Kessler et al., 1997). Thus, rural drug users who ever received mental health treatment would also be more likely to have more occasions entering a drug abuse treatment program. Oftentimes in rural areas, substance abuse services are only available in mental health care facilities (Lenardson & Gale, 2007). In addition, while the lifetime prevalence of court mandated treatment was quite low in this sample of rural drug users at 12%, it was positively associated with the number of times in treatment in the multivariate model. The drugs/crime nexus has been well-supported in previous studies (Belenko, 2001; Leukefeld, 1985; Leukefeld, Tims, & Farabee, 2002; Oser, Mooney, Staton-Tindall, & Leukefeld, 2009) and the majority of these rural drug users have a criminal history (Oser, Leukefeld, et al., 2009). Specifically, 71% have had police contact because of substance use, 87% have been arrested, and 79% have been convicted of a crime. While being court mandated to substance abuse treatment was the most robust correlate of multiple treatment episodes among rural drug users, additional efforts are needed to ensure that the majority of inmates are receiving needed substance abuse treatment during their involvement in the criminal justice system (Karberg & James, 2005; Mumola & Karberg, 2006; Oser, Knudsen, Staton-Tindall, Taxman & Leukefeld, 2009).

Only one potential enabling factor—communication with physicians - was a significant correlate of repeated substance abuse treatment episodes. Feeling comfortable talking with a doctor is an important issue that should be examined when trying to facilitate service utilization among rural drug users (Siegal, Draus, Carlson, Falck, & Wang, 2006). Perhaps, individuals residing in rural areas have an insular network of medical professionals that have provided care throughout their lives. These strong relationships could make rural drug users more comfortable disclosing their drug use problems to physicians; thereby, increasing their participation in formalized substance abuse treatment services.

Limitations

There are study limitations. Participants were not selected randomly but were recruited from only a few geographic areas; however, RDS increases the representativeness of the rural areas sampled after a moderate number of referral waves (Heckathorn, 2002; Wang et al., 2007). In addition, recall bias could occur because behaviors are self-reported. The self-reported nature of the data could also impact how truthful participants were, despite the voluntary nature of the study; nonetheless, there is research available on the validity of community-based substance user's self-report data on substance use (Harrison, Martin, Enev, & Harrington, 2007; Neale & Robertson, 2003) as well as on demographic characteristics, employment, and criminal behaviors (Johnson et al., 2000). This is a community-based study of active rural stimulant users which is a strength of the study; however, it can also be viewed as a weakness in relation to this paper. Specifically, participants were only eligible to participate if they self-reported stimulant use in the past 30 days and had not been in formal substance abuse treatment in the past 30 days. The dependent variable of interest is the number of separate lifetime occasions a person entered treatment. Thus, there is a 30 day gap in which the participant could not have been in treatment. It is possible that this is sample of participants who are not currently interested in receiving treatment; therefore, accounting for the overall low number of treatment episodes. In addition, there were no lifetime measures on the types of treatment received (e.g., inpatient, intensive outpatient, outpatient) which could impact the future need for treatment services or the primary drugs of abuse for which participants sought treatment.

The current study also utilized cross-sectional data to examine the correlates of substance abuse treatment utilization which includes several scales that were based on responses at the time of the interview; however, this is consistent with previous health services utilization studies (Padgett et al., 1990; Webster et al., 2005). Future research should examine the

predictive impact of Andersen's components on treatment utilization as well as cost and comparative rates of treatment coverage for different drugs.

Implications for Behavioral Health Services

The findings from this study of examining a health services utilization model for drug users in rural areas have clinical implications. Specifically, males were more likely to have participated in multiple substance abuse treatment episodes. This suggests the possibility of providing service outreach to female drug users in rural areas. It is also possible that women are adhering to traditional gender roles (e.g., housewife, primary caregiver) in rural areas, and therefore are unable to seek substance abuse treatment services because of household and/or childcare responsibilities.

All participants in this sample met DSM-IV criteria for lifetime substance dependence and while most had a history of criminal justice involvement, only 12% had been court mandated to treatment. Future research should continue exploring the criminal justice system as an avenue to link participants with needed substance abuse treatment services. In addition, the positive relationship between communication with medical doctors and substance abuse treatment utilization could call for increased efforts to help primary care providers in rural areas become more involved in referring drug users to substance abuse treatment.

In sum, there are few substance abuse treatment programs in rural areas (Simons, Oliver, Gaher, Ebel, & Brummels, 2005) where there is substantial need (Rawson, Huber, et al., 2002). The lack of available treatment services is compounded by the recent increases in the number of incarcerated drug offenders (Mumola & Karberg, 2006) and the high number of incarcerated individuals meeting DSM-IV substance abuse or dependence criteria (Karberg & James, 2005). This study suggests that rural stimulant users have a myriad of substance use and related problems and may be in need of multiple substance abuse treatment episodes. For example, recent national estimates indicate that the methamphetamine use cost burden in 2005 was about \$23.4 billion, with 70% of the costs represented by intangible health burdens associated with being addicted and premature mortality (Nicosia, Pacula, Kilmer, Lundberg, & Chiesa, 2009). According to cost-effectiveness studies (see Meara & Frank, 2005 for overview), substance abuse treatment can produce substantial societal savings with the reduction in associated long-term health care costs and decreases in crime (Leukefeld et al., 1998). While the overall modified Andersen (1968, 1995) model identified several correlates of multiple treatment episodes, additional research should explore the impact of the rural health care delivery system and characteristics of the external rural environment associated of substance abuse treatment for rural drug users.

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Appendix A

Likert scale for all items:

1. = Strongly disagree
2. = Disagree
3. = Neutral
4. = Agree
5. = Strongly agree

Non-Drug Using Social Support Scale

- There are people I can have a good time with.
- There is someone I can talk to about important decisions in my life.
- There are people who recognize my abilities.
- There are people who show they love or care for me.
- There are people who I can count on in an emergency.

Treatment Perceptions Scale

- A person who is in need of drug abuse treatment services can get them in this community.
- The drug abuse treatment services available in this community are effective.

Communication with Medical Doctor Scale

- I feel comfortable talking to a medical doctor about my drug use.
- My medical doctor knows that I use drugs.
- I have talked with a medical doctor about my drug use.

Stigmatization Scale

- I have a bad reputation in the community.
- It is difficult for me to hide my drug use from others in the community.
- Everyone in town knows that I am a drug user.
- I am worried about being identified in the community as a user of illegal drugs.
- Worrying about being identified in the community as a drug user keeps me from seeking medical care.
- Worrying about being identified in the community as a drug user keeps me from seeking help at a drug abuse treatment program.
- One thing that keeps me from going to a drug abuse treatment program is that everyone in town would find out that I am a drug user.

Table 1

Predisposing Factors, Historical Health Factors, Potential Enabling Factors, and Current Illness Level Factors among Rural Drug Users (n=620)

	%/Mean (Standard Deviation)	Range
<i>Predisposing Factors</i>		
Age	32.73 (10.24)	18.00–61.00
% Male	62.00%	
% White	68.00%	
% Single	48.00%	
% High School Degree	58.00%	
<i>Historical Health Factors</i>		
% Ever Received Mental Health Treatment	41.00%	
% Ever Court Mandated to Treatment	12.00%	
<i>Potential Enabling Factors</i>		
Non-Drug Using Social Support Scale	15.97 (3.14)	5.00–20.00
Treatment Perceptions Scale	5.75 (2.13)	2.00–10.00
Communication w/Medical Doctor Scale	7.49 (2.92)	3.00–15.00
Stigmatization Scale	17.44 (4.73)	7.00–35.00

Table 2

Substance Use History among Rural Drug Users (n=620)

	%/Mean (Standard Deviation)
<i>% Ever Used</i>	
Alcohol	98.00
Marijuana	98.00
Crack	83.00
Powder Cocaine	87.00
Pharmaceutical Methamphetamine	15.00
Non-Pharmaceutical Methamphetamine	65.00
Amphetamines	52.00
Heroin	25.00
Non-Prescription Painkillers	71.00
Tranquilizers	57.00
<i>Number of Days Used in Last 30 Days</i>	
Alcohol	11.00 (11.04)
Marijuana	14.09 (12.13)
Crack	7.48 (9.75)
Powder Cocaine	4.23 (7.47)
Pharmaceutical Methamphetamine	.11 (1.26)
Non-Pharmaceutical Methamphetamine	3.80 (7.22)
Amphetamines	1.23 (4.59)
Heroin	.91 (4.42)
Non-Prescription Painkillers	5.06 (8.59)
Tranquilizers	2.32 (5.65)
<i>Age of First Use (Users Only)</i>	
Alcohol	14.30 (3.80)
Marijuana	14.62 (3.81)
Crack	24.53 (8.41)
Powder Cocaine	20.87 (6.86)
Pharmaceutical Methamphetamine	21.33 (6.19)
Non-Pharmaceutical Methamphetamine	22.94 (8.49)
Amphetamines	18.56 (5.40)
Heroin	23.45 (7.03)
Non-Prescription Painkillers	19.45 (7.30)
Tranquilizers	19.65 (6.87)

Table 3

Substance Abuse Treatment History among Rural Drug Users (n=620)

	%/Mean (Standard Deviation)
<i>Treatment in Lifetime</i>	
Average Number of Times in Treatment (Range 0–20)	1.24 (2.03)
Ever Received Treatment in Rural County of Residence	72.00%
Number of Treatment Episodes:	
0	51.00%
1	20.00%
2	12.00%
3	8.00%
4 to 7	8.00%
8 or more	1.00%
<i>Treatment in Past 3 Years</i>	
% Participated in Treatment	21.00%
% Made a Serious Effort to Get into Treatment	12.00%
<i>Self-Help</i>	
% Attended Self Help Group in Lifetime	52.00%
% Attended Self Help Group in Past 12 Months	16.00%

Table 4

Negative Binomial Coefficients from the Regression of the Number of Separate Occasions a Person Entered a Drug Abuse Treatment Program on Predisposing Factors, Historical Health Factors, and Potential Enabling Factors (n=608)

	B	s.e.	IRR
<i>Predisposing Factors</i>			
Age	.03***	.01	1.03
Male	.31*	.13	1.36
White	.03	.14	1.03
Single	.02	.14	1.02
High School Degree	.07	.12	1.07
<i>Historical Health Factors</i>			
Ever Received Mental Health Treatment	.42***	.12	1.53
Ever Court Mandated Treatment	1.02***	.16	2.77
<i>Potential Enabling Factors</i>			
Non-Drug Using Social Support Scale	-.01	.02	.99
Treatment Perceptions Scale	.02	.03	1.02
Communication with Medical Doctor Scale	.07***	.02	1.07
Stigmatization Scale	.02	.01	1.02
Model χ^2			108.52***
Pseudo R ²			.06

Note:

p<.001,

**
p<.01,

*
p<.05 (two-tailed significance test)