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## Client-provider Relationship in Comprehensive Substance Abuse Treatment: Differences in Residential and Non-residential Settings

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### Abstract

As the substance abuse service system shifts from primarily residential to primarily non-residential settings, it becomes important to understand how substance abuse treatment processes and outcomes may vary across service setting. Research increasingly indicates that, along with specific treatment and service strategies, client-provider relationship is an important ingredient in effective substance abuse treatment. This study uses a moderator-mediator analysis of a comprehensive service model to examine how the relation between client-provider relationship and substance abuse treatment outcomes may differ in residential and non-residential settings. The study uses data collected for the National Treatment Improvement Evaluation Study (NTIES), a prospective, cohort-based study of U.S. substance abuse treatment programs and their clients with an analytic sample of 59 publicly-funded service delivery units and 3,027 clients. Structural equation modeling (SEM) is used to assess the structural relations and causal connections between treatment process and treatment outcome variables. Results indicate that for non-residential settings, a better client-provider relationship is *directly* related to improved outcomes of treatment duration and reduced post-treatment substance use and *indirectly* related to both outcomes through provision of services matched to client needs. In residential settings, the quality of the client-provider relationship is unrelated to process or outcome variables. The findings point to the importance of the client-provider relationship in all settings but particularly in outpatient settings where there are limited physical constraints on the treatment process.

### Keywords

residential and non-residential setting; client-provider relationship; treatment process; services; outcome; moderator; mediator

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## 1. Introduction

Examining the active ingredients in comprehensive substance abuse treatment across different service settings is important in light of the increase in the availability of outpatient treatment over the past two decades. In the early 1990s, managed care organizations sought to control costs for substance abuse treatment by limiting patient access to expensive inpatient services and promoting the use of outpatient treatment (Steenrod, Brisson, McCarty, & Hodgkin, 2001). The substance abuse treatment system, a complex system of public and private for-profit and not-for-profit organizations (Wellisch, Pendegast, & Anglin, 1995) changed significantly in the 1990s as many traditional 28-day, hospital-based treatment programs closed and outpatient programs increased. Between 1990 and 2002, the proportion of programs offering residential treatment dropped from 55% to 10% (McLellan, Carise, & Kleber, 2003). Private and public expenditures devoted to outpatient treatment services also rose during this period; the proportion of costs from outpatient treatment services rose from 30% to 52% between 1991 and 2002 (Mark, Levit, Vandivort-Warren, Coffey, Buck, & the SAMHSA Spending Estimates Team, 2007). Given this transformation in the service system, analysis of the variation of the treatment process across settings is necessary for the design and development of an effective and efficient substance abuse treatment service system.

How substance abuse treatment outcomes may differ depending on the treatment setting – whether treatment is provided in inpatient programs, such as short-term or long-term residential, or in outpatient programs – has been the subject of significant substance abuse treatment research (e.g., Greenwood, Woods, Gudysh, & Bein, 2001; Harrison & Ashe, 1999; Hser, Grella, Hsieh, Anglin, & Brown, 1999; Hubbard, Craddock, & Anderson, 2003; Marsh, & Miller, 1985; McKay, Alterman, McLellan, Boardman, Mulvaney, & O'Brien, 1998; Pettinati, Meyers, Jensen, Kaplan, & Evans, 1993; Timko, Moos, Finney, & Moos, 1994; Zhang, Friedmann, & Gerstein, 2004). Overall, research as to the superiority of one setting over another has been inconclusive (Finney, Hahn, & Moos, 1996; Hser, Anglin & Fletcher, 1998; Hubbard, Craddock, & Anderson, 2003; Miller & Hester, 1986; Pettinati et al., 1993). Several conceptual rationales have been explored to account for this uncertainty. For example, the effectiveness of residential treatment may derive from (a) the physical security from environments and relationships that are perpetuating the drug and alcohol abuse, (b) the consolidation of physiological changes that accompany abstinence from drug use, and (c) the possibility that treatment is more comprehensive and intensive. Rationales used to account for the demonstrated effectiveness of non-residential treatment argue that outcomes of outpatient treatment and inpatient treatment are comparable when they are offered at the same level of intensity and both include comprehensive health and social services. Moreover, despite the inherent relapse triggers and drug availability in the community, non-residential treatment, more than residential treatment, enables the client to mobilize relationships both in the treatment environment with service providers and in the natural environment with family members, friends and neighbors.

Client-provider relationships, especially as they affect treatment and service outcomes, have received significant attention in the substance abuse treatment literature (e.g., Barber, Luborsky, Crits-Christoph, Thase, Weiss, Onken, et al., 1999; Barber, Luborsky, Gallop, Crits-Christoph, Frank, Weiss, et al., 2001; Belding, Iguchi, Morral, & McLellan, 1997; Carroll, Nich, & Rounsaville, 1997; De Weert-Van Oene, de Jong, Jörg, & Schrijvers, 1999; De Weert-Van Oene, Schippers, de Jong, & Schrijvers, 2001; Luborsky, Barber, Siqueland, McLellan, & Woody, 1995; Marsh, Shin, & Cao, 2010; Simpson, Joe, Rowan-Szal, & Greener, 1997; Tunis, Delucchi, Schwartz, Banys, & Sees, 1995). A recent review of the research indicates that client-provider relationship is consistently related to longer stays in treatment but only inconsistently related to reductions in drug use (Meier, Barrowclough, &

Donmall, 2005). Despite this understanding of the significance of relationship in influencing substance abuse treatment outcome, research is needed to document how client-provider relationship functions across treatment settings.

### 1.1. A model of comprehensive substance abuse treatment

As the effectiveness of substance abuse treatment is increasingly recognized, services research is turning to questions of process, that is, to understanding the mechanisms related to positive outcomes. Overall, process models of substance abuse treatment address two questions: (1) “How does treatment work?” through the systematic analysis of mediators of treatment effectiveness, and (2) “Under what conditions does treatment work?” through the analysis of moderators of treatment effectiveness (Finney, 1995; Moos, & Finney, 1995; Finney et al., 1996). The development of effective process models depends on systematic analysis that considers both mediators and moderators of substance abuse treatment outcome.

This paper will analyze a specific model of comprehensive substance abuse treatment where comprehensive services are defined as approaches to substance abuse treatment where ancillary health and social services are provided along with counseling and pharmacotherapy. A substantial body of services research has identified services and service mechanisms related to positive outcomes when services are provided in a comprehensive framework (Ducharme, Mello, Roman, Knudsen, & Johnson, 2007; Friedmann, Alexander, Jin, & D’Aunno, 1999; Marsh, Cao, & D’Aunno, 2004; Marsh, Cao, & Shin, 2009; Marsh, Shin, & Cao, 2010; McLellan, Hagan, Levine, Gould, Meyers, Bencivengo, & Durrell, 1998). Client-provider relationship is one important element that has been identified. Other ingredients in the comprehensive service model include (1) access services designed to increase linkage to substance abuse services, (2) outcome-targeted services or substance abuse counseling, and (3) matched services, i.e., services received by clients that match their descriptions of need.

### 1.2. Service mechanisms as mediators in comprehensive substance abuse treatment

Each element in the comprehensive service model that will be analyzed here has been theoretically and empirically related to positive outcomes in substance abuse treatment. First, as mentioned above, a review of empirical evidence linking *client provider relationship* to outcomes in substance abuse treatment indicates that client-provider relationship is a reasonably consistent predictor of retention in treatment, but an inconsistent predictor of post-treatment substance use (Meier, et al., 2005). Research examining how linkage or *access services*, including services like transportation, child care and outreach, are related to outcome show that these services are important for increasing the likelihood a client will be able to reach or obtain treatment and have been shown to be related to improved outcomes (McLellan, Hagan, Levine, Gould, Meyers, Bencivengo, & Durrell, 1998; Friedmann, D’Aunno, Jin, Alexander, 2000, Smith & Marsh, 2002). Access services have been shown to be especially important for women, for whom lack of transportation and child care are significant barriers to treatment. Transportation and child care services have been shown to enable women to remain in treatment and reduce post-treatment drug use (Marsh, et al., 2000; Marsh, et al., 2009) *Outcome-targeted* services are those directly focused on the outcome of interest. In substance abuse treatment, the various forms of substance abuse counseling are services specifically designed to reduce substance use. Treatment effectiveness research provides consistent evidence of the impact of substance abuse counseling (Egertson, Fox, & Leshner, 1997). Finally, research evidence also indicates that when services are *matched* to specific client-identified needs, comprehensive services are most effectively delivered as part of substance abuse treatment (Smith & Marsh, 2002; McLellan, Grissom, Zanis, Randall, Brill & O’Brien, 1997; Marsh, et al., 2009;

Marsh, et al., 2009). Overall, evidence indicates each of these factors -- client-provider relationship, access services, substance abuse counseling services, and matched services -- can serve as a mediator or a mechanism through which positive substance abuse outcomes are achieved. Figure 1 provides a graphic representation of the components and structure of this comprehensive service model.

### 1.3. Treatment setting as moderating variable

How treatment setting may moderate the association between mediating variables and substance abuse treatment outcome deserves further explication. Most relevant to this paper are analyses examining the moderating effect of treatment setting on the association of client-provider relationship with substance use outcomes. Previous analyses of setting effects have produced mixed results. One study found that client-provider relationship was associated with more substance use at post-treatment for clients receiving outpatient methadone services (Hser, Grella, Hsieh, Anglin, & Brown, 1999), while another found client-provider relationship, measured as part of a broader measure examining client involvement and rapport with counselor, was associated less post-treatment substance use in outpatient drug free, outpatient methadone, and long-term residential treatment settings (Joe, Simpson & Broome, 1999). While all significant associations with retention were found for all three settings, the strongest association was found for outpatient methadone. This study will build upon the current literature by examining treatment setting as a moderator of the association between client-provider relationship, retention and post-treatment substance use as well as by including other important mediating service mechanisms, such as receipt of access and matched services, which have not been explicitly considered in previous studies.

## 2. Methods

### 2.1. Design and sample

This study is a secondary analysis of data collected during 1992–1995 for the National Treatment Improvement Evaluation Study (NTIES) (Gerstein, Datta, Ingels, Johnson, Rasinski, Schildhouse, et al., 1997), which is a longitudinal, multi-site study of substance abuse treatment organizations in the United States. NTIES includes treatment organizations serving vulnerable and underserved populations, including minorities, pregnant women, youth, public housing residents, welfare recipients, and those involved in the criminal justice system. NTIES remains one of a very small number of treatment effectiveness studies that collected detailed client self-report data on service receipt and client-provider relationships. To examine the impact of treatment services on client outcomes, the study employed a pre-post follow-up design. Data were collected at both the client and program levels. Client characteristics, services, and outcomes were collected from client interviews at the three time points: treatment intake ( $N=6,593$ ), treatment exit ( $N=5,274$ ), and 12 months after treatment exit ( $N=5,388$ ). Organizational characteristics were measured at two time points during the data collection period, through telephone interviews with treatment program administrators. The data set is a multi-level data set that makes it possible to investigate the influence of organizational factors on service delivery through nested hierarchical analyses.

NTIES employed a two-stage sampling procedure. At the first stage, treatment programs that participated in demonstration grants from the Center for Substance Abuse Treatment (CSAT) were selected; at the second stage, a probability sampling of clients within CSAT-funded programs was conducted. The analytic sample was a subset of the 3,142 clients from 59 treatment service delivery units who completed all intake, treatment discharge, and follow-up interviews. Clients from correctional facilities ( $n=1,384$ ) were excluded because the study was designed for generalization to non-correctional settings. The sample included data on organizational, service, and individual characteristics for 1,123 female and 2,019

male clients; and 1,812 African American, 486 Latino, and 844 White clients. After excluding clients who reported no service need at intake (n=115), the final analytic sample for structural equation modeling consisted of 3,027 clients from 59 service delivery units: 1,922 men and 1,105 women; and 1,756 African Americans, 470 Latinos, and 801 White clients. Of those completing intake forms, 80% of respondents completed the exit interview and 83% completed the 12-month follow-up questionnaire. Compared to other national studies, NTIES reports high response rates (Gerstein & Johnson, 2000).

Analyses of the NTIES data set indicated 1–15% of data from the variables were missing. To address this issue, a multiple imputation procedure (Rubin, 1987) was conducted to fill in the missing values by assuming the data were missing at random (Little & Rubin, 1987). The Markov Chain Monte Carlo (MCMC) imputation method was employed, whereby each missing value was replaced with five plausible values (Schafer, 1997). Imputation was conducted for the organizational variables and client-level variables independently, and then combined to generate five two-level data sets. To utilize multiple imputation results, one specific model was fitted to the first data set, and the same model was fitted to the other four data sets. Path coefficients for the final fitted models are the averages of the five results.

Descriptive analyses, including data management and multiple imputation of missing values, were conducted in SAS 9.1. Structural equation modeling was conducted in LISREL 8.8.

## 2.2. Measures

To examine the relation of service characteristics to outcome in the context of a comprehensive substance abuse treatment model, items from the NTIES data set were selected to measure services received, duration and post-treatment drug use. Several organizational and individual characteristics were also included as control variables. Data on individual characteristics were collected at the pre-treatment interview, and data on services received, duration, and client-provider relationship were collected at treatment exit. Data regarding participants' post-treatment drug use were collected at 12 months after treatment exit.

**2.2.1. Explanatory variables**—Explanatory variables used include *client-provider relationship*, and service characteristics consisting of *access* to services, *outcome-targeted services* (e.g., substance abuse counseling), and degree of *matched services* (service-needs ratio). Other individual and organizational characteristics were included in the models as control variables. These included gender, race/ethnicity, age, education, treatment setting, and pre-treatment drug use. The measure of service use in each service category was derived by calculating the number of services used by the client. Client-provider relationship, which measured clients' in-treatment experience with a service provider, was assessed as an index based on 10 survey items provided below.

*Client-provider relationship* was assessed using an index constructed from 10 items measuring in-treatment experience. Each question used a categorical response scale. Questions asked whether clients had seen a treatment plan (range=1–2), helped develop the treatment plan (range=1–3), agreed with treatment goals (range=1–4), adhered to treatment goals (range=1–4), could identify an important provider during the treatment experience (range=1–2), agreed with primary provider (range=1–4), felt understood by primary provider (range=1–4), and had a primary provider who spoke the client's preferred language (range=1–3). Additionally, items measured the amount of time spent with primary provider (range=1–6), and the length of sessions with primary provider (range=1–5). The item responses were recoded and normalized such that the maximum value was 1 and the minimum value was 0, with a greater value for better relationship. A factor analysis for the 10 items revealed two factors with eigenvalues greater than 1.0 (eigenvalue: 4.47 and 2.79



respectively for the two factors, which accounted for 73% of the total item variance. The first factor had large loading on items related to capacity to identify an important primary provider, frequency of receiving counseling, length of sessions with primary provider, agreement with primary provider, feeling understood by primary provider, primary provider speaking preferred language and was inferred to be related to the development of a *bond* with the primary provider. The second factor had large loading on items related to treatment goal setting and planning, i.e., seeing treatment plan, helping develop treatment plan, agreement with treatment goals, adherence to treatment goals, and was inferred to be related to treatment *tasks*. The total score of the two factors was highly correlated with the simple sum of item scores (Pearson correlation coefficient = 0.995). Therefore, only the simple sum was used in this analysis. The simple sum of the normalized scores for the 10 items was recoded and rescaled so the maximum value was 1. An analysis of the psychometric properties of the index reveals the internal consistency reliability of the relationship index was adequate with a Cronbach's alpha of 0.85.

*Access services* (transportation and child care) were treated as a continuous variable ranging from 0–2. *Substance abuse counseling services* measured clients' reported use of individual and group drug/alcohol counseling, 12-step meetings, and prescription drugs for alcohol/drug problems. At treatment intake, clients had reported on the services they needed. The number of services received was treated as a continuous variable ranging from 0–3. *Service-needs ratio* was constructed as a continuous variable ranging from 0–1, measuring the ratio of the total number of services clients said they received compared to the number they said they needed. Services were in four categories: *family and life skills services* (parenting, domestic violence counseling, family services, assertiveness training, life skills, family planning, non-medical pregnancy services), *health services* (health services, AIDS prevention services, medical pregnancy services), *mental health services* (mental health counseling or treatment), and *concrete services* (school, job skills, housing, help collecting benefits, English training, help getting alimony/child support). Service-need was measured as a response to a question on the intake questionnaire as to "how important" (very, somewhat, not at all) the receipt of services would be in specific areas. "Very" and "Somewhat" were coded as 1, reflecting a need for service; "Not at all" was coded as 0. At discharge, clients reported on whether they had received services in each of these areas. To create the service-needs ratio, the percentage of self-reported needs that were matched was computed. *Access to services* and *substance abuse counseling services* variables were not a component of the service-needs ratio, and were included in the analysis as independent explanatory variables.

**2.2.2. Outcome variables**—*Treatment duration*, included as an intermediate outcome in the study model, was measured as a continuous variable indicating the length of treatment in weeks between the first and last days of treatment. *Post-treatment drug use*, the study's ultimate outcome, was measured at the 12 months post-treatment exit interview by summing the number of days in the last 30 that each respondent reported using the five most frequently used substances: alcohol, marijuana, crack cocaine, cocaine powder, and heroin. It thus represents the sum of the number of days respondents reported using the five drugs. This overall measure was developed in part to reflect the significant polydrug use in this sample. Approximately half of all respondents in the NTIES sample reported using more than one primary substance, and the majority mentioned using at least one of five included in this outcome variable.

**2.2.3. Control variables**—*Individual characteristics* evaluated in the model development included demographic information, such as gender (where women were the reference category), age, race/ethnicity (Hispanic, Black, and other, where "other" was the reference category), and education (years of schooling). Respondents also reported on several

psychosocial characteristics, including health status (a dichotomous variable, “yes” or “no” response to the question of whether health limits the work they can do), intimate partner violence (“yes” or “no” response to the question of whether they had ever been beaten), and mental health status (measured in terms of the number of 24-hour psychiatric visits in the last year). Analyses also controlled for clients’ previous alcohol or drug treatment experience and pre-treatment substance use. The pre-treatment substance use variable was constructed the same way as the ultimate outcome variable, post-treatment drug use, by summing the number of days in the 30 days prior to treatment entry that each respondent reported using the five most frequently used substances: alcohol, marijuana, crack cocaine, cocaine powder, and heroin. Respondents also were asked to indicate the primary source of payment for treatment services received: private, public, or uninsured.

The *treatment organization characteristics* evaluated in the model were derived from administrative interviews and included accreditation, treatment setting, ownership, on-site service availability, and frequency of individual and group counseling. For accreditation, administrators reported whether their program was accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), the premier organization dedicated to evaluating and certifying quality in health care. Lack of accreditation was the referent category. For treatment setting, treatment programs were dichotomized into residential or non-residential facilities. Ownership was a dichotomous variable in which administrators indicated whether a facility was private (either private for-profit or private not-for-profit) or public (local, state, federal, or tribal government). Public ownership was the referent category. On-site service availability measures the number of on-site services – including academic training, vocational training, medical, psychiatric, or pregnancy services – provided by the treatment organization. Because counseling is a staff intensive activity, frequency of counseling reported by the treatment organization was considered a measure of resource allocation in which the administrator indicated whether the typical client is scheduled to receive individual counseling or therapy less than once per week, once per week, or more than once a week. Integer scores of 1, 2, and 3 were assigned to the three categories.

### 2.3. Structural equation modeling

Structural equation modeling (SEM) was used to assess both strength and direction of relations among variables in the study model. The prospective nature of NTIES data provides the rationale for testing causal hypotheses in this study. Specifically, data on receipt of services and therapeutic relationship were collected immediately after the conclusion of treatment, while data on post-treatment drug use was collected 12 months after the conclusion of treatment. It is important to note that although causal hypotheses can be rejected statistically using SEM, they cannot be confirmed due to the possibility that important variables may be missing from the model. Nonetheless, SEM remains a useful analytic strategy since reasonably strong conclusions can be drawn when the model is theoretically derived and satisfactorily fits the empirical data. Additionally, the graphical representation of SEM results in path diagrams that better illustrate complex relations among variables.

A distinctive aspect of the NTIES data set is that it utilizes a multi-stage cluster sample design, in which client-level data are nested within organizational-level data. Due to this nested data structure, it is necessary to account for possible clustering effects in the modeling process. There are two approaches to addressing possible clustering effects within the context of structural equation modeling. One method, termed “aggregated analysis,” computes the usual parameter estimates but adjusts standard errors and model tests for goodness-of-fit. The other method, “disaggregated analysis,” includes a new set of parameters that reflect the complex sample structure. Both methods have been shown to be

sound approaches to addressing the nested structure of the data (Muthen & Satorra, 1995). In this analysis we used the “aggregate analysis” available in LISREL. LISREL 8.8 calculates the conventional chi-square goodness of fit, and then adjusts the chi-square with an adjustment factor (du Toit, S.H.C., du Toit, M., Mels, & Cheng, 2005). The LISREL approach is consistent with the method used in survey sampling to insure correct variance estimation (Rao & Scott, 1981).

**2.3.1. Exploratory factor analysis**—We used the common two-stage approach in SEM (Anderson & Gerbing, 1988; Kline, 1998). The first step was to specify a measurement model in which multiple measures were tested as indicators of possible latent variables using factor analysis. In the second step, we tested the fit of the theoretical model to the empirical data, examining the relationships among variables. In the first step, we searched for an unmeasured latent factor related to individual predisposing characteristics using all the observed manifest variables of individual characteristics (gender, race/ethnicity, age, education, health status, ever beaten, mental health status, pre-treatment drug use, prior treatment, and health insurance). We also specified a measurement model with a latent organizational factor using the observed organizational-level variables (JCAHO-accreditation, treatment setting, ownership, on-site services, and frequency of counseling). We were unable, in the modeling effort, to find satisfactory uni-dimensional latent variables and concluded that the individual and organizational latent factors were multi-dimensional. As a result, measured variables were used to assess latent constructs. To simplify the SEM modeling, we used observed control variables of gender, race/ethnicity, age, education, and pre-treatment drug use as well as observed explanatory and outcome variables. We also used the client-provider relationship index constructed for the analysis in the SEM.

**2.3.2. Path analysis**—In the second step, we compared the comprehensive service delivery model with the empirical data assessing both direction and strength of the relation among variables. The closeness of the theoretical model to the data was evaluated through goodness-of-fit statistics – the chi-square, the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). Chi-square ranges between 0 and infinity and measures the empirical distance between observed and fitted data. A large p-value for the chi-square statistic indicates a better fit of the specified model to the observed data. The CFI ranges between 0 and 1 and compares the improvement in fit of a hypothesized model to a model of complete independence among the fitted variables. Values close to 1.0 are considered a good fit for the CFI. The RMSEA is a measure of fit per degrees of freedom that controls for sample size. Values less than 0.06 indicate a relatively good fit between the hypothesized model and observed variables (Hu & Bentler, 1999).

**2.3.3. Multi-group SEM modeling in residential and non-residential settings**—Treatment setting (residential or not) is conceptualized as a moderator (Baron & Kenny, 1986). To understand whether and how client-provider relationship operates differentially in residential and non-residential settings, we tested for effect modification by treatment setting using multiple group comparisons using the approach recommended by Bollen (1989) and Henseler & Fassott (2010). Other examples of this approach in the literature are found substance abuse treatment in Chermack, Stoltenber, Fuller, & Blow (2000). First, a model was fitted that allowed all parameters in the total sample (both residential and non-residential) to be freely estimated. Then, we calculated a model that constrained all the regression coefficients to be the same across the two groups. Finally, following the procedure suggested by Henseler and Fassott (2010), we conducted separate modeling to find a fitted parsimonious model for each setting. We included the same explanatory, control, and outcome variables as the initial model for the clients in each treatment setting. At each



of the 5 model fitting assessments, non-significant covariates and paths were trimmed to obtain a parsimonious model until only significant parameters remained.

### 3. Results

Results of the analysis are presented in Table 1 and Figures 2 and 3. Table 1 shows the means and standard deviations for residential and non-residential, and all variables used in the initial models. Each estimate in Table 1 is an average of the five estimates from the five imputed data sets. The five estimates are very similar and differ only in the second decimal points. Figures 2 and 3 provide graphical representation of the fitted models, of the predictors of treatment outcome in residential and non-residential settings. The analysis and figure for the total sample (residential and non-residential together) are available in an earlier paper (Marsh et al., 2010).

When the model was fit to allow all the parameters in the total sample (both residential and non-residential) to be freely estimated, it did not fit the data well, with a goodness-of-fit Chi-square statistic of 708.67 ( $df = 62$ ;  $p < 0.001$ ). When we calculated a model that constrained all the regression coefficients to be the same across the two groups, this model also did not fit the data well with a goodness-of-fit Chi-square statistic of 904.55 ( $df = 78$ ;  $p < 0.001$ ). Finally, the difference in Chi-squares for the constrained and unconstrained models was 195.88 ( $df = 16$ ;  $p < 0.001$ ). The significant lack of fit between the two models implies that there are varying structures for the two groups. To understand the structures, we conducted separate modeling to find a fitted parsimonious model for each setting following the procedure suggested by Henseler and Fassot (2010).

#### 3.1. Predictors of treatment duration and post-treatment drug use for clients in residential settings

Figure 2 below presents the final substance abuse treatment model in residential settings. The coefficients indicated in the model are the standardized path coefficients that were statistically significant ( $p \leq 0.05$ ). Standardized path coefficients represent the relative size of the effect of each explanatory variable on the outcome variable. It is the expected change in the outcome variable of a unit change (standard deviation) in the explanatory variable. The goodness-of-fit chi-square statistic is 8.05 with 18 degrees of freedom, and the RMSEA is 0.00. The CFI is 1.0. A large p-value (0.98) for the chi-square, a CFI of 1.0, and the small RMSEA of 0.00 all indicate that the model fits the data well. The path diagram with nodes and arrows in Figure 2 represents structural relationships among variables.

For clients in residential settings, substance abuse counseling and having received needed services were the service factors predicting the intermediate outcome of treatment duration. As might be expected in the residential setting model, access services (transportation and child care that facilitate access to treatment) do not result in receipt of more types of substance abuse counseling. However, a higher service-needs ratio is directly related to a longer treatment duration, which leads to a reduction in post-treatment drug use. Figure 2 also indicates that no other factors except treatment duration directly predict reduced post-treatment drug use. In particular, quality of client-provider relationship does not play a role in the treatment process model for clients in residential settings. Accordingly, positive client-provider relationship does not directly or indirectly affect post-treatment drug use. Also, although a higher service-needs ratio leads to longer treatment duration, it does not lead to lower post-treatment drug use. These results confirm findings from previous evaluation research of residential settings, i.e., that the length of stay in the treatment program is the primary factor contributing to treatment success.

### 3.2. Predictors of treatment duration and post-treatment drug use for clients in non-residential settings

Figure 3 shows the treatment process model for clients in non-residential settings. As with the sample for residential settings, the coefficients represent the standardized path coefficients that were statistically significant ( $p \leq 0.05$ ) and indicate significant effects. Standardized path coefficients indicate the relative size of the effect of each explanatory variable on the outcome variable. The goodness-of-fit chi-square statistic is 21.93 with 25 degrees of freedom, and the RMSEA is 0.00. The CFI is 1.00. A large p-value (0.64) for the chi-square, a CFI of 1.0, and the small RMSEA of 0.00 all indicate that the model fits the data well.

For clients in non-residential settings, both quality of client-provider relationship and service-needs ratio predict the intermediate outcome of treatment duration. Access services (transportation and child care) result in more types of substance abuse counseling, which in turn result in a more positive client-provider relationship that directly leads to longer treatment duration. The causal service chain also indicates that a more positive client-provider relationship leads indirectly to longer treatment duration by leading directly to a higher service-needs ratio which directly results in clients' longer retention.

As shown in Figure 3, for clients in non-residential settings, the robust relation between treatment retention and reduced post-treatment drug use disappears when other service factors are included in the model. The other factors directly predicting reduced post-treatment drug use are the quality of the client-provider relationship and whether clients report that service needs were met. The causal chain of services predicting reduced post-treatment substance use begins with receipt of access services (transportation and child care) services, resulting in more types of substance abuse counseling services and a higher-quality client-provider relationship which, in turn, predicts reduced post-treatment substance use at 12-months post-treatment. Positive client-provider relationship also indirectly affects post-treatment drug use by a direct association with a higher service-needs ratio which directly leads to lower post-treatment drug use.

The model also reveals a unique role for access services (transportation and child care) for clients in non-residential settings. As might be expected, in residential services, where clients remain in the same location throughout treatment, receipt of access services has no mediating effect on outcome. In contrast, in non-residential services, access services represent an important service element. They not only result in receipt of more types of substance abuse counseling, but also they directly predict a higher-quality client-provider relationship.

## 4. Discussion

Continuing shifts in the substance abuse treatment service system away from residential treatment and toward non-residential treatment increase the need to understand how the treatment process may differ across settings. To understand the process across settings, we examined the moderating influence of residential versus non-residential treatment on the association between client-provider relationship and outcomes of retention and post-treatment drug use. First, we found, consistent with previous studies, that client-provider relationship is an active ingredient in the treatment process, one that is consistently related to substance abuse treatment outcome. These findings point to the significance of including client-provider relationship in service delivery models – both as a therapeutic element as well as an element likely to promote matching services to specific client needs. However, we also found that whether treatment is provided in a residential or non-residential setting is a significant moderator of this relationship. The functioning of client-provider relationship

in relation to other treatment mechanism in the comprehensive service model was distinct in each treatment setting. Examining the causal chains in the models in each setting sheds light on key elements in the substance abuse treatment process.

The most important question addressed by this analysis is whether positive client provider relationship is a significant factor in reducing post-treatment drug use in both residential and non-residential settings. Structural equation modeling shows that a positive client-provider relationship is related to higher-quality service experience (as reflected in services matched to needs) and longer treatment duration in non-residential settings, but not in residential settings. The presumed treatment mechanism in non-residential settings is that providers who develop a constructive relationship with clients are able to more effectively identify and meet service needs and to encourage clients to remain in treatment. There is no doubt the case that when clients' service needs are met, they are more likely to rate more positively their relationship with their provider. Thus, findings indicate the client-provider relationship can be an important element for holding clients in treatment absent the physical constraints characterizing residential settings.

A second question in the literature is whether relationship is therapeutic in its own right or whether it is primarily a vehicle for enhancing access to and impact of specific services. Overall, results indicate that in settings where client-provider relationship is a significant predictor of outcomes, relationship is both a therapeutic mechanism as well as a facilitative mechanism that enhances outcomes. Findings show that in non-residential settings, client-provider relationship is directly connected to treatment retention and reduced post-treatment drug use. It also is indirectly connected to greater service-needs matching, which in turn is related to reduced post-treatment drug use.

In addition to addressing two fundamental questions related to the functioning of client-provider relationship in service delivery, the analyses illuminate the functioning of other process variables as they may differ across service settings. Findings show that in residential settings, where clients are in the same location for the duration of treatment, provision of access services of transportation and child care is unrelated to receipt of substance abuse counseling services. In contrast, in non-residential settings, access services of transportation and child care lead to more types of substance abuse counseling services that predict a higher-quality client-provider relationship. These results indicate that access services of transportation and child care are an important pre-condition for receiving more substance abuse counseling services in non-residential settings, a finding consistent with a previous studies (Marsh, D'Aunno, & Smith, 2000). Further, client-provider relationship is associated with the achievement of a high service-needs ratio and to treatment retention; both are also directly related to the outcome of reducing post-treatment drug use. These results provide insight as to how client-provider relationship contributes the effectiveness of non-residential substance abuse treatment.

Insights about the treatment process have important implications for the design and improvement of services. Findings from this paper reinforce the well-established connection between treatment retention and improved substance abuse treatment outcome in residential settings. They indicate that an important aspect of residential treatment services models is to enable clients to receive substance abuse counseling and to remain in treatment. Treatment retention does not remain an active ingredient in non-residential settings, but study findings point to treatment processes that are important while a client remains in treatment in non-residential settings. Specifically, the implications of the analysis for treatment design in non-residential models point to the value of matched or tailored services to meet clients' health and social needs as mechanisms for improving treatment retention and for reducing post-treatment drug use. Further, they point to the value of service providers who are able to

develop a positive working relationships with clients in the process of providing services both for treatment retention and for reducing post-treatment substance use. Non-residential services also clearly benefit from the inclusion of access services in the form of transportation and child care as pre-conditions to the use of counseling services. In sum, access services, matched services and a positive client-provider relationship are all service mechanisms that actively contribute to more successful substance abuse treatment outcomes.

A number of limitations must be considered in relation to this study. Two are related to the NTIES data set and a third to the structural equation modeling analysis. NTIES is one of a small number of large-scale, observational follow-up studies conducted in the U.S. to estimate the effects of specific services on substance abuse treatment outcomes. Its strengths derive from its prospective design, high follow-up response rate, multiple measures of service delivery, including measures of client-provider relationship, as well as treatment outcome. However, a primary limitation of NTIES is the restricted capacity to generalize due to sample selection procedures that sampled, in the first stage, a set of programs funded by the Center for Substance Abuse Treatment, and in the second stage, individuals from a population who had been admitted to a treatment program during a given period of time. Despite limitations related to the sampling procedure, NTIES investigators report that this sample is largely comparable (e.g., in terms of distribution by gender, educational levels, prior drug treatment experience, criminal justice referrals) with other large-scale treatment follow-up studies, except that NTIES oversampled for African Americans and Latinos (Gerstein et al., 1997).

The second limitation of the data relates to the fact that they were collected between 1993 and 1995 and became publicly available in 1997. Service delivery patterns have changed in the last decade, and health and social services are less frequently available in substance abuse treatment, especially with respect to treatment setting (Kimberly & McLellan, 2006; Campbell, Wells, Alexander, Jiang, Nahra, & Lemak, 2007). In this study, this limitation is mitigated by the fact that primary inferences that are drawn pertain to the relations among a set of treatment process and outcome variables and to differences between residential and non-residential settings. The inferences drawn in the study are relevant to the specific sample participating in the NTIES study. At the same time, they are relevant to the development of differential service delivery strategies with respect to treatment setting: residential and non-residential settings.

A final weakness to consider relates to the limitations of structural equation modeling as an analytic technique. Structural equation modeling is a valuable tool for identifying causal relations in data that are fundamentally correlational. However, the causal connections identified must be considered in light of the fact that causal hypotheses can be rejected in the model but not confirmed since important variables could be missing. The prospective nature of the NTIES data strengthens causal assumptions between services, retention and the ultimate outcome of reduced drug use at 12 months post-treatment. However, the fact that most service variables were measured at discharge (e.g., including access services, substance abuse counseling services, matched services, and client-provider relationship) limits the possibility of making strong causal assumptions among service variables.

While research documenting the overall effectiveness of substance abuse treatment continues to grow, evidence of effective components of care – evidence that is so critical to the design and delivery of effective treatment – is sorely needed. This study contributes to knowledge of the process of substance abuse treatment by pointing to the importance of client-provider relationship as a treatment ingredient that is both directly related to reduced post-treatment outcomes and indirectly through related through its connection to increased service-needs matching. Further, findings that indicate the connection between client-

provider relationship and post-treatment drug use is strongest in non-residential settings is relevant to the design of services across different settings. Overall, findings point to the value of a comprehensive service model that includes service mechanisms of, not only client-provider relationship, but also access services, outcome-targeted services and matched services. Findings reveal the possibility that a comprehensive service model may operate differentially across service settings. As the substance abuse treatment system shifts to providing more care in nonresidential settings, the continued conceptualization and analysis of effective components of care across service settings becomes increasingly important.

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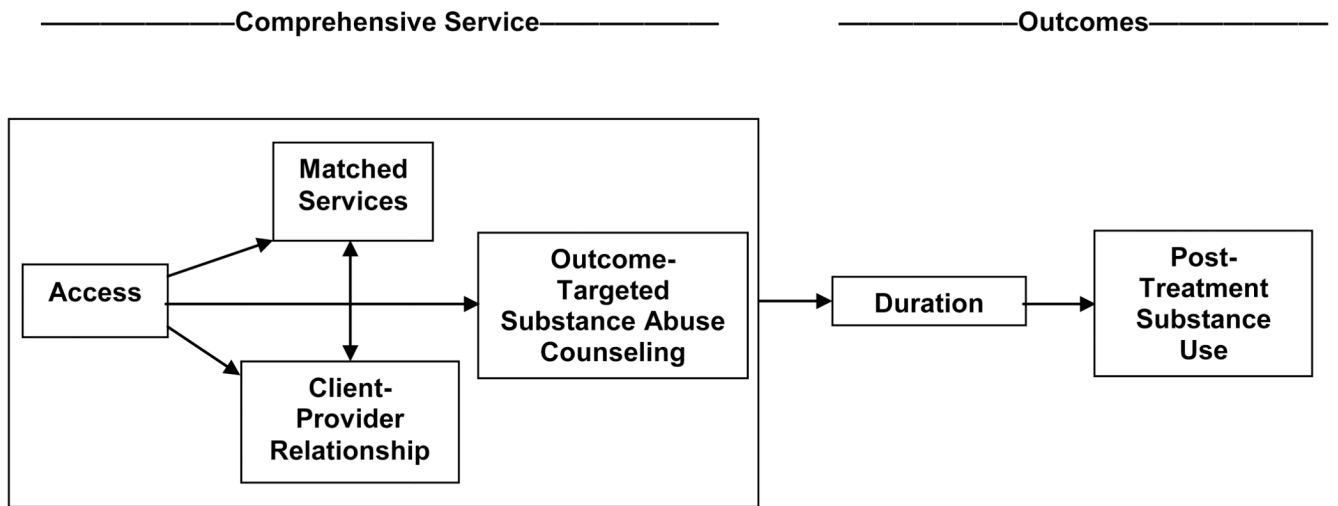
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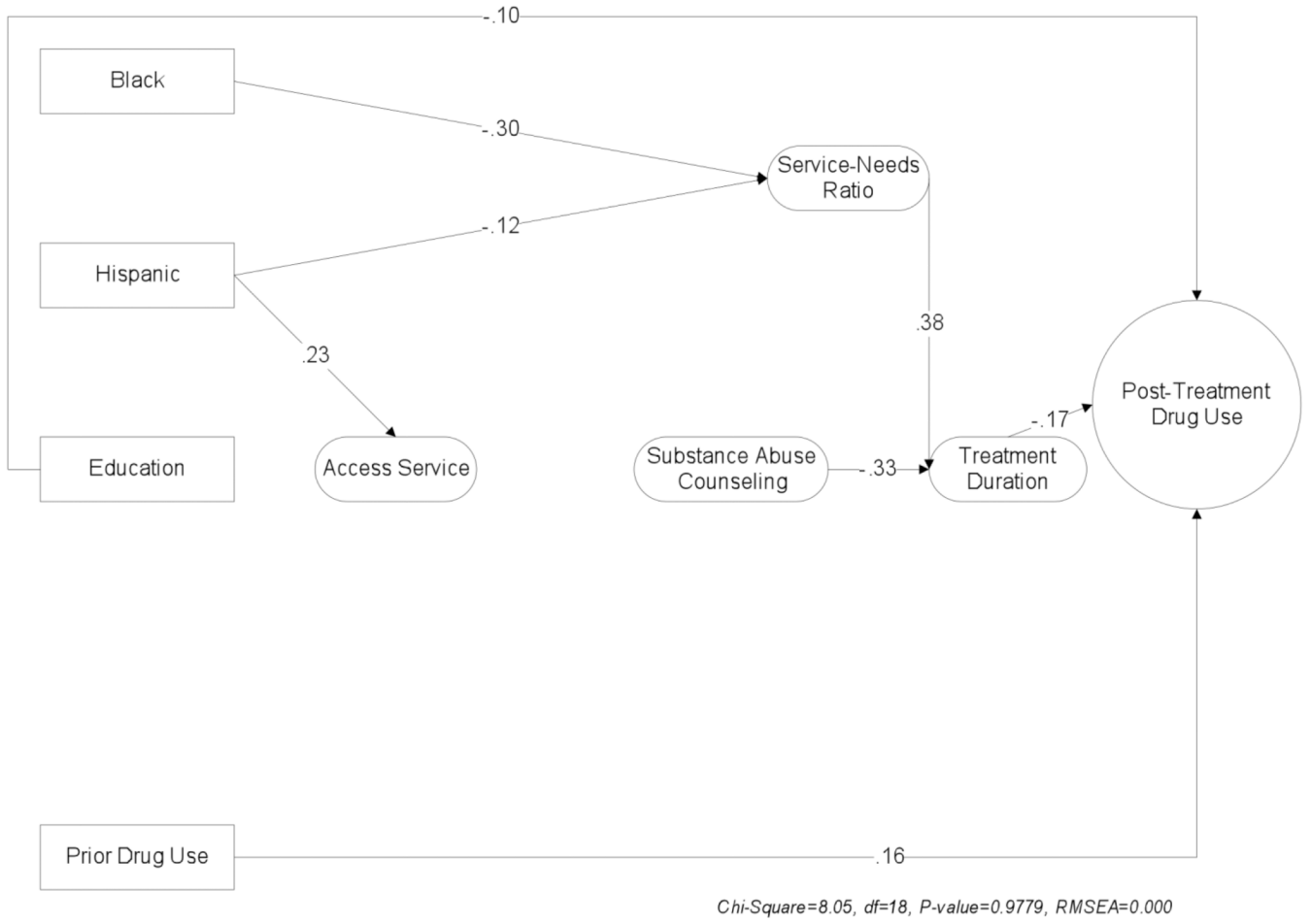
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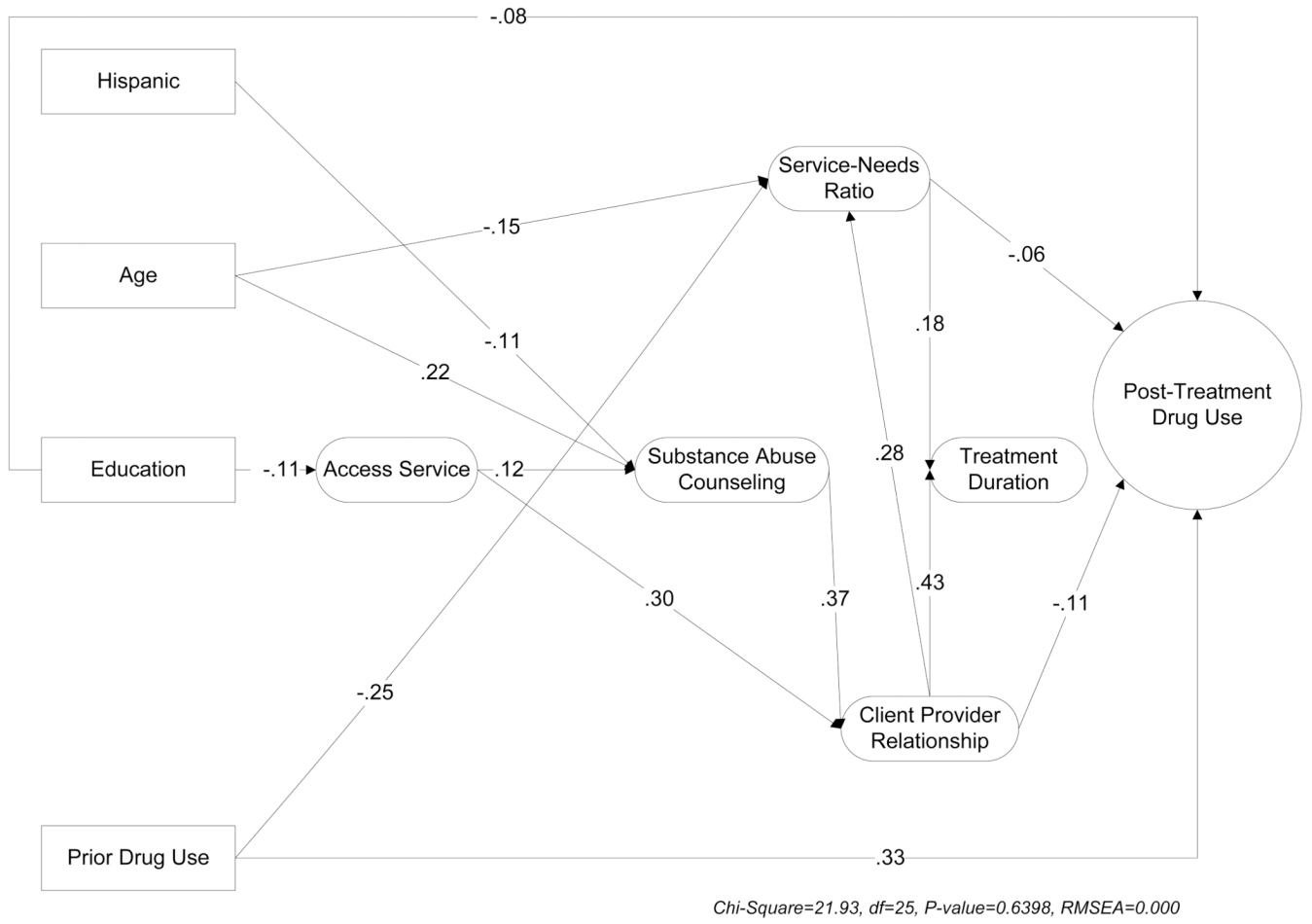


**Figure 1.**  
Components of Comprehensive Service Model



**Figure 2.**  
Substance Abuse Treatment Model in Residential Settings





**Figure 3.**  
Substance Abuse Treatment Model in Non-residential Settings

Table 1

Summary of the variables used in the SEM models.

Variable	All (n=3,142)		Residential (n=1,532)		Non-residential (n=1,610)	
	Mean	STD	Mean	STD	Mean	STD
<i>Explanatory Variables</i>						
Client-provider relationship	7.13	2.40	7.29	2.44	6.97	2.34
Access services	0.00	1.00	0.14	0.99	-0.13	1.00
Substance abuse counseling services	0.00	1.00	0.32	0.86	-0.31	1.03
Family and life skills services	0.04	1.00	0.33	1.04	-0.24	0.87
Health services	-0.02	0.98	0.37	0.82	-0.39	0.98
Mental health services	0.00	1.00	0.09	1.05	-0.08	0.95
Concrete services	-0.01	1.00	0.15	1.10	-0.16	0.87
Service-needs ratio	0.43	0.27	0.47	0.26	0.39	0.28
<i>Outcome Variables</i>						
Treatment duration in weeks	15.75	14.79	11.03	13.03	20.24	14.98
Post-treatment drug use	8.23	13.33	7.59	12.91	8.84	13.69
<i>Control Variables</i>						
% Male	64.26	47.93	57.64	49.43	70.56	45.59
% Hispanic	15.47	36.17	12.53	33.12	18.26	38.65
% Black	57.67	49.42	59.40	49.12	56.02	49.65
Age in years	32.28	8.64	31.06	7.89	33.44	9.15
Education (years of schooling)	11.26	1.98	11.33	1.96	11.19	2.00
% Work limited by health	33.03	47.04	29.10	45.44	36.77	48.23
% Ever beaten	22.48	41.75	26.31	44.04	18.84	39.12
Mental health status (24-hour psychiatric visits)	0.31	0.86	0.32	0.87	0.31	0.85
Pre-treatment drug use	15.51	17.71	16.62	17.27	14.46	18.06
% Prior treatment	61.73	48.61	61.49	48.68	61.96	48.56
% Private source of payment	25.92	43.83	21.64	41.20	29.99	45.83
% Public source of payment	68.26	46.55	70.09	45.80	66.52	47.21
% Uninsured	7.78	26.79	9.53	29.37	6.11	23.96
% JCAHO accredited	15.91	36.42	5.86	21.97	25.47	43.47

Variable	All (n=3,142)		Residential (n=1,532)		Non-residential (n=1,610)	
	Mean	STD	Mean	STD	Mean	STD
% Residential	48.76	49.99				
% Private ownership	80.45	39.59	82.99	37.41	78.02	41.32
Number of on-site services	2.18	1.29	2.82	1.15	1.57	1.11
Frequency of counseling	2.06	0.64	2.35	0.65	1.78	0.49