Treatment Outcomes for Prescription Drug Misusers: The Negative Effect of Geographic Discordance

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Abstract

This is the first known study to examine geographic discordance (traveling from one's home residence to a county with a different socio-cultural context to receive substance abuse treatment) as a predictor of clinical and social functioning treatment outcomes (i.e., relapse, self-help attendance, anxiety, and incarceration) among a sample of prescription drug misusers. Treatment entry and 12-month follow-up client-level survey data was collected from 187 clients who misused prescription drugs, and center-level survey data was collected from the supervisors at treatment centers attended by the clients. Multivariate models reveal that geographic discordance significantly increased the odds that prescription drug misusers would report relapse to prescription opioid misuse, anxiety, and any incarceration at follow-up. Moreover, geographically discordant clients were significantly less likely to have attended a self-help group, net of the effect of other individual- and center-level factors. Implications for clinical practice and substance abuse treatment policy are provided.

Keywords

Geographic Discordance; Prescription Drug Misuse; Treatment Outcomes; Rural

1. Introduction

The predominantly rural state of Kentucky has a high prevalence of prescription drug misuse, especially opioids, that can be tied to therapeutic availability due to occupations such as coal mining/physical labor, high rates of disability due to chronic pain, economic deprivation, and a cultural acceptance of drug misuse (Cicero, Surratt, Inciardi, & Munoz, 2007; Havens et al., 2013; Keyes, Cerda, Brady, Havens, & Galea, 2014; Leukefeld, Walker, Havens, & Leedham, 2007; Oser, Harp, O'Connell, Martin, & Leukefeld, 2012). The need to travel lengthy distances to receive treatment has been cited as a rural barrier to

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treatment entry and positive treatment outcomes by both health care providers (Brems, Johnson, Warner, & Roberts, 2006; Pullen & Oser, 2014) and clients (Fortney, Booth, Blow, Bunn, & Cook, 1995; Schmitt, Phibbs, & Piette, 2003; Schoeneberger, Leukefeld, Hiller, & Godlaski, 2006). This study examines the effect of geographic discordance -having to travel to a county with a different socio-cultural context to receive treatment for a substance use disorder (SUD) – on treatment outcomes. An example of geographic discordance is when a prescription drug misuser from a rural county travels to a suburban or urban county for treatment. Geographic discordance is a novel concept because it is not purely a measure of having to travel for services; rather, it encompasses receiving treatment in a county with a different socio-cultural context as rural, suburban, and urban counties have varying norms, values, communication styles, and access to resources which may influence treatment outcomes. This study makes a unique contribution to the literature by examining the effect of geographic discordance on prescription drug misusing clients' treatment outcomes, while controlling for client characteristics and treatment center factors.

1.1. Treatment outcomes: The effect of client characteristics and treatment center factors

Both client characteristics and treatment center factors may influence treatment outcomes. A meta-analysis demonstrated that certain socio-demographic characteristics of clients improve clinical and social functioning treatment outcomes (Prendergast, Podus, Chang, & Urada, 2002). For example, age is a positive predictor (Heinrich & Fournier, 2005; McFarland, Dec, McCamant, Gabriel, & Bigelow, 2005) and drug use severity is a negative predictor of successful treatment outcomes (Hser, Anglin, & Fletcher, 1998; McFarland et al., 2005). Also, socio-economic status (e.g., employment and/or income) has a positive relationship with desired treatment outcomes (Heinrich & Fournier, 2005; Mankowski, Humphreys, & Moos, 2001; McFarland et al., 2005).

Despite ample research on individual-level predictors of successful treatment outcomes, few studies have simultaneously examined the effect of both client characteristics and treatment center characteristics on client outcomes. Two federally funded repeated interview evaluation studies of substance abuse treatment services have shed light on this relationship. Both the National Treatment Improvement Evaluation Study (NTIES; see Gerstein et al., 1997, Gerstein & Johnson, 2000) and the Drug Abuse Treatment Outcomes Study (DATOS; see Flynn, Craddock, Hubbard, Anderson, & Etheridge, 1997 for methodology; see Simpson & Curry, 1997 and Simpson, 2003 for major findings) collected baseline and follow-up data from clients nested within treatment organizations. In NTIES, clients who received treatment at larger organizations were more likely to be abstinent and had better social functioning (operationalized as employment) (Heinrich & Fournier, 2005). Concerning the levels of care provided, findings from NTIES and DATOS demonstrated a strong empirical link between longer length of stay and better treatment outcomes (Heinrich & Fournier, 2004, 2005; Hubbard, Craddock, & Anderson, 2003; Simpson, 2001; Zarkin, Dunlap, Bray, & Wechsberg, 2002). While these large-scale studies substantially contributed to the understanding of differential treatment outcomes, they only focused on large urban-based programs. It is unclear if conclusions from these studies can be applied to clients who have received treatment in rural areas with limited resources, more unstable treatment organizations, and a unique geographical context (Hiller et al., 2007; Warner & Leukefeld,

2001). Nor has it been examined how traveling to a county with a different socio-cultural context for SUD treatment – also known as geographic discordance – affects substance abuse treatment outcomes.

1.2. Treatment outcomes: The effect of geographic discordance

The existing research on geography in the behavioral health services literature has primarily examined the relationship between travel distance and treatment retention (Fortney et al., 1995; Schmitt et al., 2003). This is the first known study to examine geographic discordance which could be a risk factor for relapse and other social functioning problems. Receiving treatment in a county with a different socio-cultural context may negatively impact the client-counselor therapeutic alliance which is problematic as a strong alliance is associated with better treatment outcomes (Meier, Barrowclough, & Donmall, 2005; Simpson, Joe, Rowan-Szal, & Greener, 1997). For example, a rural client may not feel comfortable, bond, or develop trust with an "outsider," such as a counselor from an urban county, because they may have different socio-cultural frames of reference. Rural residents often place great emphasis on self-reliance, are distrusting of outsiders, and are suspicious of behavioral health services (Booth & McLaughlin, 2000; Brems et al., 2006; Oser et al., 2011). Rural clients also face additional structural barriers including underdeveloped public transportation systems and relative isolation (Leukefeld et al., 2003; Oser et al., 2011) that may not be understood by an urban or suburban counselor.

According to the National Institute on Drug Abuse's Principles of Drug Addiction Treatment guidelines (NIDA, 2012), linkages to social support networks, continuing care, and other services are crucial in producing successful outcomes. Prescription drug misusers receiving treatment outside their geographic locale may be less likely to be referred to self-help groups or receive linkages to needed continuing care services such as mental health treatment, as treatment staff may be unfamiliar with resources in the client's home county. Due to managed care stipulations, large caseloads, and increasing amounts of paperwork (Oser, Pullen, Biebel, & Harp, 2013), counselors may not be able to allocate time to finding resources for clients that are returning to a different county. Thus, moving beyond travel to examine how geographic discordance influences treatment outcomes is needed to guide future studies and inform clinical practice and policy.

Geographic context, including geographic discordance, is a crucial yet often overlooked variable in substance abuse research (Borders & Booth, 2007; Jacobson, 2004; Oser et al., 2011). This study makes several contributions to the literature including: (1) it is the first known study to focus on prescription drug misusers' treatment outcomes, (2) it predicts numerous measures of both clinical and social functioning treatment outcomes, (3) it includes both client-level and treatment center data, and (4) it examines the unique effect of geographic discordance on treatment outcomes, net of the effects of client-level and treatment center factors. It is hypothesized that geographically discordant prescription drug misusers will be more likely to relapse, to report anxiety, to be incarcerated, and less likely to participate in self-help groups at 12-months post-baseline.

2. Materials and methods

2.1. Sample

Data came from two distinct but related studies conducted between 2010 and 2012. First, client data were collected on personal digital assistants from all clients entering publicly funded substance abuse treatment, as part of the Kentucky Treatment Outcome Study (KTOS). Consenting records were sampled for participation in follow-up interviews 12-months after treatment and were stratified by gender and state region. An outside research team (to maintain client confidentiality) conducted 1,277 follow-up telephone interviews (76% follow-up rate). KTOS collected data on clients' socio-demographics, employment status, criminal involvement, substance use, medical history, and treatment utilization. Clients received $20 for participation in the follow-up (for more details on the KTOS methodology see Cole, Logan, Scrivner, & Stevenson, 2013). Second, treatment center data were derived from the Rural/Urban Treatment Outcome Study (RUTOS). Using the tailored design method for mail surveys (Dillman, Smyth, & Christian, 2008), RUTOS staff mailed self-administered surveys to the 49 publicly funded treatment centers in Kentucky, resulting in a 59% response rate which is consistent with similar studies (Gerstein & Johnson, 2000). RUTOS collected center data on location, levels of care offered, average daily client census, and staff characteristics. Supervisors received $50 for their time.

Both studies were approved by the Institutional Review Board at the University of Kentucky. To merge the two datasets, client-level KTOS data were nested within the organizational-level RUTOS data. After dropping observations missing client or center data, the sample size was 317 clients. In order to examine only prescription drug misusers, clients reporting no prescription drug misuse at baseline were excluded. The final sample is comprised of baseline and follow-up data for 187 clients who had misused prescription drugs, nested within twelve treatment centers.

2.2.Measures

2.2.1. Geographic locale: creating discordance—Rural-urban continuum codes (RUCCs) were used to classify both the treatment center county and the client's home county as rural, suburban, or urban. RUCCs designate counties on a scale of one to nine based on population size, adjacency to a metropolitan area, and degree of urbanization (USDA Economic Research Service, 2003). Often counties with a RUCC of one, two, or three are classified as metropolitan/urban and RUCCs of four or higher are classified as non-metropolitan/rural. For this study, differences in client-level data were more idiosyncratic, rendering a simple rural versus urban distinction inadequate for capturing substantive differences among the clients in the sample. Specifically, clients from counties with RUCCs between two and five (no clients from counties with a RUCC of six) differed significantly from those in counties with RUCCs of seven to nine, as well as those with a RUCC of one. Thus, counties were labeled as rural (RUCC = 7-9), suburban (RUCC = 2-5), or urban (RUCC = 1). To determine if the client's home residence was in the same geographic locale as the treatment center they attended (i.e., concordance), or not (i.e., discordance), RUCCs were compared. Clients who received treatment in a geographic locale different from that of their home residence were labeled "discordant," while those whose home residence and

treatment center were in the same geographic locale were labeled "concordant" (discordant=1; concordant=0).

2.2.2. Center-level predictors & client-level predictors (baseline)—For the purposes of this study, two center characteristics were aggregated down to the client level and analyzed: the provision of residential treatment and the average daily census. First, centers offering a residential level of care were coded "1" (no residential care=0), but it should be noted that the level of care received by the client was not reported in KTOS. Second, average daily census was created by summing the average number of clients per day in each level of care offered at a center.

At the client-level, demographic variables included baseline measures of age in years, gender (female=1; male=0), race (white=1; non-white=0), education (high school diploma/ GED=1; <12 years of education=0), marital status (married=1; other=0), and employment (currently employed full/part-time=1; other=0). Clients were asked about eight economic hardships in the past year derived from a modified version of the 1996 Survey of Income and Program Participation (She & Livermore, 2007), which ranges from zero (no economic hardships) to eight (experienced all eight). Examples of economic hardships included difficulty paying rent/mortgage and not having enough food. Clients were also asked if they had ever injected drugs before treatment (yes=1; no=0).

2.2.3. Treatment outcome dependent variables—A variety of clinical and social functioning treatment outcomes were examined at the 12-month follow-up including drug use, self-help group attendance, anxiety, and incarceration. To measure substance use categories, clients were asked at both baseline and follow-up if they had used a variety of drugs in the past year. Five dichotomous dependent variables (yes=1; no=0) were examined including: prescription opioid misuse (e.g., oxycodone, Percocet), buprenorphine misuse, methadone misuse, prescription benzodiazepine misuse (e.g., Xanax, Valium), and a variable indicating use of any other illegal drugs not included in the previous four categories (e.g., cocaine, marijuana). It should be noted that buprenorphine and methadone are medications successfully used in the treatment of opioid dependence; however, this study is focusing on misuse of buprenorphine and methadone (e.g., diverted, not prescribed). As such, these items only measure non-medical use of prescription drugs, or drugs not legally prescribed to the user.

Clients were asked at both waves if they attended any self-help group meetings such as Alcoholics Anonymous and Narcotics Anonymous (AA/NA) in the past month (yes=1; no=0). Anxiety was assessed at both waves by an item asking clients if, within the past year, they experienced a period lasting six months or longer where they worried excessively or were anxious about multiple things on more days than not (e.g., family, health, finance) (yes=1; no=0). This measure comprises part of the DSM-IV TR diagnostic criteria for Generalized Anxiety Disorder, however, KTOS did not assess the additional criteria necessary to make a broader diagnosis. Also, clients were asked at both waves how many nights in the past year they had been incarcerated. This was re-coded into a dichotomous variable (any incarceration=1; none=0). The authors chose to use the dichotomous measure so that all eight models could be estimated using logistic regression.

2.3 Analytic strategy

Descriptive statistics were examined for all of the variables of interest. To illustrate how concordance and discordance were categorized, frequencies were run for each of the six scenarios. Next, to compare rural, suburban, and urban clients and treatment centers, frequencies were run for each of the key study variables by geographic locale. Chi-square analyses and ANOVAs were used to determine if between-group differences were statistically significant. The Tukey-Kramer test was used to specify which pairs differed significantly on a given variable without inflating the Type I error rate. This test is ideal for determining the critical difference between means when group sizes are unequal, as was the case with this data (Kirk, 2012). Next, each dependent variable of interest (prescription opioid misuse, buprenorphine misuse, methadone misuse, benzodiazepine misuse, other illegal drug use, self-help meeting attendance, anxiety, and incarceration) was included in a correlation matrix with the other descriptive variables (results not shown). Variables significantly correlated with any dependent variable were included in the multivariate models. These independent baseline variables include geographic discordance, offering a residential level of care, average daily census for treatment center, age, any injection drug use (IDU), and economic hardship.

Logistic regression models were used to analyze how geographic discordance influenced each of the eight dichotomous treatment outcomes at follow-up, controlling for client- and center-level characteristics. Baseline reports for each of the dependent variables were included as a control in each model (e.g., in Model 1, prescription opioid misuse at follow-up is the dependent variable and baseline prescription opioid misuse is an independent variable). Because center-level characteristics were aggregated down to the individual level, cluster robust errors were estimated in each of the regression models. This method is ideal because it indicates that client-level data are clustered within centers so while client-level data may be correlated within a treatment center, it remains independent between different treatment centers (Rabe-Hesketh & Skrondal, 2012).

3. Results

Descriptive statistics for the entire sample of prescription drug misusers (n=187) as well as frequencies for each of the six geographic concordance/discordance categories are reported in Table 1. Nearly 90% of clients received treatment at a center that offered a residential level of care. Clients attended treatment at centers with an average daily census of 104.3 clients and the average client was about thirty years old. The majority of clients were white (93.6%) females (57.2%) with a high school diploma/GED (71.1%). Marriage and employment rates were both 16%. Clients reported an average of 2.8 economic hardships in the past year, with the most commonly cited problem being an inability to see a dentist (50.3%).

Baseline rates of substance misuse were highest for prescription opioids (88.8%), prescription benzodiazepines (63.1%), and "other" drugs (75.5%). Buprenorphine and methadone misuse were around 30%, and nearly a third of clients reported IDU (32.6%). Misuse rates for all drugs were lower at follow-up. Rates of methadone misuse were not only lowest at follow-up (10.2%), but underwent the biggest proportional drop over time

(down 66.1%). Rates of prescription opioid and "other" drug misuse were highest at follow-up (42.8% and 42.3%, respectively), and rates of IDU dropped more than 50% between the two waves. Concerning the other variables of interest, while just over a third of the clients reported any past month AA/NA meeting attendance at baseline (33.7%), 61% reported meeting attendance at follow-up. Anxiety was high at both waves, and increased between waves from 56.7% to 67.4%. And, while 57.8% of clients had been incarcerated in the past year at baseline, 39% reported incarceration at follow-up (a 32.5% reduction).

Concerning frequencies for the different categories of concordance and discordance, geographic concordance was more common than discordance. Over 50% of clients reported living, as well as receiving treatment in, an urban area. When clients did experience discordance, the most common scenario was living in a rural area and receiving treatment in a suburban or urban area.

The results of bivariate analyses based on clients' geographic residence are reported in Table 2. Clients from rural areas were significantly more likely than suburban or urban clients to receive treatment in a county with a different socio-cultural context (24.5% vs. 8.1% and 1.0%, respectively, $p<.001$). Treatment center characteristics also differed between the three groups. All urban residents received treatment at a center offering residential care, compared to 67.9% of rural clients ($p<.001$). Urban clients also received care at larger facilities (146.9), compared to centers where rural (69.9) and suburban (41.7) clients received treatment ($p<.001$). The only differences in the sociodemographics of prescription drug misusing clients were that rural clients were more likely to be married than urban clients (26.4% vs. 10.3%, respectively; $p<.05$), while urban clients reported significantly more past year economic hardships (3.2) than rural clients (2.0; $p<.05$). Concerning prescription drug misuse, suburban clients were more likely to report buprenorphine misuse at baseline (46.0%) compared to urban clients (22.7%; $p<.01$). Additionally, urban clients were significantly more likely than rural and suburban clients to report "other" drug use at both baseline (83.5% vs. 66.0% and 78.4%, respectively; $p<.05$) and follow-up (52.6% vs. 26.4% and 37.8%, respectively; $p<.01$). Lastly, urban clients were more likely than rural clients to report experiencing anxiety at baseline (68.0% vs. 30.2%; $p<.001$), while rural clients were more likely than urban clients to report any past year incarceration at baseline (79.3% vs. 41.2%; $p<.001$). This trend changes at follow up as suburban clients are significantly more likely than urban clients to report any past year incarceration (51.4% vs. 29.9%; $p<.05$).

Table 3 displays logistic regression results for models with substance use treatment outcome variables. Overall, being older reduces the odds of all types of drug misuse at follow-up, except Methadone misuse in Model 3. Baseline injection drug use increases the likelihood of relapse to all types of drug misuse, except prescription benzodiazepine misuse in Model 4. Likewise, baseline misuse of any of the five drug categories significantly increases the odds of misusing that drug at follow-up. Geographic discordance only significantly predicted relapse to one drug category – prescription opioid misuse. As displayed in Model 1, clients who traveled to receive treatment in a county with a different socio-cultural context were three times more likely to relapse to prescription opioid misuse at follow-up, as compared to their geographically concordant counterparts ($p<.05$).

In addition to examining geographic discordance as a relapse predictor, it was also examined as a predictor of social functioning treatment outcomes and was significant in all three multivariate models. Results for Model 6 in Table 4 indicate that clients who experienced geographic discordance were 60% less likely to report attending any self-help groups in the past month at follow-up (p<.01), while receiving treatment at a center that offered residential care increases the odds of past month AA/NA meeting attendance more than four times (p<.01). Also, being older reduces the odds of attending AA/NA (p<.05), while any past month AA/NA attendance at baseline increases the odds of attendance at follow-up (IRR=1.7; p<.01). In Model 7, clients who experienced geographic discordance were nearly five times as likely to report experiencing anxiety, compared to those with concordant home and treatment center locations (p<.01). Other factors increasing the odds of anxiety one year after treatment entry were attending treatment where a residential level of care was offered (IRR=2.3; p<.01), being older (IRR=1.2; p<.05), and reporting anxiety at baseline (IRR=3.0; p<.001). In contrast, prescription drug misusers who reported IDU (IRR=0.6; p<.05) and who received treatment at larger centers (IRR=0.9; p<.05) were less likely to experience anxiety at follow-up. Model 8 reveals that experiencing geographic discordance increases the odds of incarceration at follow-up by a factor of 2.3 (p<.05), and any baseline incarceration increases the odds by a factor of 3.4 (p<.01). Finally, being older (IRR=0.9; p<.01) and experiencing more economic hardships (IRR=0.9; p<.001) decreases the odds of incarceration at follow-up.

4. Discussion

Disparities in substance abuse treatment outcomes based on geographic context have received little empirical attention (Borders & Booth, 2007; Jacobson, 2004; Oser et al., 2011), which is likely due to methodological challenges in study design (including adequate recruitment to ensure appropriate statistical power) and socio-cultural or environmental barriers in less densely populated areas (e.g., mistrust of outsiders, stigma, travel). Despite these challenges, examining geographic context is critical as research has shown rural and urban differences in drugs of choice, drug availability, cultural influences, treatment availability, treatment utilization, the provision of services within treatment centers, and treatment retention (Keyes et al., 2014; Knudsen, Johnson, Roman, & Oser, 2003; Lenardson & Gale, 2007; Metsch & McCoy, 1999; Oser et al., 2012; SAMSHA, 2011, 2012, 2013a; Schoeneberger et al., 2006; Shannon, Perkins, & Neal, 2014; Warner & Leukefeld, 2001). Similar to research noted above, this study found that geographical discordance varied significantly by geographic region, with 24% of rural clients being categorized as discordant, compared to 8% and 1% of suburban and urban clients, respectively. Therefore, geographic discordance was primarily an issue faced by rural prescription drug misusers as they not only had to travel to receive treatment for their SUD, but they received clinical care in a county with an unfamiliar socio-cultural context. This study expands upon the existing SUD treatment literature by focusing on geographic discordance as a predictor of treatment outcomes for prescription drug misusers, while controlling for client characteristics and treatment center factors.

4.1. Geographic discordance and prescription drug misusers' treatment outcomes

In the multivariate models, receiving treatment in a county with a different socio-cultural context had a negative effect on clients' relapse to prescription opioid misuse and all social functioning treatment outcomes, supporting its robustness as a predictor. Relapse to prescription opioid misuse is particularly problematic as rates of prescription opioid misuse are on the rise nationally (Compton & Volkow, 2006), are more prevalent in less densely populated regions (SAMHSA, 2013), and are a significant public health concern due to the increases in dependence, emergency department visits, and unintentional overdose deaths (Blanco et al., 2002; Keyes et al., 2014; NIDA, 2011; Paulozzi & Ryan, 2006). Moreover, holistic approaches that are individually tailored to meet all of the client's needs - not just the SUD - are important, and continuing care produces the best treatment outcomes for most clients (NIDA, 2012). Geographically discordant clients likely have less access to needed social supports and services to assist in recovery efforts. Therefore, possible explanations for prescription opioid relapse and poor social functioning treatment outcomes as a result of geographic discordance can be explained using Penchasky and Thomas's (1981) five dimensions of access to health services: acceptability, availability, accessibility, affordability, and accommodation. The proceeding discussion is framed from a rural client perspective as the majority of geographic discordance occurred among rural clients.

The lack of acceptable substance abuse treatment in some rural counties may lead prescription drug misusers to seek treatment outside of their geographic region in an effort to receive care at a center with a better reputation or to protect anonymity and reduce the potential for stigma within their home county. Research has found that stigma and cultural values of strength and resilience in rural areas have prevented substance abuse treatment utilization (Booth & McLaughlin, 2000; Brems et al., 2006; Fortney et al., 2004). It is likely that stigma would also inhibit the use of other continuing care resources, like attendance at self-help meetings, in rural areas. Moreover, availability is a barrier to self-help group participation in rural areas (Oser et al., 2012) because even if self-help groups exist in a rural county, the county may be less likely to have multiple weekly meetings at various times of day or to incorporate various formats to fit recovering individuals' needs. This is important as self-help group participation significantly reduces relapse (Beattie, 2001; Hunter-Reel, McCrady, & Hildebrant, 2009). It is likely that limited availability is a barrier to the use of other health and social services that may support sustained recovery and improve social functioning (e.g., employment resources, dental, mental health or HIV services).

Prescription drug users who are not natives of the geographic region where they received treatment may also face particular accessibility and affordability challenges. Both accessibility and affordability are noted as barriers to continuing care services for rural drug users (Brems et al., 2006; Fortney et al. 1995; Schmitt et al., 2003; Staton-Tindall et al., 2011). Accessibility for continuing care services may be inhibited by the lack of a public transportation infrastructure in rural areas (Leukefeld et al., 2003) as well as client factors including not having a valid driver's license, access to an automobile, or reliable persons to provide transportation (Oser et al., 2013). Moreover, affordability is a barrier due to the additional costs for both transportation and the provision of needed healthcare services (e.g., continuing care for a co-morbid mental health issue). Finally, treatment staff may be unable

to accommodate the individual needs of their discordant clients because they are unaware of the resources, community based organizations, and recovery support networks in the client's home county and lack the time or resources to find this information due to bureaucratic managed care requirements and budgetary constraints (Oser et al., 2013). After treatment, discordant clients returning home may lose positive social support networks developed while in treatment (e.g., therapeutic relationships with counselors or other clients) that could assist them in maintaining sobriety and reducing involvement in crime.

Future research is needed to examine the specific processes through which geographic discordance negatively affects desired treatment outcomes. While travel barriers and access to needed social supports and services to assist in recovery efforts are plausible explanations, additional research could provide a better understanding of the cultural milieu in substance abuse treatment centers that serve geographically discordant clients. It is possible that rural clients receiving treatment in non-rural counties are not receiving adequate care because they may not have fully expressed their wraparound service needs to their counselors due to strong cultural beliefs of self-reliance (Booth & McLaughlin, 2000; Brems et al., 2006; Fortney et al., 2004). Cultural competency could also be an issue affecting service delivery as substance abuse treatment counselors may not be aware or recognize the entire gamut of needs of a client from a different socio-cultural context (Straussner, 2001). Furthermore, additional qualitative research could shed light on how the group dynamic of people from differing socio-cultural contexts who are in treatment together affect treatment outcomes. Social support is a critical component of the recovery process and having peers in treatment together from different socio-cultural contexts may negatively impact treatment outcomes of clients from the minority cultures.

4.2. Limitations

This study is not without limitations. Secondary data analyses limited the availability of certain measures, but future research examining geographic discordance should measure specific distance traveled to receive treatment, cultural characteristics of clients as compared to other clients in treatment, treatment plan completion, level of care received, length of stay, drug use severity, drug of choice, if the client is seeking prescriptions from multiple prescribers simultaneously, and income. This study is also subject to self-report bias; however, research has found that self-reported drug use is a valid measure of drug use in drug using samples (Darke, 1998; Kokkevi, Richardson, Palermou, & Leventakou, 1997).

Another limitation was the loss of data when merging the two datasets. While baseline and follow-up data were available for 317 eligible clients and 29 treatment centers, the final analyses included only 187 clients from 12 treatment centers after dropping observations missing either level of data or for clients who reported no prescription medication misuse. Additionally, multi-level modeling was not feasible due to the limited sample size available (i.e., the small number of treatment centers for which there were also two waves of client-level data) resulting in statistical power issues. While a logistic regression with clustered robust errors is an appropriate strategy for analyzing these data, future research would ideally have adequate power to examine these questions using multi-level modeling. Lastly, while these findings may be generalizable to other prescription drug misusers in publicly

funded centers, they may not carry over to clients receiving treatment in other sectors such as private treatment or veterans affairs. Despite these limitations, this study significantly contributes to the substance abuse literature as geographic discordance is a promising area of research.

4.3. Implications for clinical practice and substance abuse treatment policy

The costs of substance abuse exceed $600 billion annually in the U.S., but treatment for SUDs significantly reduces costs associated with crime and health care (NIDA, 2012). As geographic discordance negatively affected prescription drug misusers' relapse to prescription opioid misuse and social functioning treatment outcomes, it is important to translate these findings in an effort to improve clinical practice and policy as well as reduce societal costs. A clinical practice recommendation is for treatment counselors to incorporate the use of intensive referral interventions for all clients, but especially discordant clients, as they have demonstrated efficacy (Timko & DeBenedetti, 2007). Intensive referral interventions are conscious efforts to educate clients on the benefits of self-help groups, facilitate attendance, and follow-up to ensure the continuity of a recovery-support network. Moreover, McKay (2000) calls for the use of alternative service delivery sites and methods to increase the use of continuing care, which may be particularly relevant for rural clients facing access and stigma issues. Geographically discordant clients who are resuming real-world activities after receiving services in a county with a different socio-cultural context could greatly benefit from clinical practices that increase continuing care.

This study also found that the majority of discordant clients resided in rural counties. Traveling from one's home residence to a county with a different socio-cultural context to receive treatment is likely a function of limited treatment availability in rural areas (SAMSHA 2011, 2012). It is promising that there will be an increase in treatment availability in the future, especially in rural areas, as a result of the Patient Protection and Affordable Care Act (ACA) that was signed into law in 2010, and that substance abuse treatment services will be covered by insurance companies in a similar fashion to other healthcare services. Between 2008-2012, Kentucky experienced drastic increases in the number of clients receiving methadone or buprenorphine as part of their treatment plan (SAMSHA, 2013c) and continuation of this trend is promising with the ACA legislation. Kentucky was one of the first states in the U.S. to expand Medicaid and the ACA has the potential to expand coverage to 647,000 uninsured Kentuckians (Kaiser Family Foundation, 2014). Thus, increased substance abuse treatment availability, including additional methadone clinics and buprenorphine certified physicians, may reduce the prevalence of geographic discordance and its subsequent costly negative outcomes.

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Highlights

*Geographic discordance is receiving therapy in an unfamiliar socio-cultural context.

*Most discordant clients live in rural counties and get therapy in non-rural counties.

*Discordant clients are more likely to report relapse, anxiety, and incarceration at follow-up.

*Discordant clients are less likely to attend self-help groups at follow-up.

*Negative effect of discordance on outcomes is explained by limited service access.

Table 1

Descriptive statistics for all respondents in sample (*n*=187)

	Mean or %	
	Baseline	**Follow-up**
Treatment Center Characteristics		
Offers a residential level of care	89.9%	
Average daily census of treatment center (range: 0 – 164 clients)	104.3	
Sociodemographics		
Age (range: 18 – 58)	30.8	
Female	57.2%	
White	93.6%	
High School Diploma	71.1%	
Married	16.0%	
Employed full/part-time	16.0%	
Economic hardship in past year (range: 0 - 8)	2.8	
Past Year Substance Misuse (any)		
Prescription opioids	88.8%	42.8%
Buprenorphine	32.1%	18.2%
Methadone	30.0%	10.2%
Prescription benzodiazepines	63.1%	31.6%
All other drugs	75.5%	42.3%
Injection drug use (IDU)	32.6%	16.0%
Past Month Self-Help Group Attendance		
Any AA/NA meeting	33.7%	61.0%
Past Year Mental Health		
Reported anxiety	56.7%	67.4%
Past Year Criminal Justice System Involvement		
Any incarceration	57.8%	39.0%
Geographic Concordance		
Respondent and treatment location both rural	40 (21.4%)	
Respondent and treatment location both suburban	34 (18.2%)	
Respondent and treatment location both urban	96 (51.3%)	
Geographic Discordance		
Respondent residence rural : treatment location suburban or urban	13 (7.0%)	
Respondent residence suburban : treatment location rural or urban	3 (1.6%)	
Respondent residence urban : treatment location rural or suburban	1 (0.1%)	

[1] Percentages do not equal 100% due to rounding

Table 2

Bivariate analyses by client's geographical residence region (n=187)

	Rural	Suburban	Urban	
	n=53	n=37	n=97	
	Mean/%	Mean/%	Mean/%	*p*
Percent of sample	28.3%	19.8%	51.9%	
Geographic discordance	24.5%	8.1%	1.0%	<.001
Treatment Center Characteristics				
Offers a residential level of care	67.9%	94.6%	100.0%	<.001
Average daily census of treatment center	69.9	41.7	146.9	<.001
Socio-demographics				
Age	30.7	28.4	31.8	.121
Female	54.7%	62.2%	56.7%	.773
White	96.2%	89.2%	93.8%	.404
High School Diploma	73.6%	78.4%	67.0%	.386
Married	26.4%	16.2%	10.3%	.037
Employed full/part-time	15.1%	18.9%	15.5%	.866
Economic hardship in past year	2.0	2.8	3.2	.028
Past Year Substance Misuse (any) at Baseline and Follow-Up				
Prescription opioids	92.5%	89.2%	86.6%	.552
at follow-up	39.6%	46.0%	43.3%	.828
Buprenorphine	39.6%	46.0%	22.7%	.014
at follow-up	18.9%	24.3%	15.5%	.488
Methadone	26.4%	40.5%	27.8%	.286
at follow-up	9.4%	16.2%	8.3%	.386
Prescription benzodiazepines	62.3%	64.7%	62.9%	.967
at follow-up	24.5%	40.5%	32.0%	.272
All other drugs	66.0%	78.4%	83.5%	.049
at follow-up	26.4%	37.8%	52.6%	.007
Injection drug use	34.0%	35.1%	30.9%	.871
at follow-up	9.4%	16.2%	19.6%	.269
Past Month Self-Help Group Attendance				
Any AA/NA attendance (baseline)	35.9%	46.0%	27.8%	.130
at follow-up	56.6%	62.2%	62.9%	.742
Past Year Mental Health				
Anxiety (baseline)	30.2%	64.9%	68.0%	<.001
at follow-up	64.2%	75.7%	66.0%	.473
Past Year Criminal Justice System Involvement				
Any incarceration (baseline)	79.3%	70.3%	41.2%	<.001
at follow-up	47.2%	51.4%	29.9%	.027

Table 3

Logistic regression models examining the effect of geographic discordance on substance use treatment outcomes

	Model 1 Rx opioid misuse	Model 2 Buprenorphine misuse	Model 3 Methadone misuse	Model 4 Rx benzos misuse	Model 5 All other illegal drugs
	OR (95% CI)	*OR* (95% CI)	*OR* (95% CI)	*OR* (95% CI)	*OR* (95% CI)
Geographic discordance	3.0[*] (0.8 ; 10.5)	1.4 (0.6 ; 3.4)	1.9 (0.5 ; 7.9)	2.7 (0.4 ; 18.1)	1.0 (0.2 ; 4.6)
Offers a residential level of care	0.8 (0.3 ; 2.1)	1.1 (0.2 ; 5.4)	0.4 (0.1 ; 1.6)	1.2 (0.2 ; 6.6)	1.3 (0.3 ; 5.6)
Avg. daily census	1.0 (1.0 ; 1.0)	1.0 (1.0 ; 1.0)	1.0 (1.0 ; 1.0)	1.0 (1.0 ; 1.0)	1.0[*] (1.0 ; 1.0)
Age	0.9[***] (0.9 ; 1.0)	0.9[**] (0.9 ; 1.0)	0.9 (0.9 ; 1.1)	0.9[**] (0.9 ; 0.9)	0.9[*] (1.0 ; 1.0)
Baseline IDU	1.7[*] (0.9 ; 3.1)	1.8[**] (1.2 ; 2.9)	5.7[***] (2.7 ; 11.8)	1.6 (0.7 ; 3.8)	2.0[*] (1.0 ; 4.1)
Economic hardship	1.0 (1.0 ; 1.1)	1.1 (0.9 ; 1.3)	1.0 (0.9 ; 1.2)	1.0 (0.9 ; 1.1)	1.0 (1.0 ; 1.1)
Baseline Drug Use Controls					
Rx opioid misuse	1.8[*] (0.9 ; 3.6)	--	--	--	--
Buprenorphine misuse	--	3.2[***] (2.1 ; 5.1)	--	--	--
Methadone misuse	--	--	16.2[***] (3.9 ; 66.8)	--	--
Rx benzos misuse	--	--	--	3.1[***] (1.9 ; 5.1)	--
All other illegal drugs	--	--	--	--	4.8[***] (2.1 ; 10.8)

[*] = p < .05

[**] = p < .01

[***] = p < .001

Table 4

Logistic regression models examining the effect of geographic discordance on social functioning treatment outcomes

	Model 6 AA/NA meeting attendance	Model 7 Anxiety	Model 8 Incarcerated
	OR (95% CI)	*OR* (95% CI)	*OR* (95% CI)
Geographic discordance	0.4[**] (0.1 ; 1.1)	4.9[**] (1.7 ; 14.2)	2.3[*] (0.9 ; 5.7)
Offers a residential level of care	4.1[**] (1.6 ; 10.2)	2.3[**] (1.1 ; 4.8)	0.9 (0.3 ; 2.4)
Avg. daily census	1.0 (1.0 ; 1.0)	0.9[**] (1.0 ; 1.0)	1.0 (1.0 ; 1.0)
Age	0.9[*] (0.9 ; 1.00)	1.2[*] (1.0 ; 1.1)	0.9[**] (1.0 ; 1.0)
Baseline IDU	1.1 (0.7 ; 2.0)	0.6[*] (0.3 ; 1.0)	0.8 (0.5 ; 1.2)
Economic hardship	0.9 (0.9 ; 1.0)	1.1 (0.9 ; 1.2)	0.9[***] (0.8 ; 1.0)
Baseline Controls			
AA/NA meeting attendance	1.7[**] (1.1 ; 2.8)	--	--
Anxiety	--	3.0[***] (1.5 ; 5.7)	--
Incarcerated	--	--	3.4[**] (1.2 ; 9.6)

[*] = p < .05

[**] = p < .01

[***] = p < .001