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## Other Articles

### Case Management and Quality of Life: Assessing Treatment and Outcomes for Clients with Chronic and Persistent Mental Illness

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**Objective.** To examine the impact of treatment setting and exposure to case management services on the quality of life of U. S. veterans with chronic and persistent mental illness.

**Data Sources/Study Setting.** Data were collected longitudinally on a panel of 895 clients enrolled in 14 pilot programs in Department of Veterans Affairs long-term psychiatric hospitals by the Serious Mental Illness Treatment Research and Evaluation Center during the period 1991–96.

**Study Design.** Data were collected using two primary survey instruments (clinician assessment and client assessment) at baseline, every six months for the first two years, and every year thereafter, for a total of four years of follow-up. Case management exposure over time and its impact on the client's quality of life represent the key variables in the study. Additional controls included a variety of sociodemographic, socioeconomic, and psychiatric characteristics.

**Data Collection/Extraction Methods.** Hierarchical linear modeling was used to control for potential selection bias, test for the compositional effect of treatment setting, and examine the impact of case management exposure over time on the individual client's quality of life.

**Principal Findings.** Increased exposure to case management results in an improved quality of life across several domains, including both objective and subjective dimensions for health, general, leisure, and social, and the subjective dimension only for housing.

**Conclusions.** The study findings provide managers, clinicians, and policymakers a fuller understanding of how this mode of service delivery—case management—affects *several domains* of quality of life for clients with chronic illnesses.

**Key Words.** Case management, quality of life, long-term care, chronic and persistent mental illness

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## INTRODUCTION

Curing disease in acute inpatient settings is still a visible and important function of health services. However, we are witnessing an expanded orientation to health care. This orientation places increasing emphasis on managing episodes of illness across institutional and noninstitutional settings and on establishing treatment goals for increased functional status and quality of life of individuals suffering from chronic conditions. Expanded conceptions of health, health care, and health outcomes place considerable importance on coordinating services across treatment settings and integrating medical services with other types of services offered in the community (e.g., housing, mental health, social services) (Kaluzny, Zuckerman, and Rabiner 1998; Mechanic 1996; Wagner, Austin, and Von Korff 1996). Such coordination is particularly important for individuals suffering from chronic and persistent mental illness (CPMI) and is usually offered in the form of case management services.

During the course of a lifetime, approximately one percent of the population will be affected by schizophrenia and 8 percent by affective disorder, two primary diagnostic categorizations of CPMI (Babigian 1985; Weissman, Bruce, Leaf, et al. 1991). The social costs associated with CPMI are significant. For schizophrenia, treatment costs alone exceed \$7 billion annually; indirect costs such as social services and loss of productivity account for twice that amount. This financial burden is roughly equal to that of all cancers combined (Hall, Goldstein, Andrews, et al. 1985). The systemic and chronic nature of serious mental illness makes outright cure difficult. Rather, managing the illness and its attendant conditions and improving functional status and quality of life represent key treatment goals for the seriously mentally ill.

This study examines the individual, treatment, and programmatic determinants of change in quality of life over time for a group of institutionalized

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U. S. veterans with CPMI as they transition into a community-living environment. Our primary research question is: To what extent does exposure to case management affect the quality of life of clients with CPMI over time?

### *Case Management*

Case management was introduced as a mechanism to assist clients in navigating the service system and obtaining needed services (Bachrach 1981; Mueser et al. 1998). "The case manager functions, in theory, as the human link between the client and community, particularly the maze of organizations and providers in the fragmented service system" (Pescosolido, Wright, and Sullivan 1995, p. 40). Case management services are expected to address the needs of persons with chronic illnesses, such as CPMI, who experience impairment due to symptoms, role dysfunction due to disability, and limited opportunity due to disadvantage (Anthony 1992). Case management addresses each of these limitations by (1) actively coordinating and following up on the client's ongoing mental health treatment, thereby reducing his or her psychiatric impairment; (2) training the client in psychosocial rehabilitation and social skills to increase his or her psychosocial functioning; and (3) brokering resources to open up a broader range of financial, employment, and social opportunities for the client.

Although different models and definitions of case management exist, general agreement has emerged concerning the basic service elements that case management should incorporate, including outreach, assessment, treatment plan development, arranging for service delivery (either directly or through referral), and monitoring and assessment of services (Holloway et al. 1995). Case management programs vary in the number of these elements they provide (comprehensiveness of services) and in the intensity of their approach (exposure to case management services) (Chamberlain and Rapp 1991; Eggert et al. 1991; Graham and Birchmore-Timney 1989). We focus on case management exposure in this study.

### *Previous Case Management Research*

Case management programs have been studied in relation to a wide variety of outcomes, including hospitalization; costs of care; use of other mental health services; and client outcomes, such as symptomatology, social functioning, compliance with treatment, residential stability, and quality of life (Eggert et al. 1991; Holloway et al. 1995; Scott and Dixon 1995; Solomon 1992). Most research on the effects of case management has focused on service utilization

and costs as outcomes, rather than on the clients' satisfaction with their own lives or objectively measured quality of life (Scott and Dixon 1995). This is the case, despite a major criticism of earlier deinstitutionalization efforts, for which reductions in cost and utilization were overarching goals and to which inadequate attention to the impact of this transition on the clients' well-being and quality of life was paid. Further, findings to date on the effects of case management have been mixed and generally inconclusive (Chamberlain and Rapp 1991), as the Cochrane Collaboration illustrates.

The Cochrane Collaboration conducts a periodic and systematic literature review in case management for people with severe mental disorders (Marshall et al. 1999). The most recent systematic review was completed on December 1, 1997, and was limited to studies of randomized controlled trials (RCT) specifically on "case" or "care" management (versus assertive community treatment, or ACT, more generally) and involving clients mainly between the ages of 18 and 65 years. While their extensive literature review did find significant effects of case management on continuity of contact with the health care system and more psychiatric admissions, it found no significant effects of case management on clinical or psychosocial outcomes measures. Despite these limitations, researchers generally agree that exposure to case management services is a critical component of care for persons with a variety of serious and chronic illnesses, including mental illnesses (Gorey, Leslie, Morris, et al. 1998; Lamb 1995; Mueser et al. 1998). Some researchers suggest that these inconsistent results may be explained by study limitations such as inadequate follow-up time to measure change (Holloway et al. 1995) and inadequate attention to the amount of case management provided (Scott and Dixon 1995).

### *Case Management and Quality of Life*

Quality of life can be broadly defined in terms of "adequate resources, fulfillment of social roles in multiple life domains, satisfaction with life in various domains, and general life satisfaction" (Lehman 1988). In general, persons with CPMI tend to display lower levels of educational, financial, and vocational achievement than the general population (Anthony 1992). Quality of life and interventions to enhance quality of life become more relevant as individuals are shifted from institutional settings, which offer housing and basic subsistence, to community settings, which lack such inherent support.

Ideally, mental health service providers help persons with CPMI improve the quality of their lives. Providing case management services is one primary treatment mechanism for assisting clients. These services are expected

to enhance the quality of life for persons with CPMI by facilitating linkage to needed resources, providing assistance in combating bureaucratic barriers and in navigating complex social and provider systems, and providing continuity of care (Bachrach 1993; Bigelow and Young 1991; Corrigan and Kayton-Weinberg 1993; Quinlivan, Hough, Crowell, et al. 1995). Improvements as facilitated by the case manager—decreased impairment, improved functioning, and opened opportunity—are expected to improve multiple quality-of-life domains, including social relationships, access to employment opportunities, mental and physical health status, and housing opportunities. We therefore hypothesize:

H1: As exposure to case management increases, individuals with CPMI will exhibit higher levels of quality of life.

Our research aims to address several limitations of the past research literature in this area by examining the relationship between the amount of exposure to case management and quality of life over time. Our study also incorporates a longer follow-up period, a large sample of individuals with CPMI, and controls for a variety of alternative explanations of the relationship between case management and quality of life.

### *Other Factors Affecting Quality of Life*

In addition to case management, clearly a variety of other factors exist that potentially affect an individual's quality of life. Accordingly, to assess accurately the independent effect of case management exposure on quality of life, controlling for these competing influences is important. We explicitly examine the effects of the following client characteristics on quality of life: (1) psychiatric—psychiatric diagnosis, history of inpatient stay, and clinical functional status; (2) sociodemographic—age, gender, race, and marital status; and (3) socioeconomic—education, financial resource availability, and employment status.

## METHOD

### *Study Setting*

At present, approximately 326,000 veterans with CPMI use the Veterans Affairs (VA) service system annually. However, as suggested by the National Co-Morbidity Study (National Advisory Mental Health Council 1993), the potential population of veterans with CPMI is 630,000, representing 2.3 percent

of the U. S. veteran population. A 1994 General Accounting Office (GAO) report found that discharge planning staff seldom monitor a veteran's progress after release from Veteran Health Administration (VHA) psychiatric inpatient facilities because of inadequate staffing, difficulties in maintaining contact, and resistance by some veterans to continued VHA involvement in their lives (GAO 1994).

Although the VHA maintains a wide array of outpatient-based services, their most resource-intensive efforts target an inpatient-based delivery system. The VHA is actively attempting to change this situation by supporting further deinstitutionalization of the CPMI veteran population and providing resources for the provision of community-based ambulatory services. Many programs have opted to introduce or enhance case management services as a supportive intervention for this population. This shift provides a unique opportunity to study the consequences of psychiatric deinstitutionalization for a subpopulation of U. S. veterans with CPMI specifically, and to examine more generally the effects of case management on quality of life.

### *Sample*

The criteria we used to designate a program in our sample are that the program treat clients with an ICD-9-CM diagnosis of one of the psychoses (schizophrenia, affective disorders, dementia, psychoses due to alcohol or substance abuse, but excluding transient organic psychosis and psychosis with childhood origin) and either 150 days of inpatient hospitalization (*chronic stayers*) or five inpatient admissions (*intermittent stayers*) within the past year.<sup>1</sup> The study targets clients in 14 VA medical centers providing substantial amounts of care to psychiatric clients with these characteristics. These 14 sites received funding to institute special programs to enhance the care provided for their chronic clients with CPMI and to prepare them to re-enter the community. These clients constitute a sizeable number of the clients in VA mental hospitals. A review of the patient treatment files (PTF) for the 14 hospitals included in the targeted facilities in 1991 indicated that over 7,000 clients met these criteria, although only a fraction of these clients will ever be enrolled in the specialized treatment programs. Clients were not selected randomly; they were selected on the basis of assessed individual "readiness" for community living.

Three broad types of programs are represented by these 14 sites: inpatient rehabilitation, or "sustained treatment and rehabilitation" (STAR); intensive case management (ICM); and day treatment centers (DTC). STAR programs focus on sustained treatment and rehabilitation, as their name

implies, and they include transitional services prior to client discharge into a community setting. ICM programs offer intensive case management in an outpatient setting. DTCs offer rehabilitative and recreational activities in an outpatient setting.

To ensure that as many clients as possible were followed over the course of the project, the Serious Mental Illness Treatment Research and Evaluation Center (SMITREC) developed comprehensive procedures to track clients who left the program medical center and were potentially lost to follow-up. Clients who continued to receive health care services from the VA were tracked through the centralized VA computer files. Once a medical center was identified as the current source of care, arrangements were made for the primary clinician providing services to assess the client using the project instruments. To minimize loss to follow-up, over the course of the study, repeated attempts were made to locate all clients enrolled in the study. Those individuals who were initially enrolled and who subsequently dropped out of the treatment programs and were never located represent 24 percent of the sample<sup>2</sup>—a substantially lower percentage than for most samples comprising the seriously mentally ill (Harding, Brooks, Ashikaga, et al. 1987; Leff, Sartorius, Jablensky, et al. 1992; Tsuang and Coryell 1993). However, all available assessments for these lost-to-follow-up individuals are included in the analyses.

Our study sample is made up of 996 individuals located in the 14 separate programs and represents 4,762 individual assessments, or time points.<sup>3</sup> At the individual level, 10 percent of the total sample was excluded from the final analysis due to missing items, resulting in an analytic data set of 895 individuals. Statistical analyses revealed no significant differences between the dropped sample members and the remaining members on all independent variables.

### *Data Sources*

The data collection strategy for the evaluation included multiple assessments of the sample clients over time in each of the 14 sites: a comprehensive initial and follow-up clinician's assessment and a comprehensive initial and follow-up client's assessment. These assessments gather clinical and psychosocial data on clients over time. Once client eligibility for inclusion in a pilot program was determined, staff members completed both the client and clinical assessments for each program participant every six months for the first two years and annually thereafter, for a total of four years of follow-up. The earliest data collection on sample clients began in October 1991.

The clinician assessment was completed by a clinician familiar with the client and includes DSM-III-R diagnoses recorded as ICD-9 codes and three clinical scales to measure symptom severity, functioning, and types of treatment program elements (including case management) provided since the last assessment.<sup>4</sup>

An additional client assessment, which consisted of initial and follow-up interviews with clients, was completed by trained study-site coordinators.<sup>5</sup> It included Anthony Lehman's quality-of-life scales (Lehman 1988), specifically developed for persons with CPMI, and a series of questions related to the client's sociodemographic background and interaction with the health care delivery system.

Additional data were obtained from the centralized database on VA clients, maintained at the Department of Veterans Affairs' Data Processing Center (DPC). They included variables on the number of VA admissions and length of stay per visit, summed over time to produce total length of stay/number of admissions in the year preceding enrollment in the study, as well as during the years of enrollment. The DPC database also supplied demographic information, such as sex, race, and age of sample clients.

### *Measures*

We utilized measures at three different levels: time, individual, and program. There are four measures at the time level: quality of life, clinical functioning, case management exposure, and years. The remaining client characteristics represent individual rather than time-level data because they are intended to represent the client's status at program entry: age, gender, marital status, race, financial resources, education, employment, psychiatric diagnosis, and history of inpatient stay. Finally, treatment program type is measured at the program level of analysis. Table 1 provides a detailed measurement description for all variables in the study, including descriptive statistics.

Additional detail on the central variables in this study—quality of life and case management exposure—is provided below.

### *Dependent Variable—Quality of Life*

The dependent variable in this study is a multidimensional measure based on a standardized measurement instrument: Lehman's Psychiatric Quality of Life Interview (QOLI). Lehman specifically designed the QOLI to be used with seriously mentally ill clients. The Lehman quality-of-life scales measure subjective (well-being) and objective (social integration) dimensions



Table 1: Means, Standard Deviations, and Measurement Description of Variables Used in HLM Analysis

Concept	Variable	Mean	SD	Measurement Description
Subjective QOL over time	Domain areas			All subjective scales measured on a 1- to 7-point "terrible-delighted" scale (further detail on item wording available from authors)
	Family	4.71	1.25	Four items, Cronbach alpha .86
	Finance	3.99	1.60	Four items, Cronbach alpha .89
	General	4.55	1.37	Two items, Cronbach alpha .75
	Health	4.81	0.98	Six items, Cronbach alpha .84
	Housing	4.69	1.10	Six items, Cronbach alpha .84
	Leisure	4.72	1.01	Six items, Cronbach alpha .86
	Safety	5.01	1.05	Five items, Cronbach alpha .90
	Social	4.78	0.97	Six items, Cronbach alpha .88
	Domain areas			(further detail on item wording available from authors)
Objective QOL over time	Family	2.19	1.02	Mean, Two items, 1-5 range (high = high frequency of contact)
	Finance	4.66	1.86	Additive, Six items, 0-6 range (high = enough money to cover a variety of monthly expenses)
	Health	3.35	0.73	Mean, Ten items, 1-5 range (high = high self-assessed health)
	Housing	3.90	0.34	Additive, Four items, 0-4 range (high = housing amenities of different types in good working condition)
	Leisure	8.57	3.09	Additive, 16 items, 0-16 range (high = high level of involvement in different leisure activities)
	Safety	2.90	0.30	Mean, Two items, 1-3 range (high = low level of victimization)
	Social	1.91	0.92	Mean, Six items, 1-5 range (high = high frequency of contact)
	Years	1.39	1.12	Number of days since program entry divided by 365 days
	GAF	46.76	14.72	GAF scale ranges from 1 to 90; 1 indicates severe clinical functioning problems and 90 indicates good clinical functioning in all areas. GAF assessed at program entry, every six months for two years, and every year thereafter for two additional years. The GAF scale is equivalent to Axis V in the DSM-III-R, American Psychiatric Association (1987) Diagnostic and Statistical Manual of Mental Disorders (3rd ed., revised).
	Case management	0.32*	0.47	Dichotomous variable (1/0) indicating receipt of case management at any given assessment point.
CSM exposure over time				

continued

Table 1: Continued

Concept	Variable	Mean	SD	Measurement Description
Sociodemographic characteristics	Age	50.20	12.77	Age in years is obtained through the VA record system by matching on social security number. Variables obtained this way were tested for differences on a sample of CPMI inpatient users by comparing bed section and main patient treatment files (PTF) for 14 hospitals during fiscal years 1992 through 1994. The results indicate acceptable reliability for gender, age, and race in the VA data files.
	Gender (male)	0.96*	0.20	Dichotomous variable, male (1), female (0). Obtained through the VA record system by matching on social security number.
	Marital status (married)	0.09*	0.28	Dichotomous variable: legally married or living together for at least seven years (1), not married (0). Marital status is captured at program entry through the family section of the comprehensive patient assessment. Not married includes widowed, separated, divorced, and never married.
Socioeconomic characteristics	Race (white)	0.83*	0.37	Dichotomous variable: white (1) and nonwhite (0). Obtained through the VA record system by matching on social security number.
	Education	12.22	2.67	Ordinal variable indicating the highest grade completed in school between grade 3 or less (3) and graduate school (20).
	Financial resources	1.85	1.31	Additive scale containing 14 items that measure access to different income sources such as SSI and food stamps. Scale ranges from 0 to 14, with 14 representing maximum access to income sources.
	Employment	0.14*	0.35	Dichotomous variable indicating any paid employment at program entry; yes (1) and no (0).
Psychiatric profile	Primary diagnosis (schizophrenia)	0.81*	0.39	Dichotomous variable: schizophrenic or schizoaffective disorder (1) or nonschizophrenic (0) based on the ICD-9-CM code corresponding to the primary diagnosis at program entry. Nonschizophrenic includes all other psychoses (except transient organic and those with childhood origins).
Treatment program type	Institutional stay	203.95	128.22	Number of days in the 12 months prior to program entry that client was in inpatient setting.
	DTC, STAR, and ICM programs			Dichotomous variables indicating program type. STAR (1/0), ICM (1/0), and DTC (1/0). ICM was the referent group.

\*The mean value of a categorical variable represents the proportion of this characteristic in the sample.

of individual quality of life across a variety of resource areas, including living situation, family and social relations, leisure activities, work, finances, safety, and health.

Each of the items in the subjective dimension is measured on a 1- to 7-point “feeling” scale, where 1 indicates “terrible” and 7 indicates “delighted.” Where at least 60 percent of the scale’s items are completed, a mean value is calculated for each domain (general, housing, etc.). If more than 40 percent of the items in any scale are missing, the entire scale is treated as a missing value.<sup>6</sup> The objective dimension of quality of life addresses the same domains as the subjective dimension, with one exception: There is no objective measure of general quality of life. Items for each objective domain are aggregated into a single scale, either by summing the scores for all items or by taking a mean score. Items are reverse coded as necessary and combined to construct a scale that is positively related to objective resource availability and degree of social integration. Unlike the subjective scales, the objective scales do not utilize a common scale. Details on measurement and reliability for the objective and subjective scales are available in Table 1. Information on the specific items included in the objective and subjective scales are available from the authors.

The psychometric properties of the QOLI have been, and continue to be, extensively studied (Becker 1995; Lehman, Slaughter, and Myers 1991; Levitt, Hogan, and Bocosky 1990). In general, psychometric validation tests examining the QOLI scales yield acceptable levels of reliability and validity. Cronbach alphas range from 0.79 to 0.88 for the subjective scales and from 0.44 to 0.82 for the objective scales; test-retest reliability ( $r$ ) ranges from 0.41 to 0.95 for the subjective scales and from 0.29 to 0.98 for the objective scales; factor analysis effectively discriminated between quality-of-life and mental-health scales (Lehman 1988; Nieuwenhuizen, Schene, Boevink, et al. 1997).

The QOLI instrument is contained in the initial and follow-up client assessment surveys. Staff members, along with clients, completed this instrument at program entry, every six months for two years, and every year thereafter for two additional years. Therefore, QOL is a time-varying dependent variable and, as such, permits an assessment of change in a client’s quality of life over time.

### *Case Management*

Case management is operationalized as a time-varying dichotomous variable representing whether a client was receiving case management services at any given assessment point. If clients were receiving case management services at

the time of an assessment, they received a value of 1 on the case management variable; otherwise, they received a 0. Receipt of case management services during program participation was captured through the clinician's initial and follow-up assessments across all assessments completed for a given client. Since this is a time-varying measure, we were able to examine the effects of case management exposure over time on time-varying quality of life. To our knowledge, longitudinal analyses that incorporate time-varying case management and quality of life simultaneously have not been undertaken.

### *Analysis Strategy*

This study aims to model individual quality of life with predictor variables at three different levels of analysis: time level (level 1), individual level (level 2), and program level (level 3). The data have a nested, multilevel structure, with time points nested within individual clients who are nested within treatment programs. Multiple assessments of quality of life over time and time-varying covariates for each client represent the within-client level of analysis. Client characteristics that are fairly stable over time (e.g., gender) represent the individual level of analysis. Program type represents the treatment program level of analysis. We employed multilevel statistical methodology to account for the nested structure of the data in determining statistical relationships. We chose hierarchical linear modeling (HLM) as the multilevel analytical technique for this analysis (Bryk, Raudenbush, and Congdon 1994). HLM accommodates the nested data structure by appropriately separating out within-program and within-person variance from between-program and between-person variance (Bryk and Raudenbush 1992). HLM corrects for two common problems of traditional regression approaches, disaggregation and aggregation bias, by explicitly estimating parameters at different levels of analysis, thus explicitly accounting for the partial independence of individuals within the same group (Hofmann 1996).

### *Treatment of Missing Values*

HLM can accommodate missing values at level 1 (time) only. Rather than use an imputation method to estimate values for missing values at level 1 or delete these cases altogether, HLM allows inclusion of cases with partial missing data. Therefore, not all clients are required to have a complete set of assessments. However, HLM cannot handle missing values at higher levels of aggregation. In this study, no data were missing for program type (level 3). At the individual level (level 2), mean values (for continuous variables) or

modal values (for categorical variables) for the entire sample were substituted for cases with missing values.<sup>7</sup>

## DESCRIPTIVE RESULTS

Table 1 displays the means and standard deviations for all variables included in the analysis. At the individual level, the average age of the sample is 50 and ranges from 21 to 83. Of the sample, 96 percent is male, 9 percent is married, and 83 percent is white. On average, the sample consists of high school graduates with very low access to financial resources. Only 14 percent of the sample was involved in paid employment at the time of program entry. Across the sample, 81 percent is schizophrenic, and the average inpatient stay in the year prior to program entry is 204 days. On the whole, these clients are clearly impaired, both socially and functionally, and have little support and few resources to draw upon as they transition from an inpatient to an outpatient setting.

Each of the subjective QOL domains can be compared to each other because they are measured on the common “terrible–delighted” scale range of 1 through 7. Individuals are least satisfied with their financial situation over time (mean = 3.99) and most satisfied with their personal safety over time (mean = 5.01). The objective QOL indicators should be evaluated separately from each other because they lack the common metric of the subjective scale; rather, they indicate degrees of social engagement and resource availability specific to certain domain characteristics. The higher the level of the objective value of quality of life in a given domain, the more socially integrated the individual respondent is. The mean levels of objective quality of life and the range of the specific domains indicate that individuals are least integrated in their contact with family and social relationships with friends. They are most integrated in their objective housing situation and level of personal safety.

Over time, level of clinical functioning of the sample varied considerably, ranging from 1 (lowest level of functioning) to 90 (highest level of functioning); the mean falls approximately in the middle of the scale (mean = 46.76). Thus, while these clients clearly suffer from chronic, serious mental illness, their level of functioning fluctuates over time. On average, at assessment, clients were actively engaged in some type of case management for about one-third of their program tenure. There is a strong relationship between setting and case management exposure. On average, clients in each of the three program types were exposed to very different levels of case management:

STAR, 6 percent; ICM, 84 percent; DTC, 36 percent. Additionally, there is variation in case management exposure within programs and across the 14 separate treatment settings, further suggesting the use of a multilevel method.

## ANALYTIC RESULTS

Multilevel analyses typically proceed in the following order: (1) intraclass correlation, (2) first-level model, (3) second-level model, and (4) final model.

The intraclass correlation is computed to determine the amount of variance in the dependent variables attributable to each of the three levels of analysis incorporated in the model. The total variance in quality of life was partitioned into its within-individual (over time), between-individual, and between-treatment-program components. Overall, the majority of the variance in quality of life is split evenly within and between individuals. There are some exceptions, however. For example, satisfaction with family relations, as well as objective contact with family members, is more variable across individuals than across time. By contrast, clients' satisfaction with their financial situation and their objectively measured financial status are more variable over time than across individuals. Additionally, there are other cases where the proportion of variance is split unequally within and between individuals (general life satisfaction, satisfaction with health and safety, and objectively measured health and housing situation). Finally, a relatively small, but significant, percentage of variance in quality of life across all domains—ranging from one percent to 21 percent—is contained at the program level of analysis. Taken together, these results provide support for our decision to use multilevel methods to model the variance at each level of analysis. In addition to variation over time, there is significant variance in the dependent variable between individuals and between programs. Treating the analysis at a single level would ignore this potentially meaningful variance.

Tables 2 and 3 summarize the results of the final full models of subjective and objective quality of life, respectively. The final multilevel models represent a common, saturated model for the purpose of comparing models across each unique domain and across the objective and subjective dimensions of quality of life. The final multilevel models reveal a pattern of explanatory differences among each QOL domain.

### *Case Management*

Overall, our results provide selective support for hypothesis H1. Case management is positively and significantly related to four QOL domains (general,

Table 2: Final HILM Model of Subjective QOL—Significant Effects, Baseline Quality of Life Estimates, and Change in Quality of Life Estimates (standard error in parentheses)

	Family Effect (SE)	Finances Effect (SE)	General Effect (SE)	Health Effect (SE)	Housing Effect (SE)	Leisure Effect (SE)	Safety Effect (SE)	Social Effect (SE)
<b>Time-varying effects on QOL</b>								
Clinical functioning	0.006*** (0.022)	—	0.008*** (0.002)	0.006*** (0.001)	—	0.011*** (0.002)	0.007*** (0.002)	0.005*** (0.004)
Case management	—	—	0.147** (0.056)	0.138*** (0.038)	0.089* (0.046)	0.093* (0.043)	—	0.089* (0.040)
<b>Overall baseline QOL</b>	4.681*** (0.086)	3.329*** (0.165)	4.555*** (0.183)	4.816*** (0.122)	4.560*** (0.109)	4.681*** (0.137)	5.025*** (0.147)	4.860*** (0.098)
<b>Programmatic effects: baseline QOL</b>								
STAR program	—	—	—	—	—	—	—	—
DTC program	—	—	—	—	—	—	—	—
<b>Individual effects on baseline QOL</b>								
Sociodemographic profile								
Age	—	-0.008** (0.003)	—	—	—	—	—	—
Male	0.347* (0.176)	—	—	—	—	—	—	—
Married	—	—	—	—	—	—	—	—
White	—	—	—	—	—	—	—	—
Socioeconomic profile								
Education	—	—	—	—	—	—	—	—
Employment	—	—	—	—	—	—	—	—
Financial resources	—	—	—	—	-0.075** (0.025)	—	-0.094*** (0.028)	—

continued

Table 2: Continued

	Family Effect (SE)	Finances Effect (SE)	General Effect (SE)	Health Effect (SE)	Housing Effect (SE)	Leisure Effect (SE)	Safety Effect (SE)	Social Effect (SE)
Psychiatric profile								
Institutional stay	—	0.237*	—	0.205**	—	0.226**	—	0.195*
Schizophrenia	—	(0.111)	—	(0.083)	—	(0.086)	—	(0.082)
<b>Overall change in QOL</b>	-0.008 (0.015)	0.609*** (0.077)	0.056 (0.045)	-0.008 (0.012)	0.047** (0.015)	0.075 (0.041)	-0.026 (0.031)	0.008 (0.012)
<b>Programmatic effects on change in QOL</b>								
STAR program	—	-0.222* (0.094)	—	—	—	—	—	—
DTC program	—	—	—	—	—	—	—	—
<b>Individual effects on change in QOL</b>								
<b>Sociodemographic profile</b>								
Age	—	0.004** (0.001)	—	—	—	—	—	—
Male	—	-0.223* (0.092)	—	—	—	—	—	—
Married	—	—	—	—	—	—	—	—
White	—	—	0.112* (0.051)	—	—	—	—	—
<b>Socioeconomic profile</b>								
Education	—	—	—	—	—	—	—	—
Employment	—	—	—	—	—	—	—	—
Financial resources	—	—	—	0.027** (0.010)	—	—	0.024* (0.011)	—
<b>Psychiatric profile</b>								
Institutional stay	—	—	—	—	—	—	—	—
Schizophrenia	—	—	—	—	—	—	—	—

\*\*\*  $p \leq .001$ ; \*\*  $p \leq .01$ ; \*  $p \leq .05$ .



Table 3: Final HLM Model of Objective QOL—Significant Effects, Baseline Quality of Life Estimates, and Change in Quality of Life Estimates (standard errors in parentheses)

	Family Effect (SE)	Finances Effect (SE)	Health Effect (SE)	Housing Effect (SE)	Leisure Effect (SE)	Safety Effect (SE)	Social Effect (SE)
<b>Time-varying effects on QOL</b>							
Clinical functioning	0.003* (0.001)	0.023*** (0.005)	—	—	0.023*** (0.005)	0.003* (0.001)	0.005*** (0.001)
Case management	—	—	—	-0.040* (0.018)	0.390*** (0.142)	—	0.138*** (0.036)
<b>Overall baseline QOL</b>	2.290*** (0.185)	3.906*** (0.145)	3.462*** (0.132)	3.961*** (0.030)	9.052*** (0.368)	2.830*** (0.040)	2.208*** (0.223)
<b>Programmatic effects: baseline QOL</b>							
STAR program	—	—	—	—	—	—	—
DTC program	—	—	—	-0.136** (0.044)	—	—	—
<b>Individual effects on baseline QOL</b>							
Sociodemographic profile							
Age	-0.013*** (0.002)	—	—	—	-0.039*** (0.006)	—	-0.005** (0.002)
Male	—	—	—	—	—	—	-0.370*** (0.108)
Married	0.242* (0.121)	—	—	0.064* (0.031)	—	—	—
White	—	—	-0.148* (0.066)	—	-0.741** (0.247)	—	—
Socioeconomic profile							
Education	0.045*** (0.010)	—	—	—	0.138*** (0.025)	—	0.033*** (0.007)
Employment	—	-0.478*** (0.146)	—	—	—	—	—

*continued*

Table 3: Continued

	Family Effect (SE)	Finances Effect (SE)	Health Effect (SE)	Housing Effect (SE)	Leisure Effect (SE)	Safety Effect (SE)	Social Effect (SE)
Financial resources	0.103*** (0.027)	0.173*** (0.040)	-0.045* (0.019)	—	0.380*** (0.072)	-0.037*** (0.009)	0.115*** (0.020)
Psychiatric profile	—	—	—	—	—	—	-0.0005* (0.00002)
Institutional stay	—	—	—	—	—	—	—
Schizophrenia	—	—	—	—	—	—	—
<b>Overall change in QOL</b>	-0.061*** (0.014)	0.489*** (0.086)	0.027 (0.032)	-0.001 (0.021)	-0.057 (0.044)	0.017*** (0.005)	-0.016 (0.012)
<b>Programmatic effects on change in QOL</b>	—	—	—	—	—	—	—
STAR program	—	—	—	—	—	—	—
DTC program	—	—	—	—	—	—	—
<b>Individual effects on change in QOL</b>	—	—	—	—	—	—	—
Sociodemographic profile	—	—	—	—	—	—	—
Age	—	0.004* (0.002)	—	—	—	—	—
Male	—	—	—	—	—	—	0.139** (0.055)
Married	—	—	—	—	—	—	—
White	—	—	—	—	0.258* (0.126)	—	—
Socioeconomic profile	—	—	—	—	—	—	—
Education	—	—	—	—	—	—	—
Employment	—	—	—	—	—	—	—
Financial resources	—	-0.059** (0.021)	—	—	—	0.013** (0.004)	-0.045*** (0.010)

continued

Table 3: Continued

	Family Effect (SE)	Finances Effect (SE)	Health Effect (SE)	Housing Effect (SE)	Leisure Effect (SE)	Safety Effect (SE)	Social Effect (SE)
Psychiatric profile							
Institutional stay	—	-.0005* (0.00002)	—	—	—	—	—
Schizophrenia	0.094* (0.039)	—	—	—	—	—	—

\*\*\* $p \leq .001$ ; \*\* $p \leq .01$ ; \* $p \leq .05$ .

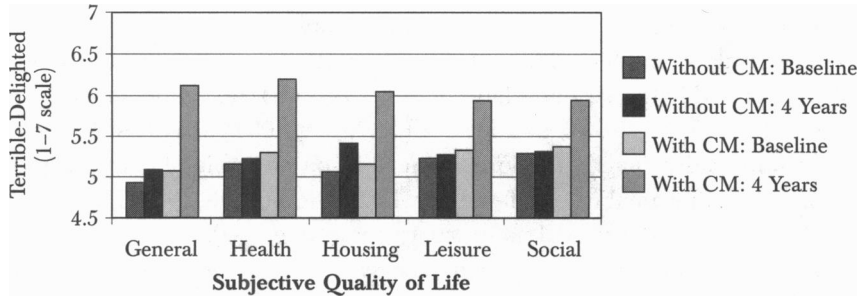
health, leisure, and social). Controlling for other psychiatric, demographic, and socioeconomic characteristics, we found that clients engaged in case management are both more actively involved in leisure activities (.390,  $p \leq .001$ ) and social relationships (.138,  $p \leq .001$ ), and they are more satisfied with this involvement (leisure, .093,  $p \leq .05$ ; social, .089,  $p \leq .05$ ) than are clients who are not receiving case management services. Both the subjective and objective dimensions of the social and leisure domains are affected positively by the provision of case management. Individuals receiving case management reflected higher satisfaction (subjective) with both their general well-being (.147,  $p \leq .01$ ) and with their receipt of health services (.138,  $p \leq .001$ ) and housing (.089,  $p \leq .05$ ). Although health and housing did not show improvement on the objective measures, it may be that the attention of the case managers to health and housing issues positively affects client satisfaction in these domains. Note, however, that the objective measure of housing quality actually declined ( $-.040$ ,  $p \leq .05$ ) for individuals receiving case management services. There was no statistically significant relationship between case management exposure and either dimension (objective or subjective) of quality of life for safety, finance, and family domains.

Figure 1 illustrates the magnitude of difference in predicted QOL at baseline and after four years of program enrollment for those exposed and those not exposed to case management services. This figure indicates that, all else being equal, case management exposure results in an increase in QOL over time for selected domains. Although the two groups—those exposed and those not exposed to case management—start out with similar baseline QOL values, these values diverge significantly over time.

### *Program Type*

With two exceptions, treatment program type was not significantly related to quality of life after controlling for all other covariates in the model. Taking into account the control variables, whether a client was in a STAR, DTC, or IPCC program, was a weak predictor of either baseline QOL status or improvement in quality of life over time. STAR programs appear to have a dampening effect on satisfaction with financial well-being over time ( $-.222$ ,  $p \leq .05$ ), and persons in DTC programs were in lower-quality housing at baseline ( $-.136$ ,  $p \leq .01$ ). This does not mean that treatment programs do not affect quality of life. It simply means that treatment program type is a fairly poor predictor of quality of life. Other aspects of treatment programs, aside from program type, could affect quality of life. Indeed, the final multilevel

Figure 1: Predicted Subjective Quality of Life at Baseline and at Program End by Case Management Exposure



*Note:* For graphical display purposes, only significant effects ( $p \leq .10$ ) of case management exposure on subjective quality of life domains are included. The subjective scales are measured using a common metric and allow comparability across domains. Holding all else constant, predicted quality of life is displayed at baseline and after four years of program enrollment for clients not receiving case management at any time during program enrollment and for clients receiving case management for the full four years of program enrollment.

models indicate that a significant amount of variance in quality of life between treatment settings remains to be explained.

### *Other Effects*

**Psychiatric Profile.** Clinical functional status as measured by the Global Assessment of Functioning (GAF) scale is significantly related to most domains of quality of life across both the objective and subjective dimensions. As functional status improves over time, so does quality of life. Controlling for all other variables in the model, a client's history of inpatient psychiatric stay in the year prior to program enrollment had no significant effect on quality of life. Being schizophrenic was significantly and positively related to baseline quality of life for the subjective finance, health, leisure, and social domains. Although satisfaction in these domains among schizophrenics was higher than among nonschizophrenics at baseline, the *objective* complements of these subjective domains were not significantly related to an individual's psychiatric diagnosis.

**Socioeconomic Profile.** At baseline, individuals with more formal education had better relations with family members ( $.045, p \leq .001$ ) and engaged in more leisure ( $.138, p \leq .001$ ) and social ( $.033, p \leq .001$ ) activities than did individuals with less formal education. Those employed at the time

of treatment program enrollment had less access to financial resources for purchasing needed items such as food and clothing ( $-.478, p \leq .001$ ). Perhaps individuals who are employed have reduced access to government-sponsored income-assistance programs that provide resources for items such as food and clothing. At baseline, individuals with more access to financial resources also exhibited better family relations (.103,  $p \leq .001$ ) and more engagement in social (.115,  $p \leq .001$ ) and leisure (.380,  $p \leq .001$ ) activities. However, these same individuals with more financial-resource availability experienced poorer baseline quality of life in the health (objective,  $-.045, p \leq .05$ ; subjective,  $-.075, p \leq .01$ ) and safety (objective,  $-.037, p \leq .001$ ; subjective,  $-.094, p \leq .001$ ) domains across both the subjective and objective dimensions.

*Demographic Profile.* At baseline, client age was significantly and negatively related to degree of family relations ( $-.013, p \leq .001$ ) and engagement in leisure ( $-.039, p \leq .001$ ) and social ( $-.005, p \leq .01$ ) activities, as well as satisfaction with financial situation ( $-.008, p \leq .01$ ). Males tended to engage in fewer social activities ( $-.370, p \leq .001$ ), although they generally felt better about their family relations than did females (.347,  $p \leq .05$ ). Married individuals tended to have better family relations (.242,  $p \leq .05$ ) and housing arrangements (.064,  $p \leq .05$ ) than did nonmarried clients. Whites tended to display poorer health status and access to health services resources ( $-.148, p \leq .05$ ), as well as less engagement in leisure activities ( $-.741, p \leq .01$ ) than did nonwhites.

*Time.* The passage of time itself was strongly and positively related to both the objectively measured (.489,  $p \leq .001$ ) and subjectively measured (.609,  $p \leq .001$ ) financial dimensions of quality of life. In general, a client's financial situation tended to improve over time. Clients tended to become more satisfied with their housing situation (.047,  $p \leq .01$ ) and to achieve more personal safety (.017,  $p \leq .001$ ) over time. However, their contact with family diminished over time ( $-.061, p \leq .001$ ).

## DISCUSSION

This study focused on the relationship of case management exposure and quality of life among a sample of 895 individuals with CPMI who are being deinstitutionalized into community settings. CPMI may diminish quality of life because of its tendency to exacerbate the sense of social isolation, economic hardship, and difficulty in accessing appropriate health and social

services. Case management was posited to improve quality of life in these areas by providing a mechanism to facilitate adjustment into the community setting, by dealing systematically with the problems of community living, and by assuring continuity of and appropriate access to care. Five key results emerged from our analysis.

First, the effects of case management exposure on quality of life can be demonstrated, but they are specific to particular dimensions of quality of life. Exposure to case management improved both subjectively and objectively measured quality of life in four domains (health, general, leisure, and social) and in one subjectively measured domain (housing). Viewed collectively, these domains may lend themselves to active intervention and coordination by the case manager. For example, improvement in the health domain may result directly from the efforts of the case manager to ensure that the client has access to appropriate health services and that coordination among providers is fairly seamless. With regard to the leisure and social domains, a case manager can enroll clients in or refer them to appropriate psychosocial or leisure programs and activities sponsored by the community or health providers and can easily monitor attendance, participation, or both, in such activities through contacts with providers. In other words, improvement in health, housing, social, and leisure domains of quality of life may be particularly well suited to the case managers' core functions of coordinating care or services, targeting appropriate services in the community setting, and monitoring the quality, consistency, or both, of these services or activities.

Second, our results suggest that several other QOL domains show little influence of case management exposure. In particular, no association between case management exposure and quality of life was found for either the objectively or subjectively measured family, finance, or safety domains. Although the absence of effects in these areas may be a function of inadequate training for case managers, poor funding of case management programs, and weak community infrastructure, fundamentally these domains may simply be less amenable to intervention and improvement by the case manager. It may be important for policymakers and clinical managers to explore other options to engage families (Dixon, Lyles, Scott, et al. 1999) or provide financial subsidies for clients suffering from severe and persistent mental illness.

Third, these findings are important insofar as they suggest that the effects of case management exposure on the quality domains of health, general, social, and leisure are not explained by disease severity or functional status. That is, the effects of case management on these quality domains occur

regardless of how functionally impaired the client is or what his or her diagnosis might be at baseline.

Fourth, aside from the general effects of case management services across QOL domains, our results revealed a strong association between functional status and most QOL domains. Consistently, lower-functioning individuals displayed significantly poorer quality of life. It is perhaps tempting to conclude that lower-functioning clients should not be placed in community settings or that they cannot acquire the psychosocial skills necessary to deal with issues of community living. However, it should be noted again that case management exposure appears to improve quality of life in a number of different domains, regardless of level of client functioning. Taken together, this means that, although we can expect that poorer-functioning clients will exhibit lower quality of life than their higher-functioning counterparts, these individuals will still benefit from exposure to case management in community settings. In practical terms, case management might be supplemented with additional programmatic efforts for these lower-functioning individuals. Such programs might include supported housing with 24-hour on-site supervision or psychosocial day programming.

Fifth, we failed to detect any consistent effects of program type on quality of life. Although program type served an important purpose in our analysis in controlling for the context in which case management is performed and because the level of case management exposure differed across program type, we noted no independent effects of program type. Program type may be a poor indicator of how services are actually provided to the severely mentally ill. For example, knowing that a unit was a transitional inpatient unit or a DTC may reveal little about the specific services individual clients are receiving within these programs or whether those services cohere in a therapeutically meaningful way. However, despite the absence of effects by program type, we should note that treatment setting (not program type) was a significant source of variation in quality of life in our HLM model. It is important, therefore, for future research to better identify the reasons for that variation.

The application of HLM in this study proved to be an appropriate analytic technique for examining the relationship between case management exposure and client quality of life. To the best of our knowledge, this technique has not been employed previously to examine the complex set of factors that contribute to quality of life at different levels of analysis. Judging from the results of this investigation, we conclude that HLM and other forms of multilevel modeling should assume a more prominent place in the analytic toolbox of investigators interested in client outcome studies.



Here, it is worth reflecting on our results in light of the Cochrane Collaboration report on case management (Marshall et al. 1999), particularly because our study found significant effects of case management while, by and large, the Cochrane Collaboration did not. Our study differs from those reviewed as part of the Cochrane Collaboration in two important ways: (1) it is an observational study (clients were not randomly selected to participate), and (2) our sample comprises an older population of clients with CPMI (representative of the CPMI in the VA system). We are interested in the real-life effects of case management on individual quality of life and how these effects might differ over time, between individuals and between treatment programs. We used multilevel methods that explicitly acknowledge that real-life groups' shared experiences cause dependence in observations in the same context (Kreft and De Leeuw 1998). The observational nature of our study complements the case management studies using RCT by allowing a larger sample ( $n = 895$ ), greater external validity, the examination of case management in a variety of treatment contexts ( $N = 14$ ), incorporation of a longer time frame (up to 4.5 years for some), and the use of appropriate methods to account for multilevel variation. However, while allowing the benefits just noted, this observational design limits our ability to control for the determinants of exposure to case management. Further study in this area is warranted.

Our study also has other potential limitations:

- Our ability to detect program-level effects was limited by the small number of treatment programs ( $N = 14$ ) available at that level of analysis. This limitation may partially explain why few program-level effects were detected in the study.
- The sample analyzed consists primarily of single, white males—attributes that are clearly typical of the U. S. veteran population experiencing CPMI but that are not necessarily reflective of the broader population suffering from this illness, or of groups who experience other types of chronic conditions. Further, the particular institutional environment of the VA health care system may exercise some unmeasured effect on our results that limits our ability to generalize our findings to other settings.
- Analyses that SMITREC conducted on the lost-to-follow-up group suggest that, while there are no significant differences on some key sociodemographic and psychiatric measures, several significant differences warrant consideration. SMITREC suggests a tendency for drop-outs to be less generally satisfied, nonwhite, and less likely to

be in STAR programs than those who do not drop out of treatment programs over time (see Note 2).

- Despite the strengths of our case management-exposure measure—its longitudinality, client-specific assessment, and control for program type—it is far from perfect. Specifically, we were unable to ascertain directly the type of case management provided, including case manager caseload, occupational orientation of the case manager, and whether case management focuses on service brokerage or therapy. To the extent that our control for program type does not reflect such differences, such omitted variables may explain much about the relationship between case management and client quality of life. Future studies should investigate individual elements of case management, such as resource brokerage, service linkage, and social skills training, to determine whether different elements of case management are more strongly related to client improvement than are others.
- Rather than modeling case management exposure, we are modeling quality of life as a function of case management exposure and other factors. We do control for several factors that often determine receipt of case management services, including psychiatric diagnosis, GAF, days of inpatient stay, and socioeconomic status. However, other unmeasured factors are likely to account for the degree of case management exposure, including staff availability, the “squeaky wheel” client, and adherence to and participation in the program. It is further possible that our dependent variable, QOL, is a determinant of case management exposure. We incorporate time-varying measures of case management and QOL to address this concern, although no specific lag has been introduced into the model. The fact that case management operates nonuniformly across QOL types suggests further that the causal direction may be that the provision of case management influences certain QOL domains.

Despite the aforementioned limitations, the findings from this investigation have shown measurable effects of case management exposure on several key domains of quality of life. It is important to note that our study suggests a stronger relationship between case management exposure and four quality-of-life domains (leisure, social, health, general) than have most previous studies, particularly experimental ones, in this area. Perhaps the U. S. VA health care system itself is unique. Our study includes an older U. S. veteran population, and it is unclear how much this group may respond more favorably to case management activities than the general CPMI population. Case managers may encourage veterans to engage in VA-sponsored leisure

and social activities and link clients into the VA health care system where the case managers are housed.

This study further suggests several policy-relevant alternatives, particularly in those areas for which case management exhibited no measurable effect. Generally, case management had measurable effects on all QOL domains except family, finance, housing, and safety. Perhaps the whole area of family therapy and family involvement in treatment should be considered, both for further study and for alternative treatment options. Without active family involvement, there may be little a case manager can do to improve the quality of family relations. Similarly, the areas of finance and housing require adequate resources in the community for paid or sheltered employment, Supplemental Security Income benefits, and supported housing. These areas require action at the policy level. The issue of safety may be related to housing and neighborhood issues. These interrelated areas—housing, finance, and safety—should be investigated more fully for the CPMI population.

## NOTES

1. The study was initiated prior to the release of DSM-IV diagnosis coding. NIMH (1991) has identified high utilizers of inpatient psychiatric care as those with serious mental illness and histories of intermittent or chronic stay.
2. Based on other SMITREC analyses, this lost-to-follow-up group does differ significantly from those remaining in the program. Patients lost to follow-up tend to be more likely to be less impaired in instrumental activities of daily living (IADLs) at baseline, less satisfied with life in general, nonwhite, and less likely to be in the inpatient STAR program but more likely to be in standard care. Furthermore, patients with incomplete data were also more likely to be mood disordered. There were no significant differences on the Brief Psychiatric Rating scale (BPRS), the Global Assessment of Functioning (GAF) scale, age, sex, or comorbid substance abuse.
3. Since *change* in quality of life is being assessed, at least two data points are necessary for this particular analysis.
4. SMITREC provided training in the use of the GAF, BPRS, ADL, and IADL scales. As part of the training, a video of a patient being interviewed by a psychiatrist was shown to a group of clinicians on a given unit. These clinicians rated the patient on the videotape across the four scales, and their ratings were compared against each other and to the psychiatrist's rating in the videotape. Beyond training, inter-rater reliability analyses were conducted over two time periods (January–June 1993 and December 1994–March 1995) across the following measures: GAF, BPRS, ADL, and IADL. Each site randomly selected patients for whom two clinicians filled out the rating scales independently. All four measures reflected acceptable inter-rater reliability within each assessment period. Client diagnoses obtained via the

survey were not tested for inter-rater reliability but were validated by comparing to diagnoses obtained from central VA databases; specifically, the PTF linked to admission data. If there were discrepancies, the site was contacted and diagnosis was reconciled.

5. It did not matter whether the client's reading level was low, because the evaluation coordinator conducted the QOLI in person and orally. The use of a terrible–delighted scale with visual prompts (sad to happy faces) does not require the ability to read.
6. There were too few responses to create scales for the school and job domains.
7. Percentage missing at the client level was as follows: financial resources (12.1 percent); education (11.3 percent); employment (10.1 percent); inpatient stay (7.5 percent); age, gender, marital status, and race (0.8 percent); and psychiatric diagnosis (0 percent).

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