# Psychiatric Comorbidity Measures as Predictors of Retention in Drug Abuse Treatment Programs

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**Objective.** To examine lifetime and current psychiatric comorbidity measures as predictors of drug abuse treatment retention, and to test the generalizability of results across treatment agencies in diverse settings and with varying practices.
**Data Sources/Study Setting.** The national Drug Abuse Treatment Outcome Studies (DATOS), a longitudinal study of clients from 96 treatment agencies in 11 U.S. cities.
**Study Design.** The design is naturalistic and uses longitudinal analysis of treatment retention in long-term residential, outpatient drug-free, and outpatient methadone treatment modalities; client background (including psychiatric comorbidity) and program service provision are predictors. Clinical thresholds for adequate treatment retention were 90 days for long-term residential and outpatient drug-free, and 360 days for outpatient methadone. Psychiatric indicators included lifetime DSM-III-R diagnoses of depression/anxiety and antisocial personality, and dimensional measures of current symptoms for depression and hostility.
**Data Collection/Extraction Methods.** Data include structured interviews with clients, a survey of treatment program administrators, and program discharge records.
**Principal Findings.** Dimensional measures of current psychiatric symptoms emerged as better predictors than lifetime DSM-III-R diagnoses. In addition, the predictive association of hostility with retention varied significantly across treatment agencies, both in the long-term residential and outpatient drug-free modalities. Other notable findings were that on-site mental health services in long-term residential programs were associated with better retention for clients with symptoms of hostility.
**Conclusions.** Assessment issues and stability of results across programs are important considerations for treatment research and practice.

**Key Words.** Drug treatment, retention, psychiatric comorbidity, ancillary services

A consistent predictor of success following treatment for drug abuse is length of time spent in the treatment program (De Leon 1985; Hubbard, Marsden, Rachal, et al. 1989; Simpson and Sells 1982). Therefore, the efficient design of treatment requires identifying clients who are likely to leave early and

developing methods to induce them to stay. Psychiatric problems often are suggested as a distinguishing feature of potential dropouts, but the predictive utility of these problems has been a matter of debate (e.g., De Leon 1989).

Treatment providers generally agree that clients presenting for treatment with substance use disorders and psychiatric impairments (i.e., comorbid clients), because they have multiple difficulties facing them, are more difficult to treat (Leshner 1997; Sheehan 1993). Indeed, post-treatment outcomes for comorbid clients frequently are poorer (McLellan, Luborsky, O'Brien, et al. 1986; Platt 1995), and comorbid clients often leave treatment more quickly as well. Associations between psychopathology and dropout have been reported for residential drug abuse treatment programs (e.g., De Leon, Skodol, and Rosenthal 1973; Ravndal and Vaglum 1991) and for outpatient methadone programs (Fisch, Patch, Greenfield, et al. 1973). However, findings of associations between mental health and residential treatment dropout have not been uniform (De Leon 1989).

The influences of psychiatric comorbidity can be extremely complex. Some studies show that comorbid clients have poorer outcomes but not poorer retention (e.g., Alterman, Rutherford, Cacciola, et al. 1996). Others indicate that clients with more psychiatric symptoms, particularly depressive symptoms, stay longer and become more invested in treatment (Agosti et al. 1991; Friedman and Glickman 1987; Joe, Brown, and Simpson 1995). Finally, as Stark (1992) reported, some particular symptom patterns, as opposed to categorical diagnoses, are related to dropout from drug abuse treatment.

These inconsistencies in the relationships between comorbidity and dropout have been problematic for researchers and clinicians alike. Treatment

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planning can be extremely difficult if providers are unsure whether comorbidity is a negative sign, a positive sign, or largely irrelevant. The current study investigates two explanations that might account for some of these divergent findings.

First, wide differences are noted in the diagnostic tools used across studies. Rounsaville (1993) observed that "comparing findings across investigations is difficult because of marked differences in the way client characteristics . . . are defined and measured" (p. 1), and he endorsed the use of standard assessment instruments to improve cross-study consistency. However, the problem is especially complex in regard to mental health because measures often have different underlying theoretical positions. Many of the available psychiatric screening tools are derived from the *Diagnostic and Statistical Manual* series (DSM-III-R or DSM-IV; American Psychiatric Association 1987, 1994, respectively) or a similar source, and they assess whether predetermined diagnostic criteria have been met (see Helzer 1993). Positive diagnoses often rely on information from a client's entire lifetime.

In contrast, other screening strategies have been designed to assess current states or symptoms that are related to, but not solely based on, DSM diagnostic criteria. Assessments of current symptoms usually do not result in a formal clinical psychiatric diagnosis, but they still yield clinically meaningful information. For example, they can provide clinically relevant information about degree of functional impairment beyond the simple presence or absence of a disorder.

Unfortunately, indicators of lifetime psychiatric diagnoses and summaries of current symptoms can produce different results simply because the two are not measuring exactly the same thing. When the criterion measure of interest reflects early treatment engagement or retention, a psychiatric diagnosis based on a client's entire lifetime might be less relevant than information about current symptoms. Spitzer, Endicott, and Robins (1975) describe the complications in psychiatric assessment that result when clients display different aspects of the same disorder, or even different disorders, at different points in time. The particular aspects active when a client enters drug abuse treatment are likely to be the relevant ones. For example, Broome, Knight, Joe, et al. (1997) report that clients' childhood and adolescent antisocial behaviors offer low explanatory power for initial treatment response beyond that of adult antisocial behaviors. Current symptoms also are of clinical concern because they may be changed through the process of treatment.

A second possible explanation for the conflicting results involving comorbidity and treatment dropouts lies in the implementation and delivery of

services across various evaluations. As De Leon (1984) commented regarding therapeutic community research, most investigations have been conducted either as part of large-scale multimodality comparisons or as examinations of single programs. However, individual programs can be highly diverse, even when they represent the same type or modality of treatment (Cole and Watterson 1976; Condelli and De Leon 1993; D'Aunno and Vaughn 1992; Simpson, Joe, Broome, et al. 1997). For example, programs often differ in their offerings of ancillary services designed to address specific client needs. Programs without specialized psychological services might be especially poor at retaining comorbid clients. For this reason, predictive relationships reported in the literature may be site-specific and should be examined for generalizability (see Steer 1980). This is a goal of the present study.

## OBJECTIVES

The purpose of the present study was to examine the relationship between psychiatric comorbidity and treatment retention, taking into account the ambiguity due to assessment strategy and program variation. Retention beyond minimum threshold levels reflects on the extent of client participation and engagement in treatment that is commonly associated with more favorable outcomes (see Gerstein and Harwood 1990). Aspects of current psychiatric symptoms were expected to be predictive of retention, but categorical lifetime indicators were not. Although these predictive relationships were expected to generalize broadly across programs, they were also thought to be sensitive to the unique context of each facility. More specifically, the availability of on-site psychological services was expected to be a program-level determinant of the predictive significance for comorbidity measures.

## METHOD

### *Sample*

As part of the Drug Abuse Treatment Outcome Studies (DATOS), data were collected between 1991 and 1993 on 10,010 admissions to 96 treatment programs in 11 cities throughout the United States. These programs were selected purposefully for obtaining a nationally representative sample of treatment services in community settings (see Flynn, Craddock, Hubbard,

et al. 1997, for details). The data include four major treatment modalities: long-term residential (LTR, which includes Therapeutic Communities), short-term inpatient (STI), outpatient drug-free (ODF), and outpatient methadone treatment (OMT).

In the present study, a subsample of these programs was selected. First, we excluded all clients admitted to the STI modality ($n = 3,122$) because many of these individuals were discharged involuntarily after very brief treatment episodes, often due to insurance complications. In addition, there were 35 small programs (each with fewer than 40 admissions during the study period, $n = 785$) that we excluded from the three modalities used in the study. This was necessary because our analyses focused in part on program comparisons, and we wanted only sufficiently large programs in order to represent each one reliably. (See Simpson and Curry, 1997, for other studies that include these treatment groups.)

Within the eligible programs, clients who did not complete the full intake battery ($n = 779$; see further on) or who had other missing data ($n = 55$) could not be included; together, these exclusions totaled 14 percent of admissions. Thus, the samples used in this study consisted of 2,362 clients from 18 LTR programs, 1,896 from 16 ODF programs, and 1,011 from 13 OMT programs.

Demographic information on these clients appears in Table 1. In general, the clients were predominantly male, African American or white, and in their mid-30s. However, the client profile varied across modalities. Weekly or more frequent opiate use prior to treatment was almost universal in OMT but rare in other programs; likewise, marijuana and alcohol use before treatment were more common for clients in LTR and ODF. Finally, in terms of psychiatric impairment, LTR clients were the most disturbed.

### *Procedure*

Following admission, each client gave informed consent before completing a two-part intake interview, with the two 90-minute sessions occurring approximately one week apart. Intake 1 included information regarding sociodemographic background, education, alcohol and drug use history, illegal involvement, and employment. Intake 2 contained modules of standard clinical assessment instruments such as the Diagnostic Interview Schedule (DIS) (Robins et al. 1981), Composite International Diagnostic Interview (CIDI) (Robins, Wing, and Helzer 1981), and the Symptom Checklist 90 (SCL-90) (Derogatis, Lipman, and Covi 1973). Clients also were interviewed

Table 1: Sample Description

| Characteristic | Treatment Modality | | |
|---|---|---|---|
| | *LTR* | *ODF* | *OMT* |
| Male | $68_a$ | $67_a$ | $61_b$ |
| Race | | | |
| White | $36_a$ | $31_b$ | $46_c$ |
| African American | $49_a$ | $54_b$ | $33_c$ |
| Hispanic | $13_a$ | $11_a$ | $20_b$ |
| Age, Mean (s.d.) | $31_a$ (7) | $32_b$ (7) | $37_c$ (7) |
| Marital Status | | | |
| Married/living as married | $23_a$ | $28_b$ | $40_c$ |
| Never married | $56_a$ | $49_b$ | $32_c$ |
| Divorced/separated/widowed | $22_a$ | $23_a$ | $29_b$ |
| Preadmission Weekly or Greater Use of | | | |
| Cocaine | $66_a$ | $42_b$ | $45_c$ |
| Opiates | $20_a$ | $8_b$ | $93_c$ |
| Alcohol | $56_a$ | $46_b$ | $30_c$ |
| Marijuana | $29_a$ | $26_a$ | $16_b$ |
| SCL-90 Depression, Mean (s.d.) | $1.38_a$ (.93) | $1.03_b$ (.94) | $1.14_c$ (.91) |
| SCL-90 Hostility, Mean (s.d.) | $1.04_a$ (1.01) | $0.77_b$ (.91) | $0.89_c$ (.90) |
| ASP | $51_a$ | $35_b$ | $34_b$ |
| DSM-III-R Axis I Depression/Anxiety | $14_a$ | $12_a$ | $11_a$ |
| Sample Size | 2362 | 1896 | 1011 |

*Note:* Numbers are percentages unless otherwise indicated. Entries in the same row that share a subscript do not differ significantly.

later during treatment (and a portion were selected for post-treatment follow-up) but these interviews were not used in the present study.

Senior staff at the treatment programs also completed a questionnaire administered once during the course of the project. This survey obtained information on client recruitment, treatment approach and practices, staffing and caseloads, financing, and program stability.

### *Measures*

*Client Variables.* The focus of the current study was on the specialized assessments contained in Intake 2. Specifically, diagnoses of ASP, major depression, and generalized anxiety disorder—based on DIS items and scored using an algorithm derived from the DSM-III-R—represented lifetime psychiatric functioning. Because the percentages of clients diagnosed with major

depression or generalized anxiety were small and overlapping, these two types of psychiatric distress were combined to create a single DSM-III-R Axis I "depression/anxiety" measure. Each diagnosis was converted to a dichotomous indicator variable for analysis.

SCL-90 scales representing depression and hostility indicated current functioning. The depression scale (coefficient alpha = .93) was based on the mean of 13 items describing feelings over the 30-day period prior to treatment. Key questions included "feeling lonely," "feeling worthless," and "thoughts of ending your life." The hostility scale (coefficient alpha = .89) was based on the mean of six items, including "feeling easily annoyed or irritated" and "getting into frequent arguments." Ratings for these measures were made on a scale from 0 (not at all) to 4 (extremely).

*Program Variables.* The availability of on-site psychological services was included as an aspect of programs' treatment delivery structure expected to influence the importance of psychiatric predictor variables. Psychological services were offered on-site at 16 of the LTR programs, nine programs in ODF, and eight OMT programs. Staff at three OMT facilities and one ODF facility failed to complete the information regarding ancillary services, but it was decided to retain these programs for analysis. In these modalities, therefore, a second program-level indicator variable was created to reflect unknown (versus known) service offerings. When both indicators are included in the analysis, the reference group for each is the set of programs known to lack psychological services.

*Retention.* The outcome of primary interest in this study was retention in treatment beyond the minimum thresholds shown to have therapeutic benefits (Hubbard, Marsden, Rachal, et al. 1989; Simpson and Sells 1982). To be compatible with the cost-reduction pressures of managed care systems, the focus of attention was not on "who gets the most treatment," but on "who gets at least a reasonable amount" (Shwartz, Mulvey, Woods, et al. 1997). Accordingly, the number of days between client admission and the last therapeutic contact was dichotomized at clinically meaningful time intervals for each modality. Simpson (1979, 1981) suggested 90 days as the minimum amount of time required to affect client outcomes from therapeutic communities and ODF programs, and it is similar to the minimum-time estimates suggested by others as well (Condelli 1994). Therefore, for LTR and ODF, the outcome variable was retention in treatment 90 days or longer, scored dichotomously. For OMT, the critical time appears to be longer (Simpson, 1979, 1981). Consistent with a maintenance philosophy and with empirical

trends (see Simpson, Joe, Broome, et al. 1997), the threshold for OMT was set at 360 days.

*Analytic Approach*

Associations between client psychiatric impairment and treatment retention were assessed using hierarchical linear modeling (HLM) (Bryk, Raudenbush, and Congdon 1996). This approach is the appropriate analytic choice because it addresses the multi-level nature of the data. Specifically, clients treated in the same treatment facility tend to be similar to one another. That is, they come from the same general urban areas, and they are exposed to the same general treatment conditions and philosophy. As a result, statistical comparisons of clients and of programs are intertwined, and approaches that ignore this fact can be misleading.

Conceptually, HLM handles the problem of confounding associated with nested data by simultaneously estimating relationships at both levels: clients and programs. Although the outcome is specified at the client level, regression models can be constructed with client- and program-level predictors. Relationships between client-level predictors and outcomes may vary across programs. HLM decomposes these relationships into a fixed portion (i.e., the base relationship common to all programs) and a random portion (i.e., the component that varies from program to program). The random component can be explained subsequently by program characteristics. A more extensive discussion of the theory and implementation of HLM can be found in Bryk and Raudenbush (1992).

*Specific Analytic Procedure.* Within each treatment modality, we predicted the dichotomously scored retention variable using four psychiatric impairment indicators (SCL-90 Depression, SCL-90 Hostility, ASP, lifetime DSM-III-R Axis I depression/anxiety) and a set of demographic control variables (gender, age, race, and marital status) in a logistic model. The analyses were random coefficient regression models (see Bryk and Raudenbush 1992: 20–21), designed to assess the significance and magnitude of the associations of predictors with retention and whether these associations varied across programs. Next, where significant variation in predictive relationships was found, on-site psychological services were examined as a program-level determinant of the variation. Note that presence or absence of on-site psychological services was not expected to influence the base retention rate of the program because this rate was estimated with the effects of psychiatric functioning being controlled statistically.

## RESULTS

Table 2 shows the results of the final HLM models for retention in each modality. In LTR, lifetime functioning measures—represented by DSM-III-R diagnoses of depression/anxiety and ASP—were not significantly related to retention, whereas current dimensional measures of functioning were. Clients with current depressive symptoms were significantly more likely to stay in treatment 90 days or longer, and those with more hostility were more likely to drop out. In addition, the intercept (variance component = .121; $\chi^2[17, N = 2{,}362] = 44.51$, $p < .001$) and the regression weight for hostility (variance component = .051; $\chi^2[17, N = 2{,}362] = 39.33$, $p = .002$) varied across programs. The significance of these components indicates that differences in the retention rate for each program (i.e., the intercept) and the predictive importance of hostility (i.e., its regression weight) cannot be attributed to random sampling variations between programs. Furthermore, provision of psychological services on-site was associated significantly with between-program variation in the effect of hostility. Although clients with higher hostility scores were considerably less likely to remain 90 days or more in programs without on-site services (OR = .64), the provision of such services "equalized" this difference to some extent (i.e., −.442 + .299 = −.143; OR = .87). Significant variation remained in the hostility slope when service provision was included (variance component = .040; $\chi^2[16, N = 2{,}362] = 32.72$, $p = .008$), suggesting that other determinants of hostility's importance might also be operative.

For the other two modalities, psychiatric measures provided little prognostic significance. In ODF, no psychiatric variables exhibited a significant effect across all programs. Hostility, however, had a significant random component (variance component = .044; $\chi^2[15, N = 1{,}896] = 28.26$, $p = .02$), indicating that in the context of certain treatment programs hostility was related to retention. Based on the negative regression coefficient, the hostility-retention relationship—where it exists—denotes that more hostile clients leave treatment prior to the 90-day threshold. Unlike the case of LTR, however, presence or absence of on-site psychological services did not appear to explain the relative importance of hostility. The one ODF program with unknown service offerings had particularly poor retention for hostile clients, but the meaning of this finding is unclear. For OMT, the depression/anxiety diagnosis was predictive of treatment dropout. Since none of the measures exhibited significant random components, the results for OMT appear to be

Table 2: Regression Results, by Modality, Predicting Retention from Psychiatric Comorbidity and Demographics

| | *LTR (90 Days or More)* | | *ODF (90 Days or More)* | | *OMT (360 Days or More)* | |
|---|---|---|---|---|---|---|
| *Predictor* | *Coefficient* | *Odds Ratio* | *Coefficient* | *Odds Ratio* | *Coefficient* | *Odds Ratio* |
| Client-level Model | | | | | | |
| Depression | .164* | 1.18 | −.033 | 0.97 | .118 | 1.13 |
| Hostility | −.442*** | 0.64 | −.041 | 0.96 | −.021 | 0.98 |
| DSM-III-R Axis I depression/anxiety | −.016 | 0.98 | −.066 | 0.94 | −.560** | 0.57 |
| ASP | .030 | 1.03 | −.044 | 0.96 | −.086 | 0.92 |
| Age | .018** | 1.02 | .014 | 1.01 | .014 | 1.01 |
| Married | −.249* | 0.78 | .051 | 1.05 | .071 | 1.07 |
| Male | .095 | 1.10 | −.228* | 0.80 | −.038 | 0.96 |
| Hispanic | −.048 | 0.95 | −.384* | 0.68 | −.543* | 0.58 |
| African American | .124 | 1.13 | −.302* | 0.74 | −.248* | 0.78 |
| Base retention rate | −.035 | | .610 | | .274 | |
| Program-level Model for Hostility Effect (Interaction) | | | | | | |
| On-site psychological services | .299** | | .020 | | – | |
| Services unknown | – | | −.367** | | – | |

*$p < .05$; **$p < .01$; ***$p < .001$.

consistent across programs. Retention rates (intercepts) varied significantly between programs in ODF (variance component = .614; $\chi^2[15, N = 1{,}896] = 115.59, p < .001$) and OMT (variance component = .695; $\chi^2[12, N = 1{,}011] = 103.81, p < .001$).

## DISCUSSION

The results suggest that the current psychiatric symptoms of clients at intake influence retention under certain treatment conditions, although in some cases lifetime diagnoses are also important. Specifically, in LTR, current symptoms of hostility were related to a lower likelihood of reaching the 90-day retention threshold, and current depressive symptoms were related to a higher likelihood of retention beyond it. Further, the relationship of hostility to dropping out of treatment varied significantly across programs, partly as a function of the availability of "on-site" psychological services. Lifetime measures of DSM-III-R disorders were not significantly related to dropout. In ODF, no consistent and statistically significant predictive pattern emerged across programs, but clients with greater hostility did appear more

likely to leave some programs before 90 days. As noted in other analyses of these data, however, ODF programs in DATOS have a remarkable diversity that introduces methodological problems and challenges (see Simpson, Joe, Broome, et al. 1997; Simpson, Joe, and Brown 1997). Among OMT clients, lifetime DSM-III-R Axis I depression/anxiety was associated with more frequent dropout before 360 days. This relationship was found to be highly stable across OMT programs. In other words, for two of the three modalities studied (LTR and ODF), clients with current symptoms of hostility were less likely to receive a therapeutically appropriate dose of treatment; in the third modality (OMT), clients with evidence of lifetime depression or anxiety were the ones less likely to receive sufficient treatment.

In the current study, "retention" reflected clients' compliance with treatment protocols for at least the minimum therapeutic duration. A common alternative strategy involves continuous measures for total length of stay. We therefore conducted an additional set of analyses based on months spent in treatment, but these are not reported formally in this article because they produced substantially similar results. We also believe that consideration of retention thresholds has more clinical relevance and is more practical and informative in an era of managed care (see also Shwartz, Mulvey, Woods, et al. 1997).

Some data limitations that restrict our conclusions should be noted. For instance, the two-part structure of the intake battery meant that the psychiatric assessments were not completed until approximately one week after treatment admission. Although the delay reduced the likelihood that psychiatric symptoms were brought on by drug use or withdrawal rather than by a truly comorbid condition (see Kadden, Kranzler, and Rounsaville 1995), the delay also allowed 779 clients (representing 13 percent of all admissions) to drop out of treatment before they completed the assessment phase. Consequently, this study may underestimate the prevalence of psychiatric comorbidity and its effect on early treatment attrition. One implication of our findings is that the very early dropouts might have included clients with the most severe symptoms—persons whose presence in the analysis would have produced more robust results. Time of testing is likely to be another important variable determining the generalizability across studies for this effect, but closer investigation of this issue was not possible. In terms of between-program differences, two points should be made. First, the availability of on-site psychological services does not necessarily guarantee that every client in need of services receives them. More detailed examination of individual clients' treatment experiences is needed to understand fully the role of these

services. Second, the HLM methodology performs best when the number of groups (i.e., treatment programs) is large. Even in the present national study, the number of groups is relatively small—13 to 18 per modality. Statistical power is lower as a result and may underestimate program differences.

Despite these limitations, our findings have implications for the inconsistency of prior research. Of particular importance is the evidence that current, dimensional mental health measures are more relevant for the prediction of retention than are lifetime measures. In LTR and at least some ODF programs, current symptoms predicted retention; only in OMT was a lifetime measure a significant predictor. The unique findings in OMT might be attributed to serving opioid users, but definitions of the dependent variable also seem relevant. With a greater time lapse between assessment of intake and dependent measures (360 days versus 90 days) current symptoms have a greater opportunity to change. In addition, LTR clients scored highest on the comorbidity measures, which might affect the process of treatment.

As expected, another important finding was that predictive relationships for psychiatric measures varied across treatment programs, even within the same modality. Among programs in LTR and ODF, the importance of hostility symptoms as indicators of dropout fluctuated. In LTR, the difference could be partially explained on the basis of the services offered. Specifically, specialized psychological services had an ameliorative effect, enabling programs with such services on-site to reduce significantly the dropout rate for clients agitated with hostility. This finding is similar to the finding reported by Magura, Rosenblum, Lovejoy, et al. (1994), namely, that clients with psychological problems tended to drop out early under "standard" treatment conditions but not when they were given cognitive-behavioral therapeutic enhancements. Meeting client needs through ancillary services, in this case mental health services, appears to help them stay in treatment. This in turn improves the chances for behavior change (Simpson, Joe, and Rowan-Szal 1997; Simpson et al. 1997). Our findings support recent recommendations to treat comorbid problems using an integrated approach (Leshner 1997) and suggest one of the ways of undertaking this task. Treatment programs that are not currently offering ready access to these services may be limiting treatment effectiveness. Future research should consider the costs of these additional services, however, in order to weigh the benefits of reduced drug use and improved functioning for comorbid clients against the increased costs involved in retaining them.

Overall, within each modality we found moderate generalizability across treatment sites for the impact of psychiatric comorbidity. Predictive

relationships for most comorbid conditions were consistent across programs; when relationships varied they could be partly explained by mental health service offerings. Clearly, an understanding of treatment and retention means an understanding of the variations in delivery and client samples. The current study represents an encouraging set of first steps to identifying conditions under which comorbidity will and will not be important for retaining clients, and it justifies continued assessment and specialized services for psychiatric dysfunction.

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