Published in final edited form as:

J Health Psychol. 2008 April ; 13(3): 388–400. doi:10.1177/1359105307088142.

Patient Satisfaction and Sustained Outcomes of Drug Abuse Treatment

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Abstract

The authors investigated the relationship between patients' self-rated satisfaction with treatment services during and shortly after treatment with their drug use outcomes at one year follow-up, using a U.S. national panel survey of patients in 62 methadone, outpatient, short-term residential, and long-term residential programs. A favorable evaluation of treatment near the time of discharge had a significant positive relationship with drug use improvement outcomes approximately one year later, independent of the separately measured effects of treatment duration, counseling intensity, patient adherence to treatment protocols, pre-treatment drug use patterns, and other characteristics of patients and treatment programs.

Keywords

drug abuse; patient satisfaction; recovery; treatment outcome

Introduction

The measurement and interpretation of patient satisfaction with health care practices and organizations was recognized as an important subfield of health services research more than a quarter-century ago (Donabedian, 1988; Ware, Davies-Avery, & Stewart, 1978; Ware, Snyder, & Wright, 1976, ¹⁹⁷⁷). Although questions remain under active investigation as to how patient satisfaction should be assessed and understood in relation to other components and outcomes of health care (Kenagy, Berwick, & Shore, 1999; Sederer, Dickey, & Hermann, 1996), there is widespread recognition that such measurement is an important element in evaluating health care quality across a broad range of conditions and services (Alden, Hoa, & Bhawuk, 2004; Grol, 2001; Kasarabada, Hser, Boles, & Huang, 2002; Mayer & Cates, 1999; Pandiani, Banks, & Schacht, 2001; Rohland, Langbehn, & Rohrer, 2000).

The use of patient satisfaction measures in evaluating the processes and outcomes of substance abuse treatment services has lagged behind this general trend in health care, including movements within the study of behavioral health care (Eisen et al., 1999; Ruggeri, 2001). Studies of patient satisfaction with alcohol and drug treatment are few in number and limited

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COMPETING INTERESTS: None declared.

geographically, with inconsistent results. One study of four alcohol and drug programs in a California Health Maintenance Organization (HMO)—a typical ‘private-tier’ provider (Gerstein & Harwood, 1990)—found little relationship between satisfaction with treatment and measures of treatment participation and outcomes (McLellan & Hunkeler, 1998). A survey on women in the Illinois child welfare system who had attended substance abuse treatment within the past 24 months (Smith & Marsh, 2002) found that matched service needs were related to the perception that treatment was helpful, but not to reports of reduced substance abuse. A study of public assistance patients in Oregon and Washington (Carlson & Gabriel, 2001) reported significant relationships among abstinent outcomes, service participation, and satisfaction with service access and effectiveness—but not ‘global satisfaction’ with treatment. A more recent study of 36 community-based programs in California (Hser, Evans, Huang, & Anglin, 2004) found positive relationships between service intensity and treatment satisfaction, both of which were correlated with longer treatment duration and completion of planned treatment, which in turn were positively associated with favorable downstream outcomes. A recent national study of buprenorphine-prescribing physicians and their patients uses a satisfaction measure, but the results presented to date are too informal to assess (Stanton, McLeod, Luckey, Kissin, & Sonnenfeld, 2006).

The limited extent of research on patient satisfaction may stem from the belief that it is not an independent factor in substance abuse treatment. For example, Simpson (2004) has argued that patient satisfaction with services is actually ‘secondary to the counseling relationship’. If so, satisfaction would simply be a proxy for the quality of the therapeutic alliance, which could be queried directly.

This research examines the clinical significance of patient overall satisfaction with treatment. The present study analyzed patient data from a multi-state, multi-region, multi-modality sample of substance abuse treatment programs. We employed a single-item measure of patient satisfaction with treatment effectiveness very similar to the one used by Carlson and Gabriel (2001; see also Rodriguez, 2004) and Smith and Marsh (2002). The satisfaction measure was recorded during a research interview at the end of the index treatment episode, whether treatment ended at completion of the treatment plan or prematurely due to involuntary termination or withdrawal against clinical advice. We also employed process measures such as treatment planning and therapeutic alliance and controls for baseline characteristics—selected because they had been significant predictors of one-year outcome in previous analyses of the present data set or other studies—and demographic and drug use measures. Our research question was whether a simple measure of patient satisfaction at discharge could predict long-term treatment effectiveness, as measured approximately one year after treatment discharge, even when controlled for many other pre-treatment and treatment process components that are known to influence such outcomes.

Consensus statements in the field have argued for more widespread use of simple standardized patient self-report measures that can be collected—repeatedly, in principle—during treatment (Institute of Medicine, 2006). Although some researchers in the field have questioned the value of post-discharge measures for evaluating treatment effectiveness (McLellan, McKay, Forman, Cacciola, & Kemp, 2005), there is ample precedent and substantial logic for choosing to validate shorter term indicators against the more persistent effects that may be captured by post-discharge measures.

Methods

Sample

Data for this study are drawn from the National Treatment Improvement Evaluation Study (NTIES), an observational study of administrative and clinical elements of drug treatment

programs involved in a major demonstration project funded by the US Center for Substance Abuse Treatment (Gerstein et al., 1997). A total of 4939 consecutively admitted clients from 68 geographically dispersed community-based treatment service delivery units in 17 states was enrolled in a three-wave, in-person, highly structured computer-assisted interview study between July 1993 and August 1995. Although six small programs were dropped for practical reasons, 91 percent of all enrolled clients completed at least one of the subsequent interview rounds. The second interview, at treatment discharge, covered services received and patient perceptions and behavior in-treatment. The third interview covered behavior during a follow-up period after discharge that averaged 11 months (mean and median). Of the 4939 originally enrolled subjects, 65.9 percent completed both subsequent interviews and were included in this analysis. Completion rates in comparable cited studies were 65.5 percent of 525 (McLellan & Hunkeler, 1998); 61.8 percent of 502 (Carlson & Gabriel, 2001); 55.1 percent of 3556 (Hser, Evans, Huang, & Anglin, 2004); and 29.6 percent of 673 (Smith & Marsh, 2002).

The analytic sample comprises 3255 clients in 62 treatment programs who completed both the discharge and follow-up interviews. (However, seven cases were ultimately excluded from the multivariate results due to missing data on one or more of the included variables—a loss small enough to obviate imputation of the missing items.) A relatively small number of these ($n = 144$) in methadone programs remained continuously in treatment from admission until the end of data collection (maintenance), and were administered the second and third interviews at time points roughly comparable to those for the discharged patients. The analytic sample of 3255 closely resembles those excluded from this analysis ($n = 1684$) on all measured dimensions except length-of-stay in treatment, which correlates positively with completion of research interviews. (We control for length of stay in our analyses.) The included sample comprises 410 clients in seven methadone maintenance (MM) programs, 1,282 clients in 31 outpatient nonmethadone (OP) programs, 578 clients in five short-term residential (STR) programs, and 985 clients in 19 long-term residential (LTR) programs.

Outcome measures

Although abstinence from illicit drug use is the ideal goal for nearly all drug treatment programs, periods of reduced use of primary or secondary drugs are part of the recovery pattern (Tims, Leukefeld, & Platt, 2001). Our dependent variables were two previously developed composite scores (documented in Friedmann, Hendrickson, Gerstein, & Zhang, 2004; Zhang, Friedmann, & Gerstein, 2003) of baseline-to-follow-up change in drug use. These scores represent improvements, respectively, in *primary* drug use and *overall* drug use, for the four most commonly used drugs in the sample: powder cocaine, crack cocaine, heroin, and marijuana. We identified a client's primary drug(s) through response to the question: 'What is the drug or drug combination that made you come to treatment this time?' Offered a list of 13 drug types, 99 percent of clients named as a primary drug one or more of the following five: marijuana; powder cocaine; crack cocaine; heroin; and alcohol. For all drugs except alcohol, the frequency of use was measured in ordinal categories (described below) across the past month and for the past year or exact post-discharge period. Alcohol use quantities and frequencies by type of beverage were measured for the past month only. For the purposes of this article and due to noncomparability between the key drug and alcohol use measures, we focused here only on the illicit drugs.

Improvement was measured as *change* in a categorical scale of the number of drug-using days during the 'peak' month (month of most frequent use) in each of two periods: the year before the baseline interview (as reported in that interview) and the post-treatment period, that is, the time between the last day of the NTIES treatment episode (or day of the discharge interview) and the day of the follow-up interview (as reported in the follow-up interview). The peak drug use levels are categorized by respondents as more than 20 days/month ($= 3$), 6–20 days ($= 2$),

1–5 days (= 1), or no days (= 0). Improvement is the pre–post difference, that is, we count a reduced level of frequency as improvement. The improvement score for any one of the four drugs could thus range from +3 (highest level before but no use after) to –3 (zero use before, the highest level after).

The primary improvement measure sums improvement scores only for the one or more primary drug(s) named by the client at admission as the reason for entering treatment (two-thirds of clients named only one primary drug, all but a few others named two). The overall improvement measure sums improvement scores across all four of these most highly prevalent illicit drugs. While the overall and primary scores are well correlated, they can differ in magnitude and even in sign. A client whose reason for entering treatment is exclusively heroin, for example, would receive a positive score on improvement in primary drug use if he or she had reduced the peak level of heroin use from pre to post treatment. However, the same client could receive a negative score on overall use by increasing levels of several other drugs from pre to post. Both the overall and the primary scores have a theoretical range from –12 to +12. The actual ranges for the primary improvement scores and overall improvement scores in the sample were –5 to +9 and –11 to +12 respectively. A positive score means improvement, that is, a net *reduction* in the summed level of use; a score of zero means no net change; and a negative score means drug use *increased* after treatment.

Predictors

Satisfaction (perceived helpfulness of treatment)—Patient perception may be considered an important function of care and can be a marker for the quality of the services received (Shuval, 1970). Patients measure quality based on what they understand and value (Larson, Nelson, Gustafson, & Batalden, 1996). In this study, we measured patient satisfaction as the perceived overall *helpfulness* of the treatment as reported in the treatment discharge interview. Satisfaction took a value of 1 if the respondent said that the treatment was ‘very helpful’ and 0 if the respondent said the treatment was ‘somewhat’ or ‘not at all helpful’. As in other studies, the majority of patients in this sample give their treatment episode a high satisfaction rating (Tourangeau, Rips, & Rasinski, 2000; Ware, 1978).

Baseline drug use: past-year peak use and recent reduction from peak use—We used two measures of drug use from the NTIES baseline interview as predictors, for somewhat different theoretical reasons (Zhang et al., 2003). We used the peak frequency of drug use in the 12 months before the baseline interview as a predictor of improvement. This controls for floor and ceiling effects: those with higher levels of drug use perforce have greater room to improve. A second drug use variable incorporates any reported reduction in the frequency of drug use from the past year peak period in the *month immediately preceding* the baseline interview. This measure of a pre-admission reduction in drug use has proven to be a strong predictor of response to treatment in previous models (Zhang et al., 2003). We consider it tantamount to crossing the borderline between the ‘preparation’ and ‘action’ stages of change (Prochaska, DiClemente, & Norcross, 1992). If the past-year peak and past-month (before treatment admission) frequencies are equal, we code this measure as 0, otherwise 1. A value of one indicates that the client has already reduced his or her drug use relative to the baseline-year peak level.

Entered treatment under criminal justice system pressure—Legal referrals belong in the external pressure category of the non-treatment related client factors that may contribute to recovery from drug abuse (Leukefeld & Tims, 1988). A study of 2194 patients in long-term residential programs found that, independent of motivation for treatment, those under legal pressure remained in treatment longer (Knight, Hiller, Broome, & Simpson, 2000). Other studies have found that justice-system-referred patients report less substance use (Kline,

1997), have a less severe clinical profile at treatment intake, and achieve similar therapeutic gains during treatment (Kelly, Finney, & Moos, 2005) as voluntary patients. In the present study, respondents were asked in the baseline survey ‘what are the most important reasons you have for coming to this program?’ From 12 possible reasons specified, respondents were asked to choose up to three most important ones. To measure whether criminal justice involvement played a major role in getting the patient into the program, we created a dichotomous variable with value being equal to 1 if the category ‘pressure from criminal justice system, attorney, etc.’ was among the three top choices in the patients’ answers; otherwise, 0.

Mental health problems—The treatment needs of patients who have a psychiatric disorder in combination with drug use disorder differ from the treatment needs of patients with drug use disorder but not psychiatric disorder (Ries, 1994). Furthermore, these patients may also differ in their ways of interpreting the treatment experience (Markowitz, 2001) and/or in treatment outcomes (McLellan, 1983). We measured the patients self-evaluated mental health status through a binary variable on whether the individual was ‘troubled or bothered’ by emotional or mental health problems at the baseline interview, an item based on the Addiction Severity Index (McLellan et al., 1992; McLellan, Luborsky, O’Brien, & Woody, 1980).

Treatment planning—Nearly all logic models of substance abuse treatment and theories of behavioral change in general (Prochaska, DiClemente, & Norcross, 1992) assume that client participation in the initial planning of treatment is important for appropriate response to treatment, although the positive effects of involving patients in decision making related to their care have yet to be demonstrated (Wensing & Grol, 2000). In the NTIES treatment discharge survey, respondents who said they had seen/known their treatment plan were asked further whether they had been involved in deciding the treatment plan or the treatment goals, or ‘someone ... decided without you’. We set up a dichotomous variable with 1 indicating that the patient helped to develop the treatment goals, and 0 otherwise.

Agreement and adherence to treatment goals—Regardless of whether a patient helped to develop the treatment plan, he or she may not have actually adhered to it during treatment. To test the effect of plan adherence on satisfaction and outcomes, we asked at the discharge interview whether the client ‘agreed with the [treatment] goals not at all, somewhat, or very much?’ and ‘[for the treatment period,] tried to stick to or reach the treatment goals very much, somewhat, or not at all?’ In this study, those who answered ‘very much’ to both questions were categorized in one dichotomous variable as 1, otherwise, 0.

Agreement with the treatment provider—Agreeing with the primary caregiver on what life changes are important for reaching treatment goals may be a useful tool for change, as it may serve as a ‘behavior contract’ (Miller, 1999). It suggests the acquisition of a positive therapeutic alliance or working relationships between the treatment therapist or counselor and the patient (Lovejoy et al., 1995). We measured patients’ agreement with the treatment provider through response to a question in the discharge interview on the extent (‘very much’, ‘somewhat’, ‘not at all’) that the patient and primary provider agreed in general ‘about what things you might need to change in your life in order to stay drug free, such as changing the place you lived, changing your friends, going back to school or getting a new job?’ As less than 2 percent of the respondents answered ‘not at all’, we set up a dichotomous variable with value of 1 indicating ‘very much’ and 0 indicating ‘somewhat or not at all’.

Treatment duration (length of stay)—Treatment duration is an important predictor of drug use improvement outcomes (Zhang et al., 2003). In our multivariate mixed models, we use a continuous measure of duration, the number of days elapsed between the first and last day of treatment received. This measure was scaled in whole and fractional months.

Average number of hours receiving counseling/help—The frequency of sessions is usually tapered as patients demonstrate progress, less risk of relapse, a stronger reliance on drug-free community supports (American Psychiatric Association, 1995). Longer appointment length can be used as a marker for quality (Wilson & Childs, 2002). We measured the average total number of hours spent each week in counseling sessions during treatment, based on items in the treatment discharge interview. This measure was constructed in two steps. First, respondents were asked ‘how often each week have you received counseling or other help from [provider], would you say five or more times per week, 2–4 times per week, 1 time per week, 2–4 times per month, or once a month or less?’ To quantify the answer in week-based values, we assigned 5, 3, 1, 0.75, and 0.2 respectively for the above categories. Fourteen out of the 3255 patients received counseling or help so sparsely that they could only specify the total numbers, and 257 patients said that there was no such person. For the above two categories, we assigned 0.1 and 0 respectively. Second, respondents were asked further ‘how long have your sessions with [the provider] usually lasted?’ The response categories offered were ‘less than 10 minutes’, ‘10–29 minutes’, ‘30–59 minutes’, ‘1–2 hours’, ‘more than two hours’. To quantify the answers in hour-based values, we assigned in order the values of 0.15, 0.33, 0.75, 1.5, and 2.5 to the above categories. We estimated the *total average number of hours spent each week* in counseling sessions by calculating the product of the *average total number of hours each session receiving counseling/help* and the *total number of sessions each week*.

Treatment type—We set up four dummy variables (methadone maintenance, withdrawn from methadone, non-methadone outpatient, short-term residential and long-term residential) to distinguish the treatment modality. The non-methadone outpatient treatment acted as the reference group.

Unable to obtain needed care—Matching comprehensive services to patients’ needs may have effect on drug use improvement in addiction treatment (Friedmann et al., 2004). If the patient said yes to the question, ‘Was there any type of service that you felt you needed from the program but had not received?’, the patient was coded 1 on this measure, otherwise 0.

Missed treatment for one week or more—Poor satisfaction may cause patients to miss treatment sessions, which may influence long-term treatment outcomes. Respondents at their treatment discharge were asked whether they had ever missed treatment or all of their appointments for one week or more. To reflect this status, we set up a dichotomous variable with value of 1 if the respondent answered affirmatively, and 0 otherwise.

Receipt of onsite or referred primary medical care—Recent research has shown that patients with medical problems value both primary medical care and specialty care (Grumbach et al., 1999) and important benefits accrue from linking drug abuse care to medical service care in the same setting (Friedmann, Zhang, Hendrickson, Gerstein, & Stein, 2003; Samet, Friedmann, & Saitz, 2001; Samet, Saitz, & Larson, 1996). We set up two separate indicator variables for patients’ receipt of onsite primary care and offsite referred primary care, as reported in the discharge interview. If the patient reported the primary medical care was received ‘on site’ then the onsite variable was coded 1; otherwise, a value of 0 was assigned. If the patient reported that primary medical care was received ‘off site’, then the offsite variable was coded 1; otherwise, a value of 0 was assigned. The referent in multivariate models is the absence of primary medical care.

Public health insurance—The states view Medicaid as an essential part of their current strategy to provide insurance to low-income populations (Weil, 2003). To test the effect of Medicaid payment relative to other modes of insurance payments on patients’ satisfaction and outcomes, we included one dummy variable: whether patients’ treatment was supported to any

extent by Medicaid, the values were coded as 1 if yes, and 0 otherwise. This variable was measured by patient self-report at the baseline interview.

Socio-demographic characteristics—Some studies have found that client sociodemographic characteristics, including age, gender, race/ethnicity, and education, have few significant effects on satisfaction (Greenley & Schoenherr, 1981). Others have found that patients from racial and ethnic minority groups use fewer health care services and are less satisfied with their care than patients from the majority white population (Saha, Komaromy, Koepsell, & Bindman, 1999). The multivariable models control for age, gender, race/ethnicity (Hispanic; non-Hispanic non-blacks; blacks), and education (High school graduate or General Equivalency Degree [GED] versus other), all recorded at baseline. We dichotomize age at 25 years, due to previous findings of nonlinearity in response to treatment, with adolescents and the youngest adults responding differently from older ones.

Statistical analysis

We used multilevel regression, which took into account the clustering of patients within treatment program, to examine the independent effects of satisfaction and treatment process components on drug use improvement at follow-up, controlling for other patient and program characteristics (Leyland & Goldstein, 2001). The statistical software used was STATA 7.0 (StataCorp, 2001). We specified ‘cluster()’ in the REGRESS procedure to allow relaxing the assumption of independence within programs. The key treatment outcomes were first regressed on the treatment process variables along with the satisfaction measure. Dummy variables were then included indicating methadone, short-term, and long-term residential programs, with non-methadone outpatient programs as the reference group. In the most complete model, we included all other control variables—patient demographic characteristics and other pre-treatment characteristics—to examine whether satisfaction with treatment continued to predict drug use outcomes when all other measured, expected determinants of outcome were held constant. All statistical tests were two-tailed.

Results

Descriptive statistics

Table 1 shows descriptive information on all variables. The sample was mostly over 25 years of age (median age, not shown in table, 33 years), two-thirds male, a majority non-Hispanic black, and just over half had high school degrees. Nearly 60 percent had lower drug use in the month before treatment than the peak month of the prior year; less than a third were under criminal justice pressure to enter treatment or were supported by Medicaid, and nearly half were troubled by mental or emotional problems. About two-thirds helped develop their treatment goals, a similar proportion agreed with their primary provider about means to achieve the goals, and about half reported adherence with this agenda. Mean length of stay was 4.5 months (varying by modality, with short-term residential much shorter, methadone maintenance much longer), with three hours/week of average contact. Two-thirds of all patients expressed high satisfaction with treatment services they received. Drug use improved significantly at follow-up. Primary improvement scores in the sample ranged from −5 to +9, with an overall mean of +1.21. The overall improvement scores ranged from −11 to +12 with an overall mean of +2.00.

Multilevel regression models

Table 2 presents results from multivariate regression models on primary and overall drug use improvements, labeled as model 1 and model 2, depending on whether patient and program characteristics other than satisfaction and treatment process components were controlled for.

Patient satisfaction had significant positive net effects on both primary ($\beta_P = 0.20, p < .05$) and overall ($\beta_O = 0.36, p < .01$) drug use improvement outcomes, independent of other measures and components of treatment process. These effects became stronger ($\beta_P = 0.23, p < .001$; $\beta_O = 0.41, p < .001$) when controls for additional patient and program characteristics were introduced, particularly baseline drug use measures, treatment modality, and patient age, sex, and education attainment.

Several other factors also influenced the outcomes positively. Patients who reduced primary drug use in the month before coming to treatment had significantly higher primary and especially overall drug use improvement after treatment ($\beta = 0.19, p < .01$; $\beta = 0.45, p < .001$). Higher baseline peak levels were strongly associated with greater primary and overall drug use improvement ($\beta_P = 0.70, p < .001$) ($\beta_O = 0.69, p < .001$). Female patients were significantly more likely to have higher overall improvement ($0.22, p < .005$), but not primary drug improvement, relative to male patients. Patients with high school or equivalent educational level had significantly greater primary ($0.09, p < .05$) and overall improvement ($0.27, p < .001$).

Patients who agreed/adhered to treatment goals had significantly better primary improvement ($0.12, p < .005$) in the more complete model, and both models yielded significant effects on overall improvement ($0.25, p < .05$ in model 1, $0.26, p < .01$ in model 2).

Treatment duration had consistent positive impacts on the patients' primary ($\beta = 0.05, p < .001$) and overall ($\beta = 0.07, p < .001$) improvements.

Several factors adversely influenced drug use improvement scores. Everything else being equal, missing treatment appointments for one week or longer was negatively associated with primary drug use improvement ($\beta = -0.20, p < .01$ in model 1; $\beta = -0.13, p < .05$ in model 2). Patients who reported that they were troubled or bothered by emotional or mental problems had significantly lower ($\beta = -0.19, p < .05$) overall drug use improvement.

Patients who were 25 years or younger at admission had significantly lower primary ($\beta = -0.20, p < .01$) and overall ($\beta = -0.34, p < .01$) drug use improvement than older patients. Relative to the non-methadone outpatient modality, patients in methadone, whether discharged or in continuing maintenance status at the final interview point, achieved lower levels of primary ($\beta_{MD} = -1.19, p < .001$; $\beta_{MM} = -0.83, p < .001$) and overall ($\beta_{MD} = -1.39, p < .001$; $\beta_{MM} = -1.04, p < .005$) drug use improvement. Everything else being equal, patients in long-term and short-term residential programs did not differ from patients in non-methadone out-patient programs on both primary and overall drug use improvement.

Alternative specifications and testing

To evaluate the sensitivity of the test results and/or provide robustness against alternative explanations of findings, we tested several alternative model specifications.

The numbers of patients in methadone maintenance, non-methadone outpatient, short-term and long-term residential programs who reported that they missed treatment or appointments for one week or longer were 44, 514, nine, and 55, respectively. We controlled for modality of the programs in the multivariate model. However, considering that missing treatment or appointments was largely an outpatient phenomenon, we dropped this variable in alternative models (not shown here), and found that all the other significant results remained.

We examined an interaction between treatment duration and intensity. The coefficient of this product term was significant when main effects were excluded, but the interaction term was

not significant when the two main effect items—treatment duration and treatment intensity—were in the model.

We found that the single item of patient satisfaction was strongly associated with needing specific services and receiving them. The NTIES discharge interview acquired information on types of specific services needed but not received. Among the 29 percent of patients who expressed such unmet service needs, the ranking of these unmet needs in terms of the proportion of the patients reporting them was as follows: unclassified ‘other’ services (46%), job/employment problem services (17%), housing services (15%), education services (14%), ‘emotions/nerves/mental health help’ (13%), drug or alcohol services (12%), family issue services (11%), income or financial services (8%), ‘medical and health issue services’ (7%), and ‘legal services’ (3%). Further examination showed that the global satisfaction measure was especially sensitive to drug/alcohol services: if the unmet needs included drug/alcohol services, only 21 percent reported that the treatment they received was ‘very helpful’.

Respondents who did receive particular services were asked whether each service was very helpful, somewhat helpful, or not at all helpful. Due to the limited and variable numbers of patients receiving any particular service (see below), we could not generate a general multi-item satisfaction scale from these items. However, as a construct validity check, we examined the strength of associations between overall perceived helpfulness and perceived helpfulness on different types of services received. Kendall’s Tau between the global measure and individual ones were: 0.44 ($p < .0001$, $n = 1391$) for post-discharge planning services, 0.43 ($p < .0001$, $n = 1510$) for counseling or classes specifically about drugs or alcohol, 0.29 ($p < .001$, $n = 518$) for services to help with a housing problem, 0.26 ($p < .0001$, $n = 615$) for services to get government benefits or assistance, and 0.17 ($p = 0.02$, $n = 163$) for services to help with any criminal charges, such as seeing a lawyer.

Discussion

For all specifications, including multivariate models that accounted for more than half the total variance in outcomes, we found positive effects of patient satisfaction on drug use outcomes across a one year period after treatment. This consistent effect was contrary to results in a small number of private-tier programs (McLellan & Hunkeler, 1998) and one study of a public-tier program, but it is consistent with results covering much larger numbers of public-tier programs (Carlson & Gabriel, 2001; Hser et al., 2004). Whether the private-tier results would be replicated in other private-tier programs is not known, but our results add substantial weight across diverse modalities and locations to the importance of patient satisfaction in predicting treatment outcomes among substance abuse patients in public programs.

The effects of satisfaction did not explain a great deal of the total variance in drug use improvements, affirming what has been found in the general health care sector that ‘satisfaction ratings cannot replace success ratings or other outcome indicators in assessment of quality of care’ (Edwards, Yarvis, Mueller, & Langsley, 1978). However, the robustness of the significant effect of the global satisfaction measure on the downstream behavioral outcomes, with everything else being equal, indicates that more research attention should be paid to this construct. In practice, clinicians’ job autonomy and professional standards require them to treat patients according to their best clinical judgment (Konrad et al., 1999) and this judgment may conflict with patients’ subjective satisfaction perceptions. Nonetheless, patient satisfaction is not only a useful marker in evaluating quality of care, it is readily legitimated by the principle of patient-centered care and is easy for clinical organizations to collect one or more times during treatment.

Refinements to the measurement of satisfaction may increase the extent of predictive power on the individual level. However, individual prediction is not the sole or even the principal point of this line of research. Even with very simple measurement, and probably more so with more refined measures, the computation of aggregate satisfaction across groups of patients, controlling for other characteristics that predict response to treatment is a promising approach to estimating the relative effectiveness of different treatment programs, or the same program over time. The most important controls would be case-mix adjustments for characteristics of entering patients, which would include, for example, ‘readiness to change’ (which the peak-use reduction variable seems to capture quite well). Also, other key treatment process measures are important and distinct from patient satisfaction per se—particularly the strongest process measure in our study, retention or length of stay.

The contribution of individual components of treatment to global satisfaction is likely easier to study than their contributions to the overall outcomes of treatment. Future research should examine which treatment processes influence global satisfaction and in which contexts. To extend knowledge in this direction, leading evaluators and clinical researchers seeking to provide evidence-based rationales for improving clinical practices and policies should continue to carefully measure and analyze data on baseline characteristics, treatment process, patient satisfaction, and post-treatment outcomes. However, most clinical providers need not proceed with costly post-treatment measurement.

We used a simple global measure of overall treatment helpfulness to capture patient satisfaction, although, admittedly, satisfaction is a multidimensional concept (Ware et al., 1978). On the other hand, using a single global measure of satisfaction has some advantages. One can gauge patients’ perceptions at minimal cost, and minimize the cognitive burden on respondents. This overall satisfaction can be a natural derivation of the self-assessment of one’s own progress in treatment. Although most commercial managed care products use patient satisfaction surveys rather than clinical outcomes assessment, few report results directly to individual clinicians regarding their own patients (Merrick, Garnick, Horgan, & Hodgkin, 2002). A potential exists for patients and clinicians to use perceived helpfulness to inform and monitor treatment over time, as advocated by McLellan and colleagues (2005).

Our previous findings on the strong predictive power of pre-treatment reductions in drug use (Zhang et al., 2003) were confirmed in this analysis. This finding reveals that major changes in drug do not necessarily begin only after treatment entry. Further research is needed that examines the overall change process in a life-course context, as advocated by Hser, Anglin, Grella, Longshore, & Prendergast (1997). We believe our measure has a valuable role in capturing motivation from reported behavioral preparation (see also Moore & Budney, 2002), is probably indicative of momentum toward ‘recovery’, and for this reason should be considered as a candidate for inclusion in clinical intake assessments as well as research and evaluation studies.

This study has several limitations. The sample of patients, although large and fully representative of the diverse treatment units from which they were drawn, is not a probability sample of all substance abuse patients, hence subject to unmeasured selection biases. Programs had some choice in whether to apply for CSAT demonstration funds, and agency criteria were used to make awards. These stages of selection may have marked programs with special characteristics—greater merit, or perhaps greater need. However, many programs were in NTIES on a pro forma basis, covered under ‘Target Cities’ applications by their cognizant county-level agency, and individual NTIES programs often reported little or no receipt or direct impact of the CSAT funding (Gerstein et al., 1997).

All data were collected during 1993–1995, and the US treatment world has evolved since then. Methamphetamine and OxyContin addictions have become much more prominent parts of the stimulant and opiate treatment mix in many regions. The Drug Abuse Treatment Act of 2000 authorized a new, still growing treatment modality of office-based buprenorphine prescription for opioid addiction. Motivational interviewing has been more widely adopted as a counseling tool, and programs' administrative and regulatory environments have become more complex and demanding. Linkages between treatment and criminal justice systems have grown more extensive as specialized 'drug courts' have increased in number. These and other changes suggest the importance of revalidating our findings, although they provide no particular reasons to think these results would become either weaker or stronger.

Compared with a national sample of all patients in treatment, this sample has a high proportion of African Americans and of patients admitted to long-term residential treatment programs. We control for both factors in our models, and neither would appear to bias the results reported, but further work would be useful to secure generalization to samples of patients or programs that differ markedly from the combinations evaluated here.

As a strictly observational study in which treatments were not allocated randomly, causal attributions based on statistical correlations between patient characteristics, treatment components, and outcomes are subject to the standard caveat. Also, this study relies on self-report data not only for patient satisfaction (which is intrinsically subjective) but also for domains that might have been subject to independent objective measurement and validation.

Limitations notwithstanding, we think the study provides credible evidence that patient satisfaction in public-tier substance abuse treatment programs, measured at discharge, is a positive signal of prospects for successful long-term outcome. This measure should be investigated to achieve greater refinement, capability for assessing individual components of treatment process, and potential for comparing program quality (in contrast to differential individual prognoses) with appropriate case-mix and program-type adjustments controls.

Acknowledgments

This research was supported by the National Institute on Drug Abuse (grant number R01 DA13615) and the Robert Wood Johnson Foundation Substance Abuse Policy Research Program (grant number 014673). The National Opinion Research Center at the University of Chicago and Research Triangle Institute carried out the NTIES project under contract from the Substance Abuse and Mental Health Services Administration Center for Substance Abuse Treatment (contract number ADM 270–92–0002). The views expressed in this article are the authors and not necessarily those of the Center for Substance Abuse Treatment, the National Institute on Drug Abuse, the Robert Wood Johnson Foundation, or any of their affiliated agencies. We are grateful for the very useful suggestions for amendments made by three anonymous *Journal of Health Psychology* reviewers.

References

- Alden DL, Hoa DM, Bhawuk D. Client satisfaction with reproductive health-care quality: Integrating business approaches to modeling and measurements. *Social Science & Medicine* 2004;59:2219–2232. [PubMed: 15450699]
- American Psychiatric Association. Practice guidelines for treatment of patients with substance use disorders: Alcohol, cocaine, opioids. Washington, DC: American Psychiatric Association; 1995.
- Carlson MJ, Gabriel RM. Patient satisfaction, use of services, and one-year outcomes in publicly funded substance abuse treatment. *Psychiatric Services* 2001;52:1230–1236. [PubMed: 11533398]
- Donabedian, A. Explorations in quality assessment and monitoring: Vol. 1. The definition of quality and approaches to its assessment. Ann Arbor, MI: Health Administration Press; 1988.
- Edwards DW, Yarvis RM, Mueller DP, Langsley DG. Does patient satisfaction correlate with success? *Hospital & Community Psychiatry* 1978;29:188–203. [PubMed: 621012]

- Eisen SV, Shaul JA, Clarridge B, Nelson D, Spink J, Cleary PD. Development of a consumer survey for behavioral health services. *Psychiatric Services* 1999;50:793–798. [PubMed: 10375149]
- Friedmann PD, Hendrickson JC, Gerstein DR, Zhang Z. The effects of matching comprehensive services to patients' need on drug use improvement in addiction treatment. *Addiction* 2004;99:962–972. [PubMed: 15265093]
- Friedmann PD, Zhang Z, Hendrickson J, Gerstein DR, Stein M. Effects of primary medical care on addiction and medical severity in substance abuse treatment programs. *Journal of General Internal Medicine* 2003;18:1–8. [PubMed: 12534757]
- Gerstein, DR.; Datta, RA.; Ingels, JS.; Johnson, RA.; Rasinski, KA.; Schildhaus, S., et al. National Treatment Improvement Evaluation Study (NTIES): Final report. Rockville, MD: Center for Substance Abuse Treatment; 1997 [accessed 15 January 2005]. Available at <http://www.icpsr.umich.edu/SAMHDA/NTIES/NTIES-PDF/ntiesfnl.pdf>
- Gerstein, DR.; Harwood, HJ. Treating drug problems: A study of the evolution, effectiveness, and financing of public and private drug treatment systems; Report of the Committee for the Substance Abuse Coverage Study, Division of Health Care Services, Institute of Medicine; Washington, DC: National Academy Press; 1990.
- Greenley J, Schoenherr R. Organizational effects on client satisfaction with humaneness of service. *Journal of Health and Social Behavior* 1981;22:2–17. [PubMed: 7240704]
- Grol R. Improving the quality of medical care: Building bridges among professional pride, payer profit, and patient satisfaction. *Journal of the American Medical Association* 2001;286:2578–2585. [PubMed: 11722272]
- Grumbach K, Selby JV, Damberg C, Bindman AB, Quesenberry C, Truman A, Uratsn C. Resolving the gatekeeper conundrum: What patients value in primary care and referrals to specialist. *Journal of the American Medical Association* 1999;281:261–266. [PubMed: 9918482]
- Hser YI, Anglin MD, Grella C, Longshore D, Prendergast ML. Drug treatment careers: A conceptual framework and existing research findings. *Journal of Substance Abuse Treatment* 1997;14:543–558. [PubMed: 9437626]
- Hser YI, Evans E, Huang D, Anglin DM. Relationship between drug treatment services, retention, and outcomes. *Psychiatric Services* 2004;55:767–774. [PubMed: 15232015]
- Institute of Medicine. Improving the quality of health care for mental and substance-use conditions: Quality chasm series. Washington, DC: National Academies Press; 2006.
- Kasarabada ND, Hser YI, Boles SM, Huang YC. Do patients' perceptions of their counselors influence outcomes of drug treatment? *Journal of Substance Abuse Treatment* 2002;23:327–334. [PubMed: 12495794]
- Kelly JF, Finney JW, Moos R. Substance use disorder patients who are mandated to treatment: Characteristics, treatment process, and 1- and 5- year outcomes. *Journal of Substance Abuse Treatment* 2005;28:213–223. [PubMed: 15857721]
- Kenagy JW, Berwick DM, Shore MF. Service quality in health care. *Journal of American Medical Association* 1999;281:661–665.
- Kline A. Profiles of criminal-justice clients in drug treatment: Implications for intervention. *Addictive Behaviors* 1997;22:263–268. [PubMed: 9113220]
- Knight K, Hiller ML, Broome KM, Simpson DD. Legal pressure, treatment readiness, and engagement in long-term residential programs. *Journal of Offender Rehabilitation* 2000;31:101–115.
- Konrad TR, Williams ES, Linzer M, McMurray J, Pathman DE, Gerrity M, et al. Measuring physician job satisfaction in a changing workplace and a challenging environment. *Medical Care* 1999;37:1174–1182. [PubMed: 10549620]
- Larson CO, Nelson EC, Gustafson D, Batalden PB. The relationship between meeting patients' information needs and their satisfaction with hospital care and general health status outcomes. *International Journal of Quality Health Care* 1996;8:447–456.
- Leukefeld, CG.; Tims, FM. Compulsory treatment: A review of findings. In: Leukefeld, CG.; Tims, FM., editors. *Compulsory treatment of drug abuse: Research and clinical practice*. NIDA Research Monograph 86, DHHS Publication No. ADM 89–1578. Washington, DC: US Government Press; 1988. p. 236–249.
- Leyland, AH.; Goldstein, H. *Multilevel modeling of health statistics*. New York: Wiley; 2001.

- Lovejoy M, Rosenblum A, Magura S, Foote J, Handelsman L, Stimmel B. Patients' perspective on the process of change in substance abuse treatment. *Journal of Substance Abuse Treatment* 1995;12:269–282. [PubMed: 8830154]
- Markowitz FE. Modeling processes in recovering from mental illness: Relationship between symptoms, life satisfaction, and self-concept. *Journal of Health and Social Behavior* 2001;42:64–79. [PubMed: 11357719]
- Mayer T, Cates RJ. Service excellence in health care. *Journal of American Medical Association* 1999;282:1281–1283.
- McLellan AT. Predicting response to alcohol and drug abuse treatments: The role of psychiatric severity. *Archives of General Psychiatry* 1983;40:620–625. [PubMed: 6847331]
- McLellan AT, Hunkeler E. Patient satisfaction and outcomes in alcohol and drug abuse treatment. *Psychiatric Services* 1998;49:573–575. [PubMed: 9603565]
- McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, et al. The fifth edition of the Addiction Severity Index. *Journal of Substance Abuse Treatment* 1992;9(3):199–213. [PubMed: 1334156]
- McLellan AT, Luborsky L, O'Brien CP, Woody GE. An improved diagnostic instrument for substance abuse patients: The Addiction Severity Index. *Journal of Nervous and Mental Diseases* 1980;168:26–33.
- McLellan AT, McKay JR, Forman R, Cacciola J, Kemp J. Reconsidering the evaluation of addiction treatment: From retrospective follow-up to concurrent recovery monitoring. *Addiction* 2005;100(4):447–458. [PubMed: 15784059]
- Merrick EL, Garnick DW, Horgan CM, Hodgkin D. Quality measurement and accountability for substance abuse and mental health services in managed care organizations. *Medical Care* 2002;40(12):1238–1248. [PubMed: 12458305]
- Miller, WR. Treatment Improvement Protocol (TIP) Series Number 35, Center for Substance Abuse Treatment. DHHS Publication No. (SMA) 99–3354. Rockville, MD: Substance Abuse and Mental Health Services Administration; 1999. Enhancing motivation for change in substance abuse treatment.
- Moore BA, Budney AJ. Abstinence at intake for marijuana dependence treatment predicts response. *Drug & Alcohol Dependence* 2002;67:249–257. [PubMed: 12127196]
- Pandiani JA, Banks SM, Schacht LM. Consumer satisfaction and incarceration after treatment. *Administration and Policy in Mental Health* 2001;29:145–155. [PubMed: 11939749]
- Prochaska, JO.; DiClemente, CC.; Norcross, JC. In search of the structure of behavior change. In: Fisher, JD.; Chensky, JM.; Nadler, A., editors. *Initiating self-changes: Social psychological and clinical perspectives*. New York: Springer-Verlag; 1992. p. 87-114.
- Ries, R. Treatment Improvement Protocol (TIP) Series, 9. Rockville, MD: US Department of Health and Human Services; 1994. Assessment and treatment of patients with coexisting mental illness and alcohol and other drug abuse.
- Rodriguez, F. Clients speak out 2004: Fourth annual statewide client satisfaction survey. Olympia, WA: Washington State Department of Social and Health Services, Division of Alcohol and Substance Abuse; 2004.
- Rohland BM, Langbehn DR, Rohrer JE. Relationship between service effectiveness and satisfaction among persons receiving Medicaid mental health services. *Psychiatric Services* 2000;51:248–250. [PubMed: 10655013]
- Ruggeri, M. Measuring satisfaction with psychiatric services: Towards a multi-dimensional, multi-axial assessment of outcome. In: Tansella, M.; Thornicroft, G., editors. *Mental health outcome measures*. Vol. 2. London: Gaskell; 2001. p. 34-47.
- Saha S, Komaromy M, Koepsell TD, Bindman AB. Patient–physician racial concordance and the perceived quality and use of health care. *Archives of Internal Medicine* 1999;159:997–1004.
- Samet JH, Friedmann P, Saitz R. Benefits of linking primary medical care and substance abuse services: Patients, providers, and societal perspectives. *Archives of Internal Medicine* 2001;161:85–91.
- Samet JH, Saitz R, Larson MJ. A case for enhanced linkage of substance abusers to primary medical care. *Substance Abuse* 1996;17:181–192.

- Sederer, LI.; Dickey, B.; Hermann, RC. The imperative of outcomes assessment in psychiatry. In: Sederer, LI.; Dickey, B., editors. *Outcomes assessment in clinical practice*. Baltimore, MD: Williams & Wilkins; 1996. p. 1-7.
- Shuval, J. *Social functions of medical practice*. San Francisco, CA: Jossey-Bass; 1970.
- Simpson DD. A conceptual framework for drug treatment process and outcomes. *Journal of Substance Abuse Treatment* 2004;27(107):99–121. [PubMed: 15450644]
- Smith BD, Marsh JC. Client–service matching in subsequent abuse treatment for women with children. *Journal of Substance Abuse Treatment* 2002;22:161–168. [PubMed: 12039620]
- Stanton, A.; McLeod, C.; Luckey, B.; Kissin, WB.; Sonnenfeld, J. Expanding treatment of opioid dependence: Initial physician and patient experiences with the adoption of buprenorphine. Presentation, American Society of Addiction Medicine. 2006 May 5 [accessed 27 November 2006]. http://buprenorphine.samhsa.gov/ASAM_06_Final_Results.pdf
- StataCorp. *Stata statistical software: Release 7.0*. College Station, TX: Stata Corporation; 2001.
- Tims, FM.; Leukefeld, CG.; Platt, JJ. *Relapse and recovery in addictions*. New Haven, CT: Yale University Press; 2001.
- Tourangeau, R.; Rips, LJ.; Rasinski, K. *The psychology of survey responses*. New York: Cambridge University Press; 2000.
- Ware JE Jr. Effects of acquiescent response set on patient satisfaction ratings. *Medical Care* 1978;16:327–336. [PubMed: 651398]
- Ware JE Jr, Davies-Avery A, Stewart AL. The measurement and meaning of patient satisfaction: A review of the literature. *Health and Medical Care Review* 1978;1:1–15.
- Ware, JE., Jr; Snyder, MK.; Wright, WR. Development and validation of scales to measure patient satisfaction with medical care services. NTIS Publication No. PB-288–329. Springfield, VA: National Technical Information Service; 1976.
- Ware, JE., Jr; Snyder, MK.; Wright, WR. Some issues in the measurement of patient satisfaction with health care services. RAND Report no. P-6021. Santa Monica, CA: RAND; 1977.
- Weil A. There's something about Medicaid. *Health Affairs* 2003;22:13–30. [PubMed: 12528836]
- Wensing M, Grol R. Patients' views on health care: A driving force for improvement in disease management. *Disease Management & Health Outcomes* 2000;3:117–125.
- Wilson A, Childs S. The relationship between consultation length, process and outcomes in general practice: A systematic review. *British Journal of General Practice* 2002;52:1012–1020. [PubMed: 12528590]
- Zhang Z, Friedmann PD, Gerstein DR. Does retention matter? Treatment duration and improvement in drug use. *Addiction* 2003;98:673–684. [PubMed: 12751985]

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Table 1Sample description ($N = 3255$)

	Descriptive statistics: % (valid N) or Mean (SD)
<i>Patient demographics</i>	
Age 25 or younger	22.0 ($n = 717$)
Female	35.8 ($n = 1164$)
Hispanic	15.2 ($n = 494$)
Non-Hispanic, non-black	27.2 ($n = 886$)
Non-Hispanic black	57.6 ($n = 1875$)
High school graduate or GED	55.2 ($n = 1795$)
<i>Patient baseline situation</i>	
Reduced drug use in past month	59.5 ($n = 1938$)
Criminal justice pressure on entry	30.6 ($n = 996$)
Treatment paid by Medicaid	28.8 ($n = 938$)
Troubled by emotional or mental problems	44.8 ($n = 1797$)
<i>Treatment process</i>	
Helped to develop treatment goals	66.7 ($n = 2171$)
Agreed and adhered to treatment goals	51.8 ($n = 1686$)
Agreed with the provider	68.2 ($n = 2219$)
Length staying in treatment, months	Mean = 4.50 (4.84)
Average hours each week in sessions	Mean = 2.91 (2.56)
Needed but did not receive services	29.3 ($n = 951$)
Missed treatment/appointment for a week or more	19.1 ($n = 622$)
Received medical service onsite	38.5 ($n = 1254$)
Received medical service offsite	7.8 ($n = 253$)
<i>Satisfaction</i>	
Treatment perceived as very helpful	65.1 ($n = 2116$)
<i>Outcome measures</i>	
Primary drug use improvement	1.30 (1.68)
Overall drug use improvement	2.13 (2.62)

Table 2

Multivariate modeling on primary and overall drug use improvement

	Primary drug use improvement		Overall drug use improvement	
	Model 1	Model 2	Model 1	Model 2
<i>Patient demographics</i>				
Age 25 or younger	–	–0.20 (0.06) [‡]	–	–0.34 (0.11) [‡]
Female	–	0.03 (0.05)	–	0.22 (0.08) [‡]
Hispanic *	–	0.00 (0.09)	–	0.05 (0.15)
Non-Hispanic Non-black *	–	0.00 (0.07)	–	0.10 (0.13)
High school graduate or GED	–	0.09 (0.04) [†]	–	0.27 (0.08) [§]
<i>Patient baseline situation</i>				
Past-year peak month drug use	–	0.70 (0.02) [§]	–	0.69 (0.02) [§]
Reduced drug use in past month	–	0.19 (0.06) [‡]	–	0.45 (0.11) [§]
Criminal justice pressure on entry	–	–0.09 (0.06)	–	–0.09 (0.08)
Treatment paid by Medicaid	–	0.08 (0.05)	–	0.12 (0.06)
Troubled by emot/mental problems	–	–0.06 (0.05)	–	–0.19 (0.08) [†]
<i>Program characteristics **</i>				
Methadone maintenance	–	–0.83 (0.15) [§]	–	–1.04 (0.29) [‡]
Discharged from methadone	–	–1.19 (0.16) [§]	–	–1.39 (0.27) [§]
Short-term residential	–	0.00 (0.12)	–	–0.25 (0.24)
Long-term residential	–	0.08 (0.07)	–	0.09 (0.11)
<i>Treatment process</i>				
Help to develop treatment goals	0.01 (0.10)	–0.02 (0.05)	–0.04 (0.14)	–0.10 (0.10)
Agree/adhere to treatment goals	0.10 (0.07)	–0.12 (0.04) [‡]	0.25 (0.11) [†]	0.26 (0.08) [‡]
Agree with the provider	0.06 (0.06)	–0.04 (0.05)	0.15 (0.11)	–0.03 (0.08)
Length of stay in treatment (months)	0.05 (0.01) [§]	0.05 (0.01) [§]	0.05 (0.02) [†]	0.07 (0.01) [§]
Average hours each week in sessions	0.03 (0.02)	–0.04 (0.05)	0.05 (0.03) [†]	0.01 (0.02)
Needed services not received	0.16 (0.06) [‡]	–0.01 (0.05)	0.22 (0.10) [†]	–0.03 (0.07)
Missed treatment for a week or more	–0.47 (0.07) [§]	–0.13 (0.05) [†]	–0.62 (0.11) [§]	–0.17 (0.09)
Received medical services onsite ***	0.36 (0.15) [†]	0.00 (0.06)	0.63 (0.24) [†]	0.09 (0.11)
Received medical services offsite ***	0.17 (0.10)	–0.19 (0.08) [†]	0.29 (0.20)	–0.13 (0.13)
<i>Satisfaction</i>	0.20 (0.08) [†]	0.23 (0.05) [§]	0.36 (0.13) [‡]	0.41 (0.08) [§]
Constant	0.69 (0.12) [§]	–0.45 (0.10) [§]	1.13 (0.20) [§]	–1.43 (0.18) [§]
Valid cases, N	3248	3248	3248	3248

	Primary drug use improvement		Overall drug use improvement	
	Model 1	Model 2	Model 1	Model 2
R-square	0.059	0.554	0.058	0.518

Notes: ‘—’ not entered; regression coefficients were shown with robust standard errors in parentheses. All estimates take into account clustering of clients in treatment programs.

* Reference categories are as follows: non-Hispanic Black;

** outpatient non-methadone;

*** received no medical services

[†] p < .05;

[‡] p < .01;

[§] p < .001